D.Y. Patil College of Engg. & Tech., Kolhapur

Course Objective and Course outcome of all departments

Chemical Enginnering

Course Name	Course Objective	Course Outcome
Engineering Mathematics -III	1.To develop mathematical skills and enhance logical thinking power of students.	1Solve Linear Differential Equations with constant coefficients..
	2.To give knowledge to students statestics ,Linear differential equation ,Laplace transform,Probability with emphasis of solving engineering problems	2.Make use of linear Differential Equation to solve the Chemical Engineering problems.
	3.To prepare students to formulate mathematical model using engineering skills and interpret the solution in real world .	3.Solve basic problems in probability theory, including problems involving the binomial, Poisson, and normal distributions.
		4Find Laplace transforms of given functions.
		5Apply Laplace transforms to solve Linear Differential Equations..
		6.Describe the statistical data numerically by using Lines of regression and Curve fittings.
Chemistry -I	1. To impart the basic concepts of physical chemistry	Analyze the basic concepts of physical chemistry
	2. To give the basic knowledge of chemical reaction engineering using catalyst.	Describe the basic knowledge of chemical reaction engineering using catalyst.
	3. To study the different analytical chemistry.	Illustrate the different analytical chemistry.
	4. To study the concepts of organic chemistry.	Apply the concepts of organic chemistry.
	5. To develop awareness of industrially importance of organic reactions	Distinguish the awareness of industrially important organic reactions
	6. To understand mechanism of organic reactions in soaps and detergents	Differentiate the mechanism of organic reactions in soaps and detergents
	1. Define the relations between simple stress and strains.	1.Explain the relation between simple stress and strain to study the behaviours of material under loading.

SOM & MOC	2. Analyse two dimensional stress system and torsion in shaft	2. Analyze two dimensional stress system and behaviour of material under twisting moment and power transmitted by shaft.
	3. Classify thin cylinders, thick cylinders and spheres	3. Classify thin cylinders, thick cylinders and spheres and effect of fluid pressure on it.
	4. Explain the theories of failure.	4. Analyse behaviour of material under direct and bending stresses and calculate stresses developed in section due to eccentric loading
	5. Select right material of construction to avoid the material failure	5. Apply concept of material failure by the study of various theories.
	6. Estimates economics in material selections	6. Understand the economics in material selections and select correct material of construction for process equipment.
Fluid Mechanics	1.The students completing this course are expected to understand the importance of fluid mechanics and fluid moving machineries in the field of chemical Engg.	1.Understand the importance of unit conversion and the static fluid behaviour and pressure measurement devices in the field of chemical Engineering.
	2. They will be able to develop the logic to calculate the momentum balance with consideration of nature of fluids.	2.Able to understand the fluid behaviour and basic equations regarding fluid flow.
	3. They will be able to understand behaviour of fluids and their basic equations like Bernoulli's equation with and without friction.	3.To understand compressible and incompressible fluid behaviours and calculation of friction factor with consideration of all parameters like roughness, pipe fittings.
	4. They are expected to understand transportation, Ergun's equation and concept of fluidization and agitation of fluids.	4.To recognise the fluid behaviour changed due to immersed bodies and related friction and pressure drop of fluid due to it along with fluidisation concept.
	5. They are expected to aware about flow past immersed bodies.	5. To aware about measurement of fluid flow, fluid behaviour in case of fluidization and all affecting factors.
	6. They are expected understand metering of fluids.	6.To aware about measurement of power requirements for agitator, fluid behaviour in case of agitations of fluids

Mechanical Operations	1. To develop the fundamental/basics of solid phase	1. Learn fundamentals/basics such as characterization of particles, properties, storage, transporting solid particles and design equations
	2. To develop the knowledge of Size reduction of solid and screening of solids	2. Students will be able to understand the basics of size reduction, equipment details and calculation of energy requirement. Identify basics of screening, solid-solid separation equipment and calculating efficiency of screening equipment
	3. To study the mixing and blending of solid-liquid & solid-solid	3. Students will learn basics of mixing and blending and also learn the principles, working and construction of mixing equipments
	4. To study the filtration and sedimentation for solid-liquid separation	4. Students will be able to understand the details of filtration and sedimentation, design equations of filtration, also identify principles, working and construction of separation of solid- liquid
	5. To conceive the different solid-gas separation equipment	5. Identify industrial applications and principles, working and construction of separation of solid-gas
	6. To conceive the different liquid-solid and solid-solid separation equipment	6. Identify industrial applications and principles, working and construction of separation of solid-liquid and solid-solid
Soft Skills	1.To Understand Soft Skills Awareness	Understand Soft Skills Awareness
	2.To Summarize methods for effective learning, reviewing and leadership styles	Summarize methods for effective learning, reviewing and leadership styles
	3.To Apply team work skills	Apply team work skills
	4.To Apply knowledge to present effectively	Apply knowledge to present effectively
	5.To Apply skills to communicate effectively	Apply skills to communicate effectively
	6.To Analyze skills to develop personal self awareness	Analyze skills to develop personal self awareness
	1. To develop mathematical skills and enhance thinking power of students..	1.Apply knowledge of vector differentiation to find directional derivatives, curl and divergence of vector fields..

Engineering Mathematics -IV	2. To give the knowledge to the students of Vector Differential Calculus, 2 Partial Differential Equations, Numerical Differentiation, Fourier Series, with an emphasis on the application of solving engineering problems..	2.Form and solve partial differential equations
	3. To prepare students to formulate a mathematical model using engineering skills & interpret the solution in real world.	3.Find values of first, second and third derivative at a particular point
		4.Calculate numerical Integration.
		5.Develop Fourier series expansion of a function over the given interval.
		6.Make use of Partial Differential Equation to solve the Mechanical Engineering problems.
Chemistry -II	1. To impart the basic concepts of physical chemistry	1.Analyze the basic concepts of physical chemistry
	2. To give the basic knowledge of chemical reaction engineering using catalyst.	2. Describe the basic knowledge of chemical reaction engineering using catalyst.
	3. To study the different analytical chemistry.	3. Illustrate the different analytical chemistry.
	4. To study the concepts of organic chemistry.	4. Apply the concepts of organic chemistry.
	5. To develop awareness of industrially importance of organic reactions	5. Distinguish the awareness of industrially important organic reactions
	6. To understand mechanism of organic reactions in soaps and detergents	6. Differentiate the mechanism of organic reactions in soaps and detergents
Process Calculations	1. Apply the fundamental principles of units and conversions on different systems.	1. Students will be able to calculate composition of solid, liquid and gaseous mixtures
	2. Understand basic chemical calculations for solids, liquids and gases	2. Students will be able to do material balance on different unit operations.
	3. Evaluate material balance on different unit operations and unit processes	3. Students will be able to do material balance on different unit processes
	4. Evaluate energy balance on different unit processes.	4. Students will be able to evaluate enthalpy change for unit operations.
		5. Students will be able to evaluate enthalpy change for unit processes

		6. Students will be able to evaluate calorific values of fuels and combustion calculations
Heat Transfer	1. To Introduce basic fundamentals to students regarding Heat Transfer like Mechanism of heat flow with governing laws: Conduction, Convection, Radiation in Chemical Engineering	1. Students could understand basic knowledge of modes of heat transfer and various aspect of heat propagation.
	2. To aware students about Principles of heat flow in fluids as well to get familiar about design and use of heat exchange equipment with consideration of fouling factor.	2. Students could understand principal of heat flow.
	3. To avail knowledge aboutHeat transfer to fluids without phase change, individual as well overall heat transfer coefficients with consideration of heat losses and resistances and natural and forced convection along with effect of various parameters and dimensionless groups. Viz. Nusselt number, Greatz & Peclet numbers.	3. Students could understand how to calculate heat flux with respect to geometrical dimensions and various modes of heat transfer.
	4. To aware/Train students about Heat transfer to fluids with phase change boiling liquids along with critical heat flux and various types of boiling.	4. Students could understand heat transfer without and with phase change.
	5. To avail knowledge about various heat exchange equipments and to get aware about all parts of heat exchange equipments in design aspect.	5. Students could able to design heat exchange equipments with respect to process requirement as well process conditions in optimistic way.
	6. To aware about evaporation process and various types of evaporators and classification on basis of feeding.	6. Students could become aware about evaporation and would technically sound to design and operate evaporator.
Chemical Engineering Thermodynamics	1. Ability to apply fundamental of thermodynamics in engineering applications.	1. To understandthe fundamental of thermodynamics in engineering applications.
	2. Ability to apply first law of thermodynamics in chemical process operations.	2. To apply the first law of thermodynamics in chemical process operations.
	3. Ability to apply thermodynamic properties of substance in fluid state.	3. To understandthe thermodynamic properties of substance in fluid state.
	4. Ability to calculate efficiencies of various chemical engineering operations	4. To learn to calculate efficiencies of various chemical engineering operations.

	5. Ability to relate thermodynamic properties of different processes.	5. To learn relation of thermodynamic properties of different processes.
	6. Ability to calculate energy change in heat and work conversion devices.	6. To learn to calculate energy change in heat and work conversion devices.
Computer Practices	1.To understand basic concept of programming skills	Ability to understand basic concept of programming skills
	2.To understand control statements & loops	Ability to understand control statements & loops
	3. To understand & apply functions ,it's type & Recursive function	Ability to understand & apply functions ,it's type & Recursive function
	4.To understand & apply Arrays, it's type & multidimensional array	Ability to understand & apply Arrays, it's type & multidimensional array
	5.To create structure & it's application	Ability to create structure & it's application
	6.To understand & apply classes & objects & it's type	Ability to understand & apply classes & objects & it's type
Fluid Moving Machinary	1. To study the construction and working of centrifugal pump.	1. Students will be able explain the construction and working of centrifugal pump.
	2. To study the basics theories of Centrifugal Pump.	2. Students will be able to understand the basics of centrifugal pump such as mini. Speed, specific speed, NPSH etc., calculation of horse power, characteristics etc.
	3. To study the basics of positive displacement pump	3. Students will be able to understand the classification of positive displacement pump, equation to calculate work done , efficiency etc.
	4. To study the different types of positive displacement pump.	4. Students will be able to understand the construction and working of different types of positive displacement pump.
	5. To develop the knowledge of selection of pumps in industry.	5. Course will develop the knowledge of selecting the pumps for industry and other application
	6. To study the basics of fans, blowers and compressors	6. Students will be able to understand & explain the construction, working & equations to calculate power required, work done & efficiency of fans, blowers & compressors.

Environmental studies	1. The main objective is to make the students aware of Environmental consequences, present situation what the society is facing.	1 Explain basic concepts of environment and environmental education with the need of public awareness
	2. To inculcate in students the importance of natural resources, it's conservation and further how to achieve Sustainable Development	2 The importance of judicial use and conservation of natural resources and will understand the problem of environmental degradation and how to achieve sustainable goals.
	3. To make understand the students importance of different ecosystems, their interaction and importance of food chain-food web	3 Explain the components of Ecosystem and recognize the need of conservation of biodiversity
	4. To motivate the students to think positively and step for conservation of nature, biodiversity by which we all are blessed through Western Ghats and Eastern Himalayas	4 Illustrate the severity and bad effect of pollutions and make people aware about laws
	5. Understand the severity and ill effects of different types of pollutions on Environment	5 Collect data from site visit and represent it in the form of project work copy with poster or model
	6. To develop lateral thinking through data collection, regarding news papers, referring international journal papers mostly focusing on social issues such as Global warming, water conservation, consumerism and waste products, waste land reclamation	
	7. Understand the subject holistically by undertaking a case study	
Process	1.To learn classification, parts and charactertics of instruments.	To impart ability to classify and identify parts of instruments with its charactertics. Also impart ability to measure pressure by using various instruments.
	2.To learn and understand types and basic principle behind pressure, temperature, flow and level measurement.	To impart ability to measure temperature and flow by using various instruments.
	3.To learn and understand classifications of instrumental methods of analysis.	To impart ability to measure level by using various instruments and realizes importance of data analysis.

Instrumentation and Instrumental Methods of Analysis	4.To learn and understand analytical techniques like nephhelometry,turbiditymetry, spectrophotometry, flame photometry, refractometry, conductometry etc.	To understand conceptual understanding of instrumental methods of analysis with its classification. Also to analyze the chemical industrial samples by using techniques like spectrophotometry & Colorimetry.
	5.To learn and understand analysis technique like chromatography, its types like gas chromatography, HPLCand its applications.	To analyze the chemical industrial samples by using techniques likenephhelometry, turbiditymetry, refractometry, conductometry etc.
		To analyze the chemical industrial samples by using techniques like flame photometry,chromatography, gas chromatography, HPLC.
Computational Techniques in Chemical Engg.	1.To Understand, motivation for Computational Technique and do error analysis .	Ability to Understand, motivation for Computational Technique and do error analysis.
	2.To Understand and solve linear system of equations .	Ability to Understand and solve linear system of equations.
	3.To analyze and solve algebraic system of equations.	Ability to analyze and solve algebraic system of equations.
	4.To apply numerical technique for regression and curve fitting.	Ability to apply numerical technique for regression and curve fitting.
	5.To analyze differntions and integration and solve by numerical technique.	Ability to analyze differention and integration and solve by numerical technique.
	5.To analyze and solve differential equations by different numerical methods.	Ability to analyze and solve differential equations by different numerical methods.
Mass Transfer-I	1.To understand classification of mass transfer operations, molecular diffusion in fluids and solids.	1. After completion of this course, student will be able to determine diffusivity, flux in fluids and solids,
	2.To understand fundamentals of mass transfer coefficient, theories of mass transfer, Interphase mass transfer concepts, designing of stages in it.	2. After completion of this course, student will be able to understand mass transfer coefficient, inter phase mass transfer concepts, designing of stages in it.
	3. To study gas and liquid dispersed equipments for gas-liquid operations.	3. Student can able to understand & select gas and liquid dispersed equipments for gas-liquid operations .Ability to choice appropriate separation techniques for industrials applications
	4. To understand fundamentals of gas absorption with design of tray and packed tower absorber.	4. Ability to understand fundamentals of gas absorption with design of tray and packed tower absorber.

	5. To understand fundamentals of adsorption, ion exchange, material balance and break through curve of adsorption.	5. Ability to understand fundamentals of adsorption, ion exchange, material balance and break through curve of adsorption.
	6. To study theory of simultaneous mass transfer and chemical reaction	6. Ability to analyze & select mass transfer with Chemical reaction & its kinetic Regimes
Chemical Engg. Thermodynamics-II	1.To understand the various fundamentals concepts of Solution thermodynamics.	1. Students able to estimates and analyze vapour liquid equilibrium data
	2.To understand various derived thermodynamic properties	2. Students able to understand various derived thermodynamic properties
	3. To analyze thermodynamic properties of substances in gas and liquid states.	3. Students able to relate different thermodynamic properties of gases and liquid
	4. To evaluate and analyze the thermodynamic data of chemical processes	4. Students able to apply the knowledge of properties and principles in Chemical Process calculations
	5 .To apply the thermodynamics principles in process and product development	5. Students able to calculate analyze phase equilibrium and reaction equilibrium data
	6. To apply the knowledge of properties and principles in process calculations	6. Students able to communicate about thermodynamic principles and properties.
Chemical Equipment Design-I	1.TO understand different design preliminaries	Students will be able to understand various design preliminaries
	2.To understand different stresses acting on pressure vessel	Students will be able to understand design of various parts of Pressure Vessel.
	3.To understand design procedure of different equipments	Students will be able to understand various design preliminaries
	4.To understand testing methods used for process equipments	Students will be able to design Heat Exchanger and Evaporator.
		Students will be able to design Reactor systems and agitator system.
		Students will be able to understand different safety majors.
	1. To develop ability to define and design the problem.	1. Students understand how to define and design problem.
	2. To lead to accomplishment with proper planning's.	2. Students learnt how to do proper planning of projects work.

Mini Project	3. To learn the behavioral science by working in a group.	3. Students understand how would be behavior in working in group.
	4. To develop students abilities to transmit technical information clearly.	4. Students learnt to transmit technical information effectively.
	5. To understand the importance of document design by compiling technical report on mini projects.	5. Students learnt to design documents in technical reports.
		6
Industrial Economics Management and Entrepreneurship	1.To understand economic aspects in chemical industry.	Students will be able to understand different aspects of economics like demand, supply, cost curves and national income.
	2.To understand and introduce general common terms related to economics, management and entrepreneurship.	Students will be able tounderstand importance of industrialisation, problems of SSI, government incentives for SSI and causes and effects of inflation with measures to control inflation.
	3.To make students to develop skills required for entrepreneurship development and leadership.	Students will be able tounderstand requiredqualities, importance and various incentives available to become entrepreneurs.
	4.To make students aware of different managerial techniques in the area of marketing, finance, production and material management	Students will be able tounderstand importance of principles of management like planning, organizing , directing controlling etc.
		Students will be able to understand and apply different managerial skills in areas of production, finance and material management.
		Students will be able tounderstand and apply different managerial skills in areas of marketing management.
Plant Utility and Pollution Control	1. To study steam generators and types, boiler mountings and accessories.	1. Understand impurities water, treatment of boiler feed water, water softening methods.
	2. To study important features of boiler act and boiler calculations.	2. Understand types of steam generators, boiler mountings and accessories, boiler act and boiler calculations.
	3. To develop understanding of air, water, steam insulation and compressor as utility.	3. Understand insulations, compressor air and refrigeration system as utility.

Pollution Control	4. To study waste characterization, generation, and composite analysis.	4. Apply the waste characterization, generation and composite analysis.
	5. To study new water, air, solid pollution control technologies.	5. Apply new water, air and solid pollution control technologies in chemical industry.
	6.To design better product and process to mitigate the problem of utilities and pollution in chemical industry.	6. Develop better product and process to mitigate the problem of pollution in chemical industry.
Mass Transfer-II	1. To study & determine basic knowledge of distillation by understanding types, design & applications of it.	1. The graduates are expected to have ability to apply knowledge to apply knowledge of distillation to able to design equipments.
	2. At the end of course student should understands calculation, types, material balance in extraction.	2. Students can able and to understand material balance, calculation in extraction.
	3. To study basic principle, calculation & methods of leaching to apply in industries.	3. The graduates are expected to have ability to apply knowledge & calculation of leaching in industries.
	4. Students should be able to apply basic knowledge of humidification cooling tower in industries.	4. Students can able to apply knowledge of humidification, cooling tower with its calculation.
	5. The students completing this course are expected to understand theory, calculation of industrial dryer	5. The graduates are expected to have ability to apply knowledge of dryer, its calculation in industries.
	6. At the end of course students should understand concepts, types, calculation of crystallization.	6. The graduates are expected to have ability to apply knowledge of types, calculation of crystallization in industries.
Process Dynamics & Control	1. To understand the basic principles & importance of process control in industrial process plants.	1. Students should remember Laplace transform and understand basic principles and objectives of process control.
	2. To develop mathematical models of chemical processes by writing unsteady state mass and energy balances.	2. To understand basic fundamentals of first and second order process dynamics and its behaviour.
	3. To understand the working of various control system devices, controller, valves and it designs.	3. Able to know about applying fundamental knowledge to design controllers and the control system.
	4. To understand stability characteristics of various control systems.	4. To evaluate different parameters affecting on the overall transfer function and response of process control system.
		5. To understand stability characteristics and frequency response for design of process control systems.

		6. Develop the practical skill, team work and ethical thinking to choose right career in industry or higher studies.
Chemical Reaction Engg.- I	1.Apply the fundamental principles of chemical reaction kinetics and thermodynamics to problems involving chemical reaction.	1. Students will be able to describe the algorithm that allows the student to solve chemical reaction engineering problems.
	2. Analyze experimental kinetic data to determine rate laws for homogeneous reactions	2. Students will be able to determine the reaction order and specific reaction rate from experimental data.
	3. Design different types of chemical reactors (Batch, Tube, CSTR).	3. Students will be able to determine rate of reaction for different systems
	4. Develop skills to choose the right reactor among single, multiple, recycle reactor, etc. schemes.	4. Students will be able to choose and design suitable reactor type for single reaction
		5. Students will be able to optimize reactor systems for multiple reaction systems
		6. Students will be able to design reactor systems for multiple reactions.
Process Simulation Lab.	1.Implement basic engineering knowledge to solve problems.	To introduce basic concepts of computer applications to solve chemical engineering problems.
	2.Understand, plan and execute a chemical Processes Problems and write algorithm for the process problems.	To make use of computer oriented methods for solving problems and To write algorithm for the process problems.
	3.Prepare a computer based technical report using programming.	To develop computer programming skills for solving problems related to fluid mechanics, heat transfer, mass transfer and reaction engineering.
	4.Use commercial simulation tools like MATLAB,ASPEN PLUS to solve chemical engineering problems	Ability to convert problem solving strategies to procedural algorithms and to write program structures
Industrial Practices & Case Studies	1. To expose students to opportunities for self-employment in the chemical sector after graduation	1.Students are exposed to opportunities for self-employment in the chemical sector after graduation
	2. To expose students to various organizations in the chemical industry chain from production, research, to processing and consumption.	2. Students are exposed to various organizations in the chemical industry chain from production, research, to processing and consumption.

	3. To Introduce students to organization of chemical industry and allied organisations	3. Students are expected to get introduced to organization of chemical industry and allied organisations
Chemical Reaction Engg.-II	1.The course focuses on non-ideal flow and finding of conversion in actual reactors from experiment and different models.	1. At the end of the course, student will be able to apply knowledge of non-ideal flow and will find conversion in actual reactors from experiment and different models.
	2. The course focuses on mixing of fluids, macro fluid concept and applications of CFD.	2. At the end of course, student should be able to express basic concepts of mixing of fluids, macro fluid and applications of CFD.
	3. The course develops understanding of heterogeneous solid catalyst, different industrial terms related to solid catalyst & finding different characteristics of solid catalysts.	3. At the end of course, student should be able to express working of catalyst & understand industrial terms related to solid catalyst & find different characteristics of solid catalysts.
	4. The course develops understanding & designing of fluid particle reactions with different models for it.	4. Explain underline principles, understanding & designing of fluid particle reactions with different models for it.
	5. The course describes understanding & designing of fluid- fluid reaction and application of fluid-fluid reactions rate equation to equipment design.	5. At the end of course, student should be able to understand fluid-fluid reaction, its design and applications of fluid-fluid reactions rate equation to equipment design.
	6. The course covers concepts, parameters, mechanism & applications of catalyst and deactivating catalyst & also described recent trends in reaction engineering like scale up in reactor design.	6. Explain underline basic concepts, important parameters, mechanism & applications of the catalysis and deactivating catalyst & also described recent trends in reaction engineering.
Chemical Process & Synthesis	To learn chemical processes and role of chemical engineer in chemical field.	To impart ability to implement knowledge of chemical processes and role of chemical engineer in chemical field and manufacturing processes for industrial gases.
	To learn manufacturing processes for industrial gases, fuel gases.	To impart ability to implement knowledge of ceramic and glass industries, fuel gases.
	To learn manufacturing processes of nitrogen, sulphuric acid, chloro alkali, phosphorous, potassium and Hydrochloric industries.	To impart ability to implement knowledge of chloro alkali and electrolytic industries.

Synthesis	To learn manufacturing processes for sugar, fermentation and agri industry.	To impart ability to implement knowledge of manufacturing of phosphorous and hydrochloric acid industries.
	To learn manufacturing processes for ceramic and glass industries.	To impart ability to implement knowledge of nitrogen and potassium industries.
	6	To impart ability to implement knowledge of sulphuric acid, sugar, fermentation and agrochemical industry.
Chemical Process Design	1.Students should understand different parameters used for design of process equipment.	Students will be able to understand various design preliminaries.
	2.Students should understand different parts of process equipment & design of these parts.	Students will be able to understand design of various parts of pressure vessel.
	3.Students should understand different testing methods & safety majors for process equipments.	Students will be able to design storage vessel & tall vessel.
		Students will be able to design heat exchanger & evaporator.
		Students will be able to design reactor system & agitator system.
		Students will be able to understand different safety measures.
Modeling &Simulation in Chemical	1. This course explores the basic concepts of modeling and fundamental equations for systems in chemical process industries	1. Student should be able to know the basics of modeling and physical and chemical laws for the given system
	2. To study the basic equations required for modeling the	2. Student should be able to develop model equations for the
	3. The basic objective is to develop system and to visualize the effect of various Processes inputs on system performance and state variables	3. Students will be able to develop mathematical model of system and see the effect of process inputs on system
	4. The basic objective is to develop the model equation for mass	4. Student will learn to develop model equations for the mass
	5. The basic objective is to develop the model equation for plug flow reactor and to differentiate between lumped and distributed system with example	5. Student should be able to develop model equations for the plug flow reactor and will understand the difference between lumped and distributed system with example
	6. To develop the basics of simulation software used in chemical	6. Students will be able to operate simulation software used in
	1. The students completing this course are expected to understand what is crude oil, petroleum resources & scenario of petroleum refineries in India as well across the world.	1. Students get aware about basic information about crude, resources and overall scenario of refineries in India as well across the world.

Petroleum Refinery Engineering	2. Students must aware about origin of petroleum, exploration techniques and drilling techniques in details.	2. Students get aware about origin, exploration techniques, Drilling Rigs and Drilling techniques in detailed manner.
	3.Students are expected to get aware about composition, classification, distillation & separation techniques including pre-treatment.	3. Students understood composition, Classification of crude oil and able to understand various distillation processes & separation methods.
	4. Student must know properties & specification of petroleum products and overall separation processes.	4. Students became able to understand properties and specification of petroleum products and Overall separation processes.
	5. Students are expected to get familiar with various conversion processes, Treatment methods and post production operations of Petroleum refineries.	5. Students are able to understand various steps in conversion processes, treatments and post operations in refinery.
	6. Students must know recent trends, advancement in Petroleum refineries.	6. Students are quite aware about recent trends, capacities of petroleum refineries.
Seminar	1.To make students able to select a topic for seminar in Chemical Engineering by doing proper literature survey.	Ability to select a topic for seminar in Chemical Engineering by doing proper literature survey.
	2.To develop student's abilities to analyze and transmit technical information clearly in the form of one review report (seminar) on selected topics in Chemical Engineering.	Ability to analyze and transmit technical information clearly in the form of one review report (seminar) on selected topics in Chemical Engineering.
	3.To make students to develop Presentation Skills by presenting seminar in front of panel members.	Ability todevelop Presentation Skills by presenting seminar in front of panel members.
Comprehensive tests On all subjects from S.E to B.E-I	1. To study the basic concepts of all Chemical Engineering subjects to solve Chemical Engineering problem.	1. Use basic concepts of all Chemical Engineering subjects to solve Chemical Engineering problem.
	2. To revise the knowledge of Chemical Engineering to appear for entrance examinations confidently.	2. Apply the knowledge of Chemical Engineering to appear for entrance examinations confidently.
	3. To inculcate knowledge of Chemical Engineering to perform batter in placement drives.	3. Use the basic knowledge of Chemical Engineering to perform batter in placement drives.

Industrial Training	1. To Expose students to get aware about Project Management and finance in industries	1. Students are aware about Project Management and finance in industries
	2. To aware students about an importance of team spirit and team work.	2. Students are familiar about an importance of team spirit and team work.
	3. To understand the necessity of sustainable development and eco friendly process design.	3. Students are able to understand the necessity of sustainable development and eco friendly process design.
Project Work	1.To make students able to define and design the problem and lead to its accomplishment with proper planning.	Ability to define and design the problem and lead to its accomplishment with proper planning.
	2.To make students to develop ability to plan properly and execute the project in an multidisciplinary environment.	Ability to plan properly and execute the mini project in an multidisciplinary environment.
	3.To provide students ability to implement basic engineering knowledge.	Ability to Implement basic engineering knowledge.
	4.To provide students ability to Learn the behavioural science by working in a group.	Ability to Learn the behavioural science by working in a group.
	5.To develop student's abilities to analyze and transmit technical information clearly and test the same by presentation based on the Project.	Ability to analyze technical information and transmit it by delivering technical seminar based on the Project work carried out.
	6.To make students understand the importance of document design by compiling Technical Report on the Project work carried out.	Ability to create a technical report based on the project.
Chemical Process &	1.To learn manufacturing processes for food and pharmaceutical industries.	Students will be able to understand and develop manufacturing processes for food and explosive industries.
	2.To learn manufacturing processes of paper, plastic and explosive industries.	Students will be able to understand and develop manufacturing processes of paper& plastic industries.
	3To learn principles of Green chemistry and engineering.	Students will be able to understand and develop manufacturing processes for pharmaceuticals industries.

Green Technology	4.To learn pragmatic Green chemistry challenges.	Students will be able to understand and apply the principles of green chemistry and technology.
	5.To modify process and products to make them green, safe and economical acceptable.	Students will be able to understand the various ecological treats and various green chemistry challenges.
		Students will be able to understand the various green fuel technologies.
Transport Phenomena	1. To be able to analyze various transport processes with understanding of solution approximation methods and their limitations.	1. Students should relate the similarity between momentum, heat and mass transport and their analogy.
	2. To be able to understand the chemical and physical transport processes and their mechanism.	2. To develop the ability to formulate and solve mathematical problems for momentum transport.
	3. Ability to do heat, mass and momentum transfer analysis.	3. Able to know about applying fundamental knowledge to solve momentum and heat transport problems.
	4. To be able to analyze various transport processes with understanding of solution approximation methods and their limitations.	4. To evaluate different parameters affecting on the mathematical formulation of heat transfer problem and it numerical solution.
		5. To analyze the mass transfer problem, its mathematical formulation and computational fliud dynamics.
		6. Develop the practical skill, team work and ethical thinking to choose right career in industry or higher studies.
nomics and Project En	1. The students completing this course are expected to	1.The graduates are expected to have ability to apply knowledge
	2.The students completing this course are expected to	2. Students can able and to understand concept of cost
	3. The students are to learn types of interest, taxes, insurances,	3. The graduates are expected to have ability to apply knowledge
	4. The students completing this course are expected to	4. Students can able to apply knowledge of process development
	5. The students completing this course are expected to	5. The graduates are expected to have ability to apply knowledge
	6. At the end of course students should understand concepts	6. The graduates are expected to have ability to apply knowledge
	1. To provide students a thorough understanding of ability to define petrochemicals, explain about history, present scenario and economics importance of petrochemical industries.	1. Ability to define petrochemicals, sources of petrochemicals, explain about history and present scenario.

Petrochemical Technology	2. To provide students a thorough understanding of chemical processes used in petrochemical technology and its applications.	2. To explain development of petrochemical technology, industries in India and their economic importance.
	3. To make students able to understand new trends in petrochemical industries.	3. Apply knowledge of chemical process to manufacture different types of petrochemicals.
		4. Ability to classify different petrochemicals with their specific applications.
		5. Ability to summarize the present energy crisis and non renewable petroleum resources used in petrochemical technology.
		6. Develop knowledge about future needs of petrochemical technology and industries.
Distillation	To understand basic principles of vapour liquid equilibrium.	Ability to understand basic principles of vapour liquid equilibrium.
	To understand principles of differential and steam distillation.	Ability to understand principles of differential and steam distillation.
	To study methods of design of distillation column.	Students will able to design of distillation column.
	To study important features of multi component distillation.	Will make use of multi component distillation technique for separation of mixture of chemicals.
	To make students familiar with types of azeotrop separation techniques.	Apply azeotrop separation techniques for separation azeotrop in Chemical Process Industry.
	To develop understanding of importance of distillation operation in chemical process industry.	Ability to develop better product and process to mitigate the problem of distillation unit in Chemical Industry.
Energy Conservation	1. To study the importance of energy and Indian energy scenario.	1. Students will come to know the importance of energy in production & employment & What is energy scenario in India?
	2. To study the energy available for industrial use and role of energy conservation.	2. Students will be able to understand how to forecast industrial energy supply, demand, price & availability? and What is role of energy conservation in industry?
	3. To study in detail energy management and policy.	3. Course will develop the knowledge of doing energy conservation.

Energy Conservation And Recovery	4. To know basic principles of energy conservation, equipments used for heat recover & energy audit.	4. Students will be able to explain basic principles, equations of calculating waste heat, selection of equipments for heat recover & how to conduct energy audit.
	5. To study the energy conservation in utilities.	5. Students will be able to calculate the energy recovery or conservation in utility section of industry.
	6. To know the effect of climate change in India, how to do the energy conservation in sugar industry? & energy conservation act 2001.	6. Students will be able to understand the effect of climate change on energy in India, saving of energy in sugar industry and energy conservation act 2001.
Advanced separation processes	1. To Introduce basic fundamentals to students regarding Reverse osmosis process and its importance in Chemical engineering.	1. Students are able to understand basic knowledge of heat transfer and various aspect of Reverse osmosis process
	2. To aware students about Ultra filtration process by using membrane and its industrial applications in the field of Chemical Engineering.	2. Students are able to understand Ultra filtration process by using various membranes.
	3. To aware students about concept of Micro filtration and its use in treating waste water as well potable water purification.	3. Students are able to understand Micro filtration and its use with respect to process requirement as well process conditions in optimistic way.
	4. To avail fundamental knowledge to students about Pressure swing adsorption and its applications for separation of various mixtures.	4. Students are able to become technically sound aboutPressure swing adsorption and its applications for separation of various mixtures.
	5. To expose students about basic knowledge of Electrostatic precipitator and its industrial applications.	5. Students are able to get exposed for Electrostatic precipitator and its industrial applications.
	6. To aware students about supported liquid membrane and supercritical fluid extraction processes and their merits and demerits in fields of Chemical Engineering.	6. Students are able to understand about supported liquid membrane and supercritical fluid extraction processes and their merits and demerits.
	1.To make students able to define and design the problem and lead to its accomplishment with proper planning.	Ability to define and design the problem and lead to its accomplishment with proper planning.
	2.To make students to develop ability to plan properly and execute the project in an multidisciplinary environment.	Ability to plan properly and execute the mini project in an multidisciplinary environment.

Project Work	3.To provide students ability to implement basic engineering knowledge.	Ability to Implement basic engineering knowledge.
	4.To provide students ability to Learn the behavioural science by working in a group.	Ability to Learn the behavioural science by working in a group.
	5.To develop student's abilities to analyze and transmit technical information clearly and test the same by presentation based on the Project.	Ability to analyze technical information and transmit it by delivering technical seminar based on the Project work carried out.
	6.To make students understand the importance of document design by compiling Technical Report on the Project work carried out.	Ability to create a technical report based on the project.
Civil Engineering		
Course Name	**Course Objective**	**Course Outcome**
EM-III	1.To develop mathematical skills and enhance thinking power of	1) Solve Linear Differential Equations with Constant Coefficients
	2.To give the knowledge to the students of statistics, linear	2) Apply Vector differentiation to find Divergence, Curl and
	3.To prepare students to formulate a mathematical model using	3) Describe the statistical data numerically by using Regression
		4)Solve basic problems of Probability theory using Binomial,
		5)Discuss Laplace transforms of given functions and Use Laplace
		6)Calculate numerical Integration using Trapezoidal, Simpson's
Surveying -I	1. To obtain a full understanding of the methods of	After completing of this course, student will be able to:
	2. To know the basics of levelling and theodolite survey in	1. Determine linear and angular measurements.
	3. To find out area and volumes using various instruments.	2. Record various measurements in the field book.
	4. To study the significance of plane table surveying in plan	3. Find areas of irregular figures.
	5. To be able to use minor instruments with efficiency.	4. Prepare plans and sections required for civil engineering
	6. To understand the importance of surveying in the field of civil	
Strength of Material	1. To develop an understanding of the basic principles of	1. Evaluate the response of elastic body for external actions and
	2. Study the internal effects and deformations caused by the	2. Evaluate shear force and bending moment of statically
	3. Understand the analysis and design aspects of structural	3. Analyze the stress, strain and deformation of elastic bodies
		4. Analyze the stress, strain and deformation of elastic bodies

Fluid Mechanics-I	1. To study processes and science of fluid and their properties.	After successful completion of this course, student will be able
	2. To study pressure measuring devices and pressure diagram.	1. Study the basic properties of fluids and their behavior under
	3. To apply basic principles in fluid flow problems.	2. Discuss the basic concepts and principles in fluid statics, fluid
	4. To identify the losses in pipes.	3. Recognize the principles of continuity, momentum and energy
		4. Apply the equations to analyze problems by making proper
Building Constructions & Materials	1. To understand the properties and suitability of building	1. Describe properties and suitability of various building
	2. To understand the different building components.	2. State the different building components.
	3. To understand the masonry work by using stones, bricks,	3. Demonstrate different bonds in brick & stone masonary.
	4. To understand the various types of doors, windows & types of	4. Explain different types of roof coverings & flooring
	5. To understand different types of roofs and floors.	
Numerical Methods	1. To introduce the concept of Numerical differentiation.	After completion of this course students will be able to:
	2. To introduce Numerical methods for evaluating definite	1. Identify, classify and choose the most appropriate numerical
	3. To learn fitting of straight lines and parabola.	2. Illustrate basic theory of correlation and regression.
	4. To introduce the concept of Linear Programming Problem.	3. Form and solve Linear Programming Problem.
	5. To understand methods of solution of partial differential	4. Use methods of solutions to solve classical problems.
	6. To solve problems in civil engineering.	5. Deploy skills effectively in the solution of problems in civil
Structural Mechanics	1. Introduction to structural systems and to methods of analyzing	1. Identify the response of elastic body for external actions.
	2. To understand behavior of structure.	2. Distinguish engineering properties of the materials are
	3. To analyze the structure subjected to moving loads.	3. Compute the design forces in the structures.
		4. Analyze the stress, strain and deformation of elastic bodies
Surveying -II	1. To understand tacheometric surveying in distance and height	After successful completion of this course students will be able
	2. To get introduced to different geodetic methods of survey such	1. Adopt the principles of advanced surveying instruments.
	3. To get introduced to modern advanced surveying techniques	2. Formulate triangulation stations, Flight planning and Ground
	4. To understand the elements of different types of curves and	3. Apply GIS and GPS concepts to civil engineering problems.
		4. Design and setout curves by different methods.
Concrete Technology	1. to understand physical properties of ingredients of concrete	1. Explain properties of ingredients of concrete and their effects
	2. To understand the process of manufacturing and to study	2. Explain the fundamental of process of making good quality
	3. to study the concept of strength of concrete and factors	3 Explain the concept of strength of concrete and factors
	4. To study concrete mix design by using IS code method and ACI	4. To study concrete mix design by using IS code method and ACI

	5. To understand the use of various admixtures in concrete	5. Understand the use of various admixtures as per the
	6. To understand special type of concretes and importance of	6. Understand different types of concrete and importance of
Fluid Mechanics -II	1. To study uniform and non-uniform flow in open channel.	After successful completion of this course, student will be able
	2. To apply basic principles in fluid flow problems.	1. Provide students with basic knowledge of fluid properties and
	3. To study velocity and discharge measurement devices.	2. Develop the principle and equation for pressure flow and
	4. To study impact of jet, Pumps and turbines.	3. Provide the students with the analytical knowledge of pressure
		4. Illustrate and develop the equations and design principles for
Building Desgin & Drawing	1. To understand Principles of Building planning and building	After completion of this course students will be able to:
	2. To understand planning of residential buildings with procedure.	1. Know principles of building planning.
	3. To understand Low cost housing and Maintenance, Repairs,	2. Describe Building Bye-Laws and regulations.
	4. To understand various systems such as plumbing,	3. Plan and draw residential building considering principle of
	5. To understand various building finishes.	4. Explain techniques of maintenance, repair and rehabilitation of
		5. Draw the working drawing of foundation detail, plumbing and
		6. Illustrate the concept of ventilation, air conditioning and
		7. Describe different types of building finishes.
Computer Aided Drawing	1.Use Auto-CAD for Civil engineering works	1. Describe Auto-Cad commands.
		2. Draw 2D Auto-CAD drawing of residential building.
		3. Draw municipal and working drawing.
Water Resourse Engg.-I	1.To import the basic knowledge of importance of hydrology and	To understand basic process in hydrology and their importance in
	2.To know various hydrometrological parameters and their	Apply the knowledge of estimation of hydrometrological
	3.To create awareness about floods, their estimation using	To apply knowledge of hydrograph theory and to solve and
	4. To understand importance of irrigation in indian agricultural	to classify different types of aquifers and their role in ground
	5.To understand the principles of watershed management and	to develope different methods of efficient irrigation and water
		To analyse and desaign efficient hydraulic structure
Design of Steel Structure	1. To understand behaviour of steel structure	CO302.1 Explain design philosophies and behaviour of structural
	2. To understand the design concept of steel structure	CO302.2) Analyse and design the bolted and welded connections
	3. To have sense of personal ethics	CO302.3) Analyse and design the structural steel elements like
		CO302.4) Analyse and design the gantry girder
Environmental Engg. -I	1. To understand various sources of water with respect to quality	1. Understand various sources of water with respect to quality
	2. To describe and design the various water treatment units.	2. Describe and design the various water treatment units.
	3. To design the various components related to transmission and	3. Design the various components related to transmission and

	4. To outline the principles of green building.	4. Outline the principles of green building.
	5. To analyse parameters of water	5. Analyse parameters of water
Geotechnical Engg.-I	1. Identify type of soilfrom index properties & relationship of soil	1. explain the index properties and engineering properties of soil,
	2. Interprete stress condition on soil & earth pressure	2. calculate index properties and engineering properties of soil
	3. Analyze the process of compaction & consolidation	3. determine stresses in soil & earth pressure acting on retaining
	4. Identify shear strength parameters & expalination of related	4. Interpret index and engineering properties of soil
	5. Perform laboratory experiments related to soil properties	
Transportation Engg.-I	1.To understand different design features of highway planning.	Describe constructional procedure for WBM, BBM & Concrete
	2.To analyze the design of types of pavements.	Demonstrate knowledge of Tunneling, Docks- Harbours.
	3.To study the different classification of pavement & their quality	Design Geometric features for Highways, Runways & Airports.
	4.To understand the analysis Airport engineering.	Design Flexible & Rigid pavements.
	5.To study Tunnel & their methods of construction.	Evaluate engineering properties of pavement material.
	6.To study Docks & Harbours .	
Building Planning & Design	1. Specify dimensions and space requirements for various	1. Specify dimensions and space requirements for various
	2. Explain various principles of planning of buildings and	2. Explain various principles of planning of buildings and
	3. Plan and design various public buildings using principles	3. Plan and design various public buildings using principles
	4. Illustrate the procedures for preparing perspective drawings of	4. Illustrate the procedures for preparing perspective drawings of
	5. Prepare the submission and working drawings of various public	5. Prepare the submission and working drawings of various public
	6. design furniture, utilities and services of buildings	6. design furniture, utilities and services of buildings
	7. Write a report on planning and design of building under	7. Write a report on planning and design of building under
Theory of Structures	1. Know the concept of determinacy and indeterminacy	CO 307.1 Understand concept of determinacy and indeterminacy
	2. Apply appropriate solution techniques to the problem.	CO 307.2 Analyze propped cantilever and fixed beam by using
	3. Analyze indeterminate structures by using different methods.	CO 307.3 Analyze continuous beam and portal frame using force
	4. Interpret the output of different methods	CO 307.4 Analyze continuous beam and portal frame using
	5. Aware of the limitations of the methods of solution and their	CO 307.5 Analyze indeterminate structures by using matrix
Geotechnical Engg.-II	1. explain soil exploration techniques	sampling techniques & related concepts
	2. explain bearing capacity concept and shallow foundation	of determination of bearing capacity and solve related problems
	3. solve problems on shallow and deep foundation	solve numerical on combined shallow foundation and settlement
	4. solve problems on stability of slope	dynamic formulae
	5. explain well foundation, cofferdam & sheet pile and soil	classification and its applications.
		6. Analyze finite and infinite slope stability and explain modern

Engg. Management	1. Know various functions and principles of management.	1. Explain the various functions and principles of management.
	2. Understand the various quantitative techniques and Analyze	2. Explain the various quantitative techniques and Analyze
	3. Know the material management and Analyze problems related	3. Explain the material management and Analyze problems
	4. Understand the various economic compression methods and	4. Explain the various economic compression methods and
	5. Know the importance of site layout, various legal aspect laws	5. Illustrate the importance of site layout, various legal aspect
Engg. Geology	1. Identify and classifiy the different types of minerals and rocks	1. Identify and classifiy the different types of minerals and rocks
	2. Interpret the different types of geological structures with	2. Interpret the different types of geological structures with
	3. Identify the phenomenon of earthquake and landslides along	3. Identify the phenomenon of earthquake and landslides along
	4. Acquire knowledge about groundwater and building stones	4. Acquire knowledge about groundwater and building stones
	5. Investigate the suitability of site for construction of dams,	5. Investigate the suitability of site for construction of dams,
Environmental Engg.-II	1. To explain sources, characteristics and methods of wastewaterr	1. Explain sources, characteristics and methods of wastewaterr
	2. To design the primary, secondary as well as low cost	2. Design the primary, secondary as well as low cost wastewater
	3. To evaluate stream pollution & apply the knowledge of effluent	3. Evaluate stream pollution & apply the knowledge of effluent
	4. To explain the necessity & importance of SWM & describe the various methods of SWM.	4. Explain the necessity & importance of SWM & describe the various methods of SWM.
	5. To describe air pollution, its effects & controlling techniques &	5. Describe air pollution, its effects & controlling techniques &
	6. To analyse design parameters for wastewater treatment &	6. Analyse design parameters for wastewater treatment & design
SDD-I	1. To analyze and design steel structures	1. Analyze and Design the roof truss, columns and gantry girder
	2. To prepare the working drawing for various structural	2. Analyze and Design the steel building frame
	3. Analysis and Design of building using software	
Seminar	1.understand and demonstrate the knowledge of latest civil engineering practices	1. Collect, analyze and present data related to literature.
		2. Prepare abstract and report.
		3. Exhibit the talent during presentation
		4. Perform literature review on recent technical topics.
		5. Prepare a power point presentation and a comprehensive report.
Design of Concrete Structures-I	1.To undestand the concept of RCC structural design	Convey the concept of the design procedure
	2.To conceive the elementry design of different structural element	Design the individual member and hence building
	3.To understand concepts of mathematical modelling	Prepare mathematical modelling of structure

Earthquake Engineering	4.To understand earthquake resistant design philosophy	Design earthquake resistant structure
	5.To study moden techniques of Earthquake resistant design	Know the concepts of modern techniques of Earthquake
Qunatity Surveying & Valuation	1. Understand the importance of estimation and specification of	1. Explain importance of estimation and specification of work in
	2. Interpret the various methods of building estimate.	2. Prepare building estimate by various methods.
	3. Know the various types of contracts and tendering procedure.	3. Explain and compare various types of contracts and knowledge
	4. Understand the importance of valuation in civil engineering.	4. Explain importance of valuation in civil engineering.
Project Management & Const. Equipment	1.To understand the importance of project management tools.	Explain the importance of project management tools.
	2.Prepare plan and schedule the project by using CPM and PERT	Prepare plan and schedule the project by using CPM and PERT
	3.Illustrate the importance of safety and risk management	Illustrate the importance of safety and risk management
	4.Demonstrate the knowledge for working of various	Demonstrate the knowledge for working of various construction
AFE	1. Study the different types of shallow and deep foundation.	1. Explain & express the knowledge of different types of
	2. Study the different types of shallow and deep foundation.	2. Analyze the different types of foundation
	3. Study design criteria for Machine Foundation and solve	3. Explain design criteria for Machine Foundation
	4. Explain use of sheet piles and coffer dam in various	4. Explain and apply knowledge of sheet piles and coffer dam
	5. Study problems associated with foundations in difficult soils	5. Solve problems associated with foundations in difficult soils
Design of Concrete Structures -II	1.To study the conceptof torsion, Design for Torsion Design of	Sections subjected to torsion
	2.To study concept of prestressed concrete , losses in prestress ,	Contineous beam / slab
		water tank resting on ground
Water Resource Engg. -II	1.the student will get knowledge about important irrigation	plan and design the reservoir depending upon water resource
	2.the student will understand design of weir , barrage etc	Analyse and design gravity dam , earth dam , arch dam etc
	3.the student will get knowledge about river trainning work	Demonstrate design principle of arch dam
	4.the student will get knowledge about hydropower steucture	solve seepage problem for weirs on permeable foundation
		Demonstarate knowledge of hydro power engineering
Transportation Engg.-II	1.To provide basic knowledge of urbanization & its trends.	Illustrate importance of town planning & its trends.
	2.Deals with different types of plan its implementation, regional	Identify & explain different types of urban strategies &
	To expose the various legal aspectsof town planning.	Relate the legal aspects of town planning to current societal situations.
	3.To expose design parameters of Railway engineering.	Explain design parameters related to Railway engineering.
	4.To know moderns trends & safety in railways.	Illustrate modern trends in railways & their safety.
	5.Identify the input parameters of required for design of a bridge	Decide the selection of Bridge structure, list of factors affecting

ACT	1. Understand the importance of composite construction and	1. Explain types of construction and various type of formwork.
	2. Know the advanced construction material in construction field.	2. Select advanced construction material for construction from
	3. Interpret the methods of land reclamation.	3. Describe methods of Land reclamation and drainage for land reclamation.
	4. Understand the working of various power generation	4. Explain the construction of various power-generation
	5. Interpret the scope of Rehabilitation of bridges and retaining	5. Explain the fundamentals of Rehabilitation of bridges and
	6. Know the various advanced techniques for infra-structure and	6. Describe various advanced techniques for infra-structure and
DOB	1. To understand the types, specifications and loads considered for road bridges.	At the end of successul completion of course, the Studentswill able to -
	2. To know design considerations and design of RCC deck slab,	1. Explain types, specifications and loads considered for road
	3. Explain different construction and strengthening techniques of	2. State design considerations and design of RCC deck slab,
	4. Explain different types of bridge bearings and expansion joints	3. Explain different construction and strengthening techniques of
		4. Explain different types of bridge bearings and expansion joints
SDD-II	1.To apply hlistic approach of planning, analysis, segmentation	Tranlate the ideas into workable plans
	2.To get an exposure to the method of analysis and design using	Classify the components
		Design the units and hence the structure as a whole
		Draft the detaiols for execution
		To read and understand the supplied drawing for execution on
Project	1.to formulate engineering problems related to engineering	apply knowledge of civil engineering subjects to analyze,
	2.Use professional knowledge and demonstrate ethical	function on multidisciplinary teams and communicate effectively
		identify, formulate, solve engineering problems related to civil
		demonstrate understanding of professional and ethical
		use the techniques, skills, and modern engineering tools necessary for engineering practice and apply knowledge and understanding of the engineering and management principles to manage projects in multidisciplinary environments.
Field Training	1. To undergo training in any area related to Civil Engineering	1. To Perform various activities on site confidentely
	2. To prepare site visit report of the field training	2. To Prepare comprehensive report on training
	3. To develop/built confidence about practical implimentation of	3. Illustrate practices employed in the field

Computer Science Engineering		
Course Name	**Course Objective**	**Course Outcome**
Applied Mathematics	ofstudents.	1. Describe the statistical data numerically by using Lines of
	numerical methods probability and statistics with an emphasis on	2. Solve basic problems in probability theory, including problems
	3. To prepare students to formulate a mathematical model using engineering skills& interpret the solution in realworld.	3. Calculate numericalIntegration.
		4. Define fuzzy sets using linguistic words and represent these
		arithmeticoperations such as Addition, Multiplication &
Discrete Mathematics and Structure		6. Solve assignment problems by using different techniques of
	computer sciencecareas.	1. Apply logic concepts in designing aprogram.
	theoretical computerscience.	2. Illustrate basic set concepts & apply operations onset.
	computerapplications.	3. Minimize the BooleanFunction.
		4. Apply basic concepts of probability to solve real worldproblem.
		5. Represent data structures using graph concepts.
		6. Design abstract machine, detectdeadlocks.
Data Structure	1 To make the students familiar with basic datastructures.	1. Identify the appropriate data structure for specific application.
	programming/problem.	2. Design and analyze programming problemstatements.
	computerapplications.	3. Chose appropriate sorting and searchingalgorithms.
	4. To provide the students with the details of implementation of various datastructures.	4. Outline the solution to the given software problem with appropriate datastructure.
Computer Networks	1.To perceive fundamental concepts of Computer Networks	1. Demonstrate concepts of ComputerNetworks.
	networkingprotocols	2. Explain OSI and TCP/IP layeredarchitecture
	3. To illustrate the TCP/IP protocol internal details	3. Implement network and data linklayer.
		4. Demonstrate TCP protocol indetail.
		analyzingtools.
		6. apply the principals of socket programming in thenetworks.
	1. To learn the Architecture and Basic Programmingmodel	1. Describe the Architecture of 8085 microprocessors andmicrocontroller

Microprocessors	programming for 8085 and 8086 Microprocessors	Assembly languagePrograms
	4. To differentiate the microprocessorfamily	3. Explain Programming model's of 8086 microprocessors
		Assembly languagePrograms
		5. Understand the higher processor architecture
		6. Understand the need for otherMicroprocessors
C Programming	1. To learn concepts of arrays and pointers inC	solving andprogramming.
	2. To learn file handling in C	control flow andrecursion
	3. To learn memory management inC	3. Able to formulate problems and implement algorithmsinC . .
	4. To learn structures inC	complexproblemstatements. .
		through developingapplications.
SOFT SKILL	the role and the content of soft skills through instruction,	and improve thelistening skills
	individual andgroup activities.	and prepare &deliver presentations.
	and to build the same throughactivities 4. To encourage the all	teams through the knowledge ofteam
		leadershipquality.
Automata Theory	1.To introduce students to the mathematical foundations of computation, the theory offormal languages andgrammars	1. Understand basic concepts of Regular Language and Regular Expressions
	mathematical proofsfor	2. Select appropriate abstract machine to recognize a given
	3. To make the students understand the use of automata theory in Compliers & SystemProgramming.	3. Generate complex languages by applying Union, Intersection, Complement, Concatenationand Kleene * operations on simplelanguages.
	grammars & Turingmachines	4. Apply parsing concepts for syntaxanalysis.
		5. Be familiar with thinking analytically and intuitively for problem solving situations in relatedareas of theory in computerscience.
Computer Networks - II	1. To understand the Client server model & socketinterface	1. program the client server model usingsockets
	2. To perceive IPv6 addressing and protocol	2. understand and apply next generation protocol and addressingmodel
	3. To explain and learn basic internet technology protocols	3. elaborate the fundamentals of Domain NameSystems
	4. Simulate protocols using softwaretools.	4. apply the concepts of Remote login and FTP in

		5. learn fundamentals of web, HTTP and e-mail communication protocols.
		6. understand multimedia streaming and relevant protocols.
Computer Organization and Architecture	1. To provide a high-level overview of Computerorganization.	1. recapitulate the history of computer system and the basic
	2. To discuss the basic of I/O addressing andaccess.	2. understand the concept of I/Oorganization.
	3. To make the students aware of overall design and architecture	arithmeticoperations.
	4. To analyze performance issues in processor and memory	4. articulate the design issues in the development ofprocessor.
		5. conceptualize instruction levelparallelism.
		6. understand the concept of memorytechniques.
Operating Systems - I	1.To make the students understand basic concepts of operatingsystem	1. To understand basic concepts of operatingsystem
	2.To expose the students to various functions of the Operating system and theirusage	2. To explore various functions of the Operating system and theirusage
	3.To give hands on exposure to Linux commands and systemcalls.	3. To give hands on exposure to Linux commands and systemcalls.
Software Engineering	1.To expose the students to basic concepts & principles of	1. Comprehend systematic methodologies of SDLC(Software
	2.To make the student aware of the importance of SDLC in their project developmentwork.	2. Discriminate competing and feasible system requirements indicating correct real world problem scope and prepare stepwise system conceptual model using stakeholder analysis and requirement validation.
	3.To expose the students to software testing techniques and software qualitymanagement.	3. Prepare SRS document for a project
		4. Apply software design and development techniques
		5. Develop a quality software project through effective team-building, planning, scheduling and risk
		6. Understand testing methods at each phase of SDLC
	1. To learn advanced features of the C++ programming language as a continuation of the previouscourse	1. Use the characteristics of an object-oriented programming language in aprogram.

Object Oriented Programming	2. To learn the characteristics of an object-oriented programming language: data abstractionand information hiding, inheritance, and dynamic binding of the messages to themethods.	2. Use the basic object-oriented design principles in computer problemsolving.
	3. To learn the basic principles of object-oriented design and software engineering in terms of software reuse and managingcomplexity.	3. Use the basic principles of software engineering in managing complex softwareproject.
	4. To enhance problem solving and programming skills in C++ with extensive programming projects.	4. Program with advanced features of the C++ programming language.
	5. To become familiar with the LINUX software developmentenvironment.	5. Develop programs in the LINUX programming environment.
Mini Project	1. To expose the students to solve the real worldproblems.	1. Define the problemstatement.
	2. To utilize the techniques. Skills and modern Engineering tools for building theproject.	2. Organize, Plan and prepare the detailed projectactivities.
	3. To follow the methods and tasks as per SDOLCApproach	3. Construct Flowchart, System Architecture based on the projectdescription
		4. Implement the solution for theirproblem.
Environmental Studies	1.The main objective is to make the students aware of Environmental consequences, present situation what the society is facing.	1. Explain basic concepts of environment and environmental education with the need of public awareness.
	2.To inculcate in students the importance of natural resources, it's conservation and further how to achieve Sustainable Development	2. The importance of judicial use and conservation of natural resources and will understand the problem of environmental degradation and how to achieve sustainable goals.
	3.To make understand the students importance of different ecosystems, their interaction and importance of food chain-food web.	3. Explain the components of Ecosystem and recognize the need of conservation of biodiversity.
	4.To motivate the students to think positively and step for conservation of nature, biodiversity by which we all are blessed through Western Ghats and Eastern Himalayas	4. Illustrate the severity and bad effect of pollutions and make people aware about laws.

	5.Understand the severity and ill effects of different types of pollutions on Environment	5. Collect data from site visit and represent it in the form of project work copy with poster or model.
	6.Understand the subject holistically by undertaking a case study	
	7.To develop lateral thinking through data collection, regarding news papers, referring international journal papers mostly focusing on social issues such as Global warming, water conservation, consumerism and waste products, waste land reclamation.	
Computer Graphics	To expose students to the various transformation techniques and projections.	Understand & apply various transformation & projections techniques on graphical object.
	2. To make students understand different algorithms concerned with scanning, filling, windowing and clipping on graphical objects.	Evaluate different algorithm concerned with scanning, filling on graphical object.
	3. To make the students aware of generation of curves and surfaces. 4. To give students with hands on exposure to Open GL and Animation tools.	Apply the Windowing & Clipping algorithms to clip the graphical object to increase the rendering performance.
		Analyze the different curves & surfaces.
		Create the graphical object using OpenGL & animation tools.
		Identify& apply the intensity of light on graphical object using different Illumination models.
Systems Programming	1.To expose the students to the fundamentals of languages and processing.	Students will learn the fundamentals of language processing and translators
	2. To make students to learn design of grammars, assemblers and compilers.	Students will be able to design design assembler and microprocessor
	3. To provide hands on experience to the students on simulation of linkers, loaders and software tools for UIs and DLLs.	Students will implement different phases of compiler
		Students will learn how linker, loader works
		Students will be able to use different software tools for language processing activities

Object Oriented Modelling and Design	1.To explain how a software design may be represented as a set of interacting objects that manage their own state and operations.	Students should be able to understand basic modelling techniques.
	2. To describe the activities in the object-oriented design process.	Students should be able to construct system model using OMT and UML Techniques.
	3. To introduce various models that can be used to describe an object-oriented design.	Students should be able to categorize different modelling Techniques.
	4. To show how the UML may be used to represent these models.	Students should be able to elaborate OMT and UML diagrams.
	5. To implement design patterns to provide solutions to real world software design problems	
	.6. To learn to design flexible and reusable software components.	
Computer Algorithms	1. To introduce to the students the methods of algorithm designs.	Know various methods of devising an algorithm and apply divide and conquer method to searching and sorting techniques and analyze them using priori analysis
	2. To expose students to various searching and sorting techniques	Design algorithms using greedy method for optimization problem
	3. To make students understand the analyses of algorithms.	Solve various problems by applying dynamic programming approach
	4. To show how to tackle real time problem	Use various graph and tree traversal techniques in computer science applications
		Understand difference between P , NP and NP hard problem
		Study various parallel computational models and apply it to real life problems
Network Technologies	1. To introduce students to the cellular technologies.	1. To understand the cellular technologies.
	2. To expose students to the design issues and standards of wireless networks.	2. To understand the design issues and standards of wireless networks.
	3. To make students understand wireless protocols and security services.	3. To understand the wireless protocols and security services.

Programming Lab-111	Fundamental and object oriented concepts of Java s. .	Student should able to recall fundamental object oriented concepts.
	2. Application of Interface, inheritance and packaging in Java.	Student should able to design the applications using the classes, inteface and packages.
	3. Writing code with Exception handing and I/O programming feature	Students will be able to write the application for IO and exception handling.
	4. Architecture and components of GUI development in Java	Students will be able to design the application GUI using swing components.
	5. Fundamental concept of multithreading and Network Programming in Java	Student should able to write application using multithreading and socket programming.
	6. Collection and database programming in Java.	Student should able to design and develop applications for handling the different database operations.
Buisness English	1. To improve professional communication skills of the students.	Demonstrate the skills required for effective communication in the professional world
	2. To acquire communicative competencies crucial for appropriate workplace behavior.	Develop interpersonal skills that contribute to effective and satisfying personal, social and professional relationships.
		Make use of oral and writing techniques such as telephonic conversation, email writing, video conferencing etc. in the business communication.
		Adapt to the business etiquettes required in the professional world
Compiler Construction	1. To introduce the fundamentals of compilers and their phases.	1. To understand Compiler Phases and Compiler Construction tools like LEX and YAAC
	2. To design and implement phases of a compiler.	2. To design and Implement Lexical Analyzer for C Language
	3. To expose the students to various tools like Lex and Yacc.	3. To design and implement Syntax analyzer for simple expression in language
		4. To understand code optimization and data flow analysis
		5. To understand concept of Code Generation

Operating System - II	1. Fundamental architecture of UNIX operating system kernel.	1. Understand features and services of UNIX OS.
	2. Detail algorithms of buffer cache management.	2. Evaluate the scenarios for buffer cache management system.
	3. Internal File system organizations and related algorithms in UNIX.	3. Apply & implement the different system calls in UNIX environment.
	4. System calls for UNIX file system.	4. Analyse the process, memory management and IO mechanisms of UNIX.
	5. Process structure, creation and management in UNIX.	
	6. Architecture and algorithms of process scheduling and memory management.	
	7. I/O subsystem architecture and algorithms.	
Database Engineering	1. To understand Fundamental Concepts and algorithms related to database.	1. Student are able to draw an E R diagram for given application
	2. To gain familiarity with SQL & DBMS.	2. Students are able to write queries using DDL & DML statements
	3. To understand basic concepts of Database Design	3. Students are able to install any DBMS other than learnt during practical
		4. Students are able to design & implement database for given application
Storage Networks	1. Finding key challenges in information management	1. Students able to understand data center evolution and infrastructure.
	2. Storage system architecture and data protection.	2. Students able to identify key challenges in managing information and analyze different storage networking technologies and virtualization.
	3. Storage Area Network- concepts, components and protocols.	3. Students able to evaluate the storage architectures and their components.
	4. Network -Attached Storage - concepts, components, implementation and protocols.	4. Students able to analyze business continuity terminologies, failure analysis and backup methods.
	5. Architecture of Storage Virtualization.	5. Students able to evaluate replication of storage structures and storage security framework.

	6. Need of Replication, Replication techniques and Storage Security.	
Information Security	1. To introduce Information security services and mechanisms to the students.	1. Students will be able to understand and analyze security services and mechanisms.
	2. To make students feel the security services widely used in Internet and Web services.	2. Students will be able to apply the knowledge of security services used in the Internet and web services.
	3. To give hands on exposure to various security tools and security related issues.	3. Students will be able to experiment on providing solution to various security attacks.
	4. To practice ethics in using and developing security softwares.	4. Students will be able to take precautions while using software's and developing secured software's.
Programming Lab - IV	1. To make the student familiar with basic .Net framework.	1. Understand the .NET framework and its components.
	2. To make student understand the OO features and their implementations.	2. Apply the knowledge of object oriented programming concepts in C# to create the application.
		3. Implement the object oriented programming features in C#.
		4. Analyze & create an application using ADO.NET connectivity
Domain Specific Mini-Project	1. To expose the students to use engineering approach to solve domain specific real time	1. Develop project management skills related to application design.
	problem.	2. Developing creativity and innovative in project and innovation through contested product.
	2. To use the appropriate and newer technologies while developing the project.	3. Identify any challenging practical problems and find solution by formulating proper methodology
	3. To learn the skills of team building and team work.	4. Apply the skills of team building and team work.
		To be familiar with parallel processing concept and architectural classification schemes.
	. To understand different computer architectures	To learn concept of pipeline architecture and different performance measure.

Advanced Computer Architecture	2. To learn concepts of pipeline architectures and different performance measures	To study cluster computing as an application of distributed memory.
	3. To understand memory organizations	To study and implement latest technologies in parallel processing.
	4. To understand latest technologies in parallel processing	To understand loosely coupled and tightly coupled architectures and be familiar with programmability issues.
	5. To understand loosely coupled architectures	Analyze program and network properties and different models.
		Apply the acquired knowledge of basic techniques in designing distributed systems using different architectures & styles
Distributed Systems	1. To present the principles underlying the function of distributed systems and their extension to grid and cloud computingg multiple heterogeneous and distributed resources in a dynamically changing computing environment	Analyze different models for communication and synchronization techniques in distributed system for its appropriate usage.
	2. To expose students to current technology used to build architectures to enhance distributed computing and virtualization techniques infrastructures with various computing principles and paradigms, including grid and cloud computing	Configure distributed file system and perform operations on files
	3. Expose students to past and current research issues in the field of distributed systems and new challenges in cloud computin	Develop application and deploy different cloud types & models
	4. Enhance students understanding of key issues related to multi-level interoperability across a distributed infrastructure and across	Evaluate virtualization levels / types and use in different scenarios.
		Develop specified cloud services with security consideration.
	1. To learn Basics of design of databases.	Recall basics of databases and its design.

Advanced Database System	2. To acquire knowledge on parallel and distributed databases and its applications	Compare relational databases and object oriented databases.
	. 3. To study the usage and applications of Object Oriented database.	Explain concepts of parallel & distributed databases and their applications.
	4. To Understand and perform common database administration tasks, such as database monitoring, performance tuning, data transfer, and security.	Design & develop applications using object oriented databases.
	5. To understand the usage of advanced data models.	Make use of advanced data models
Soft Computing	Students will be able to, 1. Explain the fuzzy set theory.	To learn various soft computing tools
	2. Comprehend neuro fuzzy modeling	To analyze ANN , Fuzzy , GA and Identify their applications in AI or ML
	3. Apply derivative based and derivative free optimization	To apply derivative base & derivative free optimization
	4. Demonstrate some applications of computational intelligence	Demonstrate Different models to solve engineering & other problems
Mobile Application		
	1. To develop problem solving abilities using Mobile Applications	Understand the best practices for user interface design and problem face to develop multi platform application.
	2. To study mobile programming technology	Identify the platforms, frameworks, tools use for mobile based application development.
		Select the different protocol, standards and tools for mobile app development.
		Analyze the mechanism for client side and server side device detection to check the device compatibility for different services and functionality.
		Use the advanced tools, mobile library and frameworks to develop and debug the mobile application over multiple platforms.
	1. Adhoc wireless networks, their unique applications and design issues.	Comparison with cellular network, its applications & issues in ad-hoc wireless network.

AdHoc Wireless Network	2. How Adhoc N/w works at MAC layer, forwarding mechanism and link recovery strategies.	To Understand MAC protocols and its classification of ad-hoc wireless network.
	3. Diffrent routing mechanisms in Adhoc N/w, finding path from source node to destination node, recovery of routes. best suitable for Adhoc Wireless Network. 6. Security issues in Adhoc N/w and strategies to overcome these issues. 7. Strategies for providing QoS in Adhoc N/w and dealing with power management issues to effectively use energy in Adhoc N/w	To analyse the Wireless routing protocols including proactive & reactive approach.
	4. Forming multicast sessions in Adhoc N/w, efficiently using resources available in networks.	Understanding multicast routing protocols, its functionality and classifications.
	5. Modification in traditional TCP protocol to make it	To understand the Transport layer protocols and security in ad-hoc wireless networks.
Web Technologies	1. Introduce students to emerging web technologies	Students will be able to develop a static/ dynamic web pages by using HTML, Servlet and JSP
	2. Introduce students with front end web designing	Students will be able to write well-formed and valid XML document
	3. Introduce students with XML concepts and its applications	Students will be able to write server-side scripting application using Servlet technology.
	4. Motivate the students to develop web applications using Servlets and JSP	Students will be able to write server-side scripting application using JSP technology.
Project-1		Demonstrate a technical knowledge for their selected project topic.
		Undertake problem identification, formulation and solution.
		Communicate with engineers and community at large in written and oral forms

Data Analytics	1. Understand Business Intelligence, decision support systems in Data warehouse	1.Understand Business Intelligence, decision support systems and Data warehouse
	2. Study the Data analysis using data mining, data preparation and exploration	2.Study the Data analysis using data mining, data preparation and exploration.
	3. To forester the development of data mining capability in Hadoop and R and facilitate sharing of data mining codes/functions/algorithms among Hadoop and R users.	3.Learn basic concepts of Big Data and Hadoop Ecosystem with various tools & approaches.
		4. Solve various Data Mining tasks using various rules and classification approaches.
		5. Apply various Association rules and clustering methods to solve Data mining applications.
		6. Study the concepts for exploring R and facilitate sharing of data mining codes/functions/algorithms among Hadoop and R users.
Project Management	1. Provide students with a basic understanding of project management principles and practices.	1. Understand fundamental principles of Project Management.
	2. Demonstrate competency in the creation and management of a project plan	2. Demonstrate the adequacy for project plan in terms with creation & management.
	3. Understanding impact of Scope, Time and Cost management.	3. Have ability to apply tools & techniques related to Project Management.
	4. Understanding the software quality metrics and quality assurance.	4. Identify quality standards and analyse dependencies between project requirements, specifications, and quality on product and project performance.
	5. Develop strategies to calculate risk factors involved in IT projects	5. Have the ability to develop different risk identification strategies.
Real-time Operating System	1. To understand basic real time operating system concepts.	1. Students able to understand basic terminologies and hardware architecture in real time operating systems.
	2. To understand software engineering process for real time system design.	2. Students able to evaluate the job scheduling for a particular real time operating system.
	3. To learn programming languages for programming real time systems.	3. Students able to analyse software engineering process and methodologies for real time operating system.

	4. To understand different performance measures for real time O.S.	4. Students able to evaluate programming language and production process for real time operating process.
	5. To understand different features of commercial real time operating systems.	5. Students able to understand cost estimation and commercial real time operating systems.
Elective – II STQA	1. To provide knowledge about fundamentals of software testing and software quality	6. Students will able to describe the principles of software development process and phases in software development life cycle/testing.
	2. To understand the fundamentals of software verification	1. Students will able to differentiate between testing, verification and validation.
	3. To understand and evaluate metrics and models used in software testing	2. Students will able to create the test cases from SRS and Use Cases.
	4. To understand and compare testing web applications and desktop applications	3. Students will able to Test web applications and automated test data generation
	5. To understand, compare and Choose from various software project assessment methods	
Elective – II IOT	1. To learn Internet of Things Technology	
	2. To know the basics of RFID, sensor and GPS technologies	
	3. To aware students about wireless technologies and IoT applications	
Web Technologies – II	1. To introduce emerging Web technologies concepts and tools.	1. Students will be able to Understand the different web technologies and tools used for web application development.
	2. To introduce client side and server side scripting languages and validation techniques.	2. Students will be able to write the programs using client side and server side scripting languages with applying proper validations.
	3. To learn database access technologies and state management techniques.	3. Students will be able to write Develop various programs form interfacing with database and maintaining the state information of web applications.
	4. To develop real life Web applications using ASP.NET and PHP	4. Students will be able to Create real time web applications using the PHP and ASP.NET
	1. The workable project.	5. Conduct an engineering project

Project – II	2. The project report in the bound journal complete in all respect with the following: - i) Problem specifications. ii) System definition – requirement analysis. iii) System design – dataflow diagrams, database design iv) System implementation – algorithm, code documentation v) Test results and test report. vi) In case of object oriented approach – appropriate process be followed.	1. Design Engineering solution to complex problem utilizing a system approach
		2. Demonstrate the knowledge , skills and attitudes of professional engineers
		3. Illustrate the results and discuss it in professional community at large in written and oral forms
Community Services	1. To create an awareness among the common man of Western Maharashtra region and area coming under jurisdiction of the Shivaji University regarding the e-services provided by various public sector organization	1. To study e-services provided by various public sector organization.
	2. To promote the use of technological services in day-to-day activities.	2. To promote the use of technological services for citizens of society in day-to-day activities.
	3. To understand the problems of the locality.	3. To Creating awareness of RTI (Right To Information) in society by technical students
	4. To make the student aware of the various engineering tools and techniques used in eservices.	
	5. Creating awareness of RTI (Right To Information) among general public for procuring public documents and it's appropriate use.	
Electronics & Telecommunication Engineering		

Course Name	Course Objectives	Course Outcomes
ngineering Mathematics-I	1.To develop mathematical skills and enhance thinking power of students	Make use of Linear Differential Equations to solve the Electrical En
	2.To give the knowledge to the students of fuzzy set theory, Linear Differential Equationsprobability,Laplace transforms,Fourier series with an emphasis on the application of solvingengineering problems	Applyknowledge of vector differentiation to find directional deriva
	3.To prepare students to formulate a mathematical model using engineering skills & interpret the solution in real world.	Define fuzzy sets using linguistic words and represent these sets b
		Develop Fourier series expansion of a function over the given inter
		Find Laplace transforms of given functions and use it to solve linea
		Solve basic problems in probability theory, including problems invo
Electronic Circuit Design-I	1.Provide an introduction and basic understanding of Semiconductor Devices viz. diodesand BJT, JFET.	Analyze and design electronic circuits such as rectifiers & unregula
	2.Provide basic analog electronic circuit design techniques using diodes and bipolarjunction transistors and to develop analytical skills	Analyze and design electronic circuits such as regulated power sup
	3.Develop student ability to apply basic engineering sciences to understand the operation& analysis of electronic circuits using diodes and bipolar junction transistors	Analyze & Design of BJT & FET Biasing.
	4.Design electronic circuits to meet the desired specifications.	Explain the hybrid model of transistor and analyze the transistor a
		Analysis of CE Amplifier for low frequency & High frequency respo
		Analyze & Design LPF, HPF, Clipper, Clampers, Multipliers
	1.To understand basic theorems used for network analysis.	Analyze AC and DC circuits using different network Theorems and

Network Analysis	2.To understand two port networks and its parameters	Identify and analyze the series, parallel resonance circuits, calculat
	3.To understand series and parallel resonance and its effects	Evaluate two port parameters and Understand network transfer fu
	4.To understand system behavior using pole zero plot	Analyze and design prototype LC filters.
	5.To understand and implement filter approximations	Evaluate initial conditions and solve differential equation for RL, R
nsducers and Measureme	1.Provide introduction to different types of Transducers with their classification, construction & application	Students will be able to select appropriate transducer & sensors as
	2.Provide knowledge of different sensors and their applications	Students will get acquainted with different DAS
	3.Provide knowledge of signal conditioning and instrumentation system	Students will be able to design instrumentation system
	4.Provide basic knowledge of measurement system	Students will be able to understand measurement basics & select proper instrument for particular measurement of electrical parameters.
	5.Provide basic understanding of different Electronic instruments	
	6.Provide knowledge of different types of bridges	
Analog Communication	1.The basic objective of this course is to introduce the students with analog communication, AM, FM modulation techniques, their analysis, bandwidth calculations	Explain and identyfy the fundamental concept of analog communi
	2.Italsofocusesontheperformanceanalysisofanalogcommunications systems under the presence of noise and finally introduces the pulse and digital modulation techniques.	Compare various analog modulation scheme
		Interprete the performance of analog communication system und
		Draw & Explain the operations of various receiver systems
		Define sampling theorem
		Differentiate between various Pulse modulation techniques
	1.To understand how to design flowchart and algorithms for procedure oriented programs.	understand the basic concepts of procedure oriented programmin

Programming Lab-I	2.To develop programming skills using the fundamentals and basics of C Language, control structures and looping statements.	use the control statements, looping statements and functions conc
	3.To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.	Student will be able to design programs using user defined functic
	4.To design and implement programs using files handling and user defined types.	design & apply the skills for solving the engineering problems.
Environmental studies	1.To learn the basic concepts of environment and environmental education with the need of public awareness.	Explain basic concepts of environment and environmental education with the need of public awareness.
	2.Tounderstand the problem of environmental degradation and how to achieve sustainable goals.	The importance of judicial use and conservation of natural resourc
	3.to understand the components of Ecosystem and recognize the need of conservation of biodiversity.	Explain the components of Ecosystem and recognize the need of conservation of biodiversity.
	4.to understand the severity and bad effect of pollutions and make people aware about laws.	Illustrate the severity and bad effect of pollutions and make peopl
	5.to Collect data from site visit and represent it in the form of project work copy with poster or model.	Collect data from site visit and represent it in the form of project work copy with poster
Electronic Circuit Design-II	1.Provideanintroductionandbasicunderstanding of feedbackamplifiers,poweramplifiers, oscillators,multivibrators	Analyze & Design Multistage Amplifier
	2.Develop student ability to apply basic engineering sciences to understand the operation & analysis of electronic circuits using diodes, bipolar junction transistors and field effecttransistors	Analyze & Design Feedback Amplifier
	3.Provide analog electronic circuit design techniques using diodes,bipolar junction transistors and field effect transistors,and to develop analytical skills	Analyze & Design Power Amplifier
	4.Design electronic circuits to meet desired specifications	Describe & Design Different types of Oscillators using BJT

	5.Apply knowledge of mathematics,science,and engineering to design,analyze and implement electronic circuits	Describe & Design Different types of Multivibrators using BJT
		Describe & Design IC voltage Regulators
Linear integrated Circuits	Explain the internal circuit of operational amplifier and its parameters	Explain operational amplifier with its parameters
	Explain the application of Op-amps.	Classify different configuration of op-amp
	Design various Active filters.	Identify and explain different applications of op-amp
	Analyze and design of various wave generators	Design and implement various filters
		Analyze different waveform generator circuits
		Apply knowledge of op-amp in various industrial applications
Control System Engineering	1.To provide an introduction and basic understanding of Control System	Apply knowledge of mathematics, science, and engineering to des
	2.To develop time & frequency domain analysis	Explain time & frequency domain analysis for different control syst
	3.To analyze & compare different control systems	Demonstrate & compare different control systems
	4.To understand the concept of stability & state space variables	Describe state variables
		Design model for control system
Digital Communication	1.Study the random signal theory with its mathematical analysis base	Describe the probability of random signal
	2.Understand the concept of information theory in detail with different coding theorems.	Solve the problem based on information theory
	3.Elaborate the different source coding techniques with the help of their block diagrams and function.	Classify different source coding technique
	4.Explain the different digital modulation techniques.	Explain different line coding techniques.
	5.Describe the baseband transmission and reception system.	Compare different digital modulation technique.
	1.Provide basic concept of data structure & it's types.	Elaborate the basic concept of data structure & it's types.
	2.Provide the knowledge of arrays & records as well as relevant operations on it.	Design and Implement the various algorithms on arrays & records.
	3.Provide the knowledge of linked list & relevant operations on it.	Implement algorithms on linked list.

Data Structures	4.Provide the concept of stacks, queues & it's applications.	Understand the concept of stacks, queues & its applications.
	5.Provide the knowledge of various types of trees & relevant operations.	Construct various types of trees & their applications.
	6.Provides the Knowledge of Graphs & Hashing techniques.	Understand the concept of Graph & Hashing.
Programming Lab-II	1.To understand features of object-oriented programming and design C++ classes	Student will be able to understand the basic concepts of procedur
	2.To understand how to overload functions and operators in C++.	Student will be able to use the class, objects, function and operato
	3.To learn how to implement copy constructors and class member functions.	Student will be able to understand and implement the concept of
	4.To learn how inheritance and virtual functions implement dynamic binding with polymorphism.	Student will be able to design & apply the skills for solving the eng
	5.To learn how design inheritance for code reuse in C++.	
	6.To learn how to design and implement generic classes with C++ templatesand exception handling	
Signal & Systems	1.To understand basic of CT & DT signals & system and there representation	Represent CT & DT signals & perform various operations on the sig
	2.To therefore analysis of CT & DT systems	Compute response of LTI system.
	3.To understand concept of sampling.	Select appropriate sampling rate for reconstruction of signals
	4.To analyze signals by using different mathematical tools	Perform the analysis of CT & DT signals by using furies & Z- Transfo
	5.Understand realization of system.	Realize the system using basic building block
Microcontroller	1.The objective of this course is to understand the basic concepts of microcontrollers 8051 and PIC 16F877 .	Analyse the various pins and its functions of 8051 and PIC 16F877
	2.To understand ON CHIP resources , peripheral interfaces and their features	Understand the instruction sets of 8051 and PIC 16F877 microcont
	3.To understand various programming aspects of Embedded C.	Understand various addressing modes in 8051 and PIC 16F877 mic
	4.To learn the interfacing of real world input and output devices	Write embedded c programs for on chip resources of 8051.
		Interface the external devices with 8051 microcontroller.

lectromagnetic Engineerir	1.To understand the fundamentals of vector calculus	Student will be able to comprehend the fundamentals of vector ca
	2.To learn the field theory laws & theorems for Electrostatic fields.	Student will be able to apply field theory laws & theorems for Elec
	3.To learn the field theory laws & theorems for Steady magnetic Fields.	Student will be able to apply field theory laws & theorems for Stea
	4.To understand the to develop field equations for time varying & harmonically varying fields using Maxwell's Equations.	Student will be able to develop field equations for time varying & h
	5.To Analyze electromagnetic wave propagation in different transmission media.	Student will be able to Analyze electromagnetic wave propagation
	6.To understand the basic properties of transmission lines to analyze	Student will be able to extend the knowledge of basic properties o
VLSI Design	1.To understand the concept of hardware description language.	Student should be able to use HDL for combinational and sequenti
	2.To study the various VHDL features.	Ability to simulate and test digital logic using simulator.
	3.To Design and test combinational logic using VHDL.	Ability to design and test combinational and sequential logic using
	4.To study design issues related to Digital System Design.	Ability to implement digital systems.
	5.To Design and Implement sequential logic using various CPLD and FPGA devices.	Ability to design and implement digital logic using various CPLD an
	6. To understand the different aspects of testing ASIC and FPGA based designs.	Students will be able to understand various methods of testing ASI
	7.To teach fundamental of VLSI circuit design and implementation using circuit simulators and layout editors.	Ability to design MOS based circuit and draw layout.
	8.To highlight the circuit design issues in the context of VLSI technology.	Ability to understand the choice of technology and technology sca
		Ability to demonstrate CMOS design and designing issues such as p
		Ability to realize logic circuits with different design styles.
	1.Understand basic component of digital communication systems & study of probability theory	Students are able to understand and analyze the design issues of c
	2.Study of source coding techniques and various data formats	Students are capable to describe different source coding techniqu

Digital Communication	3.Students will make acquainted with digital modulation techniques and spread spectrum techniques	Students are able to identify digital modulation schemes and comp
	4.To realize need of synchronization and their methods	Students are able to understand concept of spread spectrum tech
	5.Understand concept of baseband transmission and optimum detection	Students are able to explain the concept of optimum receiver and
Programming Lab-II	1.to Understand basics of Programming	Understand basic Programming
	2.to Understand different functions & file processing	Ability to explain different functions & file processing
	3.to anlyze GUI for small applications in mathematical problems	Apply GUI for small applications in mathematical problems
	4.to Understand simulation model for problems	Evaluate simulation model for problems
Digital Signal Processing	1.To make use of Fast Fourier Transform for faster realization of signals & systems	Students will able to make use of Fast Fourier Transform for faster
	2.To understand basic concepts of Wavelet Transform	Students will able to To understand basic concepts of Wavelet Tra
	3.to design digital FIR filter using various window methods	Students will able to design digital FIR filter using various window
	4.to design digital IIR filter from anolog filter using various techniques	Students will able to design digital IIR filter from anolog filter usin
	5.to understand key architectural features of DSP and realize FIR and IIR filter	Students will able to understand key architectural features of DSP
	6.to understand the basic concepts of MultiMate digital signal processing	Students will able to understand the basic concepts of MultiMate
Video Engg.	1.To learn the fundamental concepts of transmitter & receiver	Understand fundamental concepts of transmitter & receiver
	2.To learn the different color TV systems & its compatibility	Understand & test different color TV systems & its compatibility
	3.to understand the working principles of digital TV, HDTV, LCD, DTH etc	Will able to describe & differentiate working principles of digital TV
Power Electronics	1.To understand fast switching semiconductor devices with their construction, working, characteristics and there fast control facility	Analyze and build simple Power Electronic circuits
	2.To describe the need and function of different types of converter and topology such as acac,dc-dc techniques	Categorize the various power electronic devices and power conver

	3.To provide the basis for further study of power electronics circuits and systems	Ability to design and conduct experiments.
	4.Design, analyze, model, build and test the operation of simple power electronic circuits in a lab environment	Proper understanding of various converters could be used with mu
Computer Architecture & Operating system	1.design and implement various blocks of Arithmetic Logic Unit.	Student should be able to design and implement various blocks of
	2.design and implement control unit and processor.	Student should be able to design and implement control unit and p
	3.give a complete overview of O.S.	Student should be able to give a complete overview of O.S.
	4.study the process management and issues.	Student should be able to study the process management and issu
	5.understand Classical IPC problems and solutions.	Student should be able to understand Classical IPC problems and s
	6.understand the various memory management schemes.	Student should be able to understand the various memory manage
Electronic System Design	1.To understand analog and digital system of TTL and CMOS integrated circuits.	Analyze and design of analog and digital system of TTL and CMOS i
	2.understand mathematics, science and engineering to design, analyze and operation of analog signal conditioning circuit	Apply knowledge of mathematics, science and engineering to desi
	3.To learn basic digital hardware electronic circuit design techniques and conversion from analog to digital and vice-versa	Explain basic digital hardware electronic circuit design techniques
	4.To understand specification development in biomedical system and its application	Understand the specification development in biomedical system a
	5.To learn switch mode power supply and able to understand industrial application	Design switch mode power supply and able to understand industri
	6.To Analyze the legislation and standards of EMC and PCB layout.	Analyze the legislation and standards of EMC and PCB layout.
Information Theory &	1.To introduce information theory, the fundamentals of error control coding techniques and their applications.	Students will be able to demonstrate the knowledge of analysis of
	2.To calculate the information content of a random variable from its probability distribution, Related to the joint, conditional, and marginal entropies of variables in terms of their probabilities.	Students will be able to introduce to the basic notions of informati

Coding Techniques	3.To understand the types of channels, Channel and their Capacities to construct efficient codes for data on imperfect communication channels.	Students can analyze the channel models mathematically.
	4.To understand the need & Objective of error control coding with encoding & decoding procedure to analyze error detecting & correcting capability of different codes.	Students will be able to design encoder and decoder for various cc
Embedded System Design	1.To learn and understand the characteristics of Embedded systems and its Architectures	Differentiate and apply important attributes of Embedded system
	2.To develop skill of ARM programming.	Use ARM programmers model to encode instructions so as to writ
	3.To introduce devices and buses used for embedded networking	Design small applications of UART, I2C, SPI.
	4.To study key features of Microcontroller LPC214X	Demonstrate scaling of execution speed using MAM and PLL, Savir
	5.To develop skill of programming on chip resources of LPC214X	Design small applications of GPIO, Timers, PWM, Real time clock, \
	6.To understand the concept of real time operating systems.	Understand the concepts of RTOS & its use in Embedded system
Computer Network	1.To provide students with an overview of the concepts and fundamentals of data communication and computer networks	State the evolution of Computer network, classifies different types
	2.Review the state of art in open research area such as LAN, MAN, WLAN & applications Computer Networking	Design, implements, and analyzes simple computer networks
	3.Acquire the required skill to design simple computer networks.	Identify, formulate, and solve network engineering problems.
		Understand basics of network security.
Image Processing	1.To learn the fundamental concepts of Digital Image Processing and study basic image processing operations.	Apply principles and techniques of digital image processing in appl
	2.To cover the basic analytical methods which are widely used in image processing; linear and nonlinear filtering; and image transformations for coding and restoration	Analyze and implement image processing algorithms.
	3.To design and implement algorithms for advanced image analysis.	Hands-on experience in using software tools for processing digital
	4.To expose students to current applications in the field of digital image processing	

Elective-I (SCOM)	1.To learn the basic concepts of satellite communication.	Students will able to understand basic concepts of satellite commu
	2.To explain the orbital mechanics, launch vehicles and satellite subsystems.	Students will able to understand the orbital mechanics, launch veh
	3.To learn the satellite link design	Ability to calculate satellite link budget.
	4.To understand V-SAT system.	Students will able to describe multiple access system.
	5.To understand satellite navigation and GPS	Student will able to understand satellite navigation and GPS.
Project-I	1.to gain mathematical, analytical and engineering knowledge to design products and will be able to analyse verify and test by using modern tools.	Students will be able to gain mathematical, analytical and enginee
	2.to give Selection/ Solution of problem suitable / useful for society, industry, personal uses which are not harmful for the environment.	Students will be able to give Selection/ Solution of problem suitabl
	3.create their own work by co-ordination and equal distribution.	Students will create their own work by co-ordination and equal dis
	4.Write synopsis and present themselves through Oral and power point presentation.	Students will be able to Write synopsis and present themselves thr
	5.Budgeting and optimizing cost of project which will be useful for their start up, higher education and employment.	Students will be able to do the Budgeting and optimizing cost of pr
Microwave Engineering	1.Understand the basic concept of microwave engineering, and apply EM wave theory	Analyse the microwave waveguides and passive circuit component
	2.Understand the theoretical and experimental design and analysis of microwave tube devices and circuits	Identify and differentiate the state of art in microwave tubes and t
	3.Learn the basics of Monolithic Microwave Integrated Circuits (MMIC)	Indentify materials used in MMIC and microwave hazards
	4.Study Microwave semiconductor devices & applications	Differentiate solid state devices used in microwave based on their
	5.To understand various microwave measurement techniques	Measure the output power, VSWR, impedance, frequency and wav
	6.Expose students to different microwave antennas	Apply the microwave antenna knowledge for industrial and scienti
	1.To elaborate and show how wireless networks are penetrating our daily lives for data, multimedia and voice services.	Explain wireless networking protocols (Bluetooth, Security etc.), architectures, and standards used for wireless communication systems

Wireless Communication Network	2.To explain them about the techniques in accessing, analyzing and transferring of remote end data with high reliability and security	Apply communication engineering concepts in preparing a link budget and design of cell geometry.
	3.To understand different Hand off concepts, channel assignment and frequency reuse concept	Discuss call establishment procedure
	4.To understand concept of GSM architecture and framing structure	Explain the importance of Multiple Access techniques, voice coding techniques and mobility management in GSM network
	5.To understand different Wireless LAN protocols and communication protocol such as IEE802.11	
	6.To understand wireless access protocols and WAP security.	
Power Electronics & Drives	1.To motive the students to develop the knowledge about various configurations of three phase controlled Rectifiers.	Ability to analyze and evaluate the three phase controlled convert
	2.To motive the students to develop the knowledge about various configurations of cycloconverter.	Ability to build power electronic circuits using matlab tools.
	3.To enable students to gain knowledge and understanding aspects of three phase inverter.	Understand the fundamental principles and applications ac drives
	4.To enable students to gain knowledge and understanding of ac & dc drives	Ability to design, analyze and understand the operation of inverter
	5.Applying matlab tools and methodologies for a design of power converter circuits.	
Elective-II	1.to understand techniques of digital image processing in applications related to digital imaging system design and analysis.	Apply principles and techniques of digital image processing in appl
	2.to learn the image processing algorithms.	Analyze and implement image processing algorithms.
	3.to get Hands-on experience in using software tools for processing digital images.	Hands-on experience in using software tools for processing digital
	1.to gain mathematical, analytical and engineering knowledge to design products and will be able to analyse verify and test by using modern tools.	Students will be able to gain mathematical, analytical and enginee

Project-II	2.to give Selection/ Solution of problem suitable / useful for society, industry, personal uses which are not harmful for the environment.	Students will be able to give Selection/ Solution of problem suitabl
	3.create their own work by co-ordination and equal distribution.	Students will create their own work by co-ordination and equal dis
	4.Write synopsis and present themselves through Oral and power point presentation.	Students will be able to Write synopsis and present themselves thr
	5.do the Budgeting and optimizing cost of project which will be useful for their start up, higher education and employment.	Students will be able to do the Budgeting and optimizing cost of project which will be useful for their start up, higher education and
Mechanical Engineering		
Course Name	**Course Objective**	**Course Outcome**
Applied Thermodynamics	1.To introduce student about basic physics and chemistry behind thermodynamics	Remember the fundamental laws of thermodynamics
	2.To study basic concepts of thermodynamics and its applications.	Understand and Solve the introductory problems on Rankine cycle.
	3.To study physical significance of entropy term and its application.	Classify steam generators and condensers and Steam turbines.
	4.To study application of first and second law of thermodynamics to various thermodynamic devices like Steam generator, Condenser, Nozzles andTurbines.	Design the steam nozzle
	5. To study different types of turbines and corresponding velocity diagrams.	Understand and Solve problems on Steam turbines.
		Understand the property of lubricants and selection of lubricants.
	To acquaint students with the basic concepts of Metal Structure	Understand basic concept of metal structure.

Metallurgy	To impart fundamental knowledge of Ferrous and Non Ferrous Metal Processing	Understand fundamental knowledge of Ferrous and Non Ferrous Metal.
	To study applications of different Metals and Alloys	Selection of Metals and Alloys for different application.
	To Know Fundamentals of Metallography	Understand need of Heat treatment and various heat treatment processes.
	To develop futuristic insight into Metals	
Fluid Mechanics	1. To identify various properties of fluids and their SI units	1. Understand properties of fluids and classification of fluid flows
	2. To state and illustrate fundamentals of Fluid Statics, Kinematics and Dynamics.	2. Identify the fluid flow problem and explain the theoretical concepts of fluid statics, fluid kinematics and fluid dynamics
	3. To study the use of Continuity Equation, Bernoulli's Equation and Momentum Equation for various applications.	3. Apply fundamental equation of fluid mechanics i.e. Continuity equation, Bernoulli's Equation and momentum equation for different fluid flow applications
	4. To study the theory of laminar flow and application of Hagen Poiseuille's equation	4. Make basic analysis of laminar flow to calculate resistance to it through circular pipe and parallel plates
	5. To understand the physics of fluid flow through the pipe and its applications.	5. Calculate different losses in fluid flow through different arrangements of pipes
		6. Apply theory of boundary layer, Drag and lift forces in proper cases
Machine Drawing	1. To study BIS conventions used in machine drawing.	1. Use BIS conventions in machine drawings.
	2. To find the line/curve of intersection between two solids.	2. Find line/curve of intersection between two solids.
	3. To study the function of various machine components.	3. Sketch the various machine components.
	4. To study the use of production drawings.	4. Read and interpret the given production drawings.
	5. To study assembly and detail drawings.	5. Understand significance of assembly and detail drawings.
	1.To understand how C++ improves C with object-oriented features	Write, compile and debug programs in C++ language
	2. To introduce an object oriented programming language	Design programs involving decision control statements, loop control statements and case control structures.

***Computer Programming**	3. After the students have successfully completed the course, they shall have sufficient knowledge of the basic computer operations and various programming techniques especially in C++	Develop algorithms for solving problems using object oriented language.
	To develop and enhance the programming skills amongst the students in general aswell as application of it in the field of Mechanical Engineering.	Apply their knowledge and programming skills to solve various computing problems in the field of Mechanical Engineering.
Workshop Practice – III	To study Patterns, Core boxes, Preparation of Pattern for solid casting.	Understand types of Patterns, Core boxes and Preparation of Pattern for solid casting.
	To study Sand testing, Size analysis, Moisture percentage, Permeability Test.	Understand properties of sand by permeability test, moisture percentage test, and green strength.
	To study Gating system for metal casting with casting defects.	Understand gating system for metal casting with casting defects
Applied Numerical Metho	To introduce numerical methods to solve different types of equations	Understand and apply various methods to find roots of equations.
	To introduce regression and interpolation techniques	Learn and Implement different methods to solve simultaneous equations.
	To know various methods of Differentiation & Integration.	Understand and apply the methods of Regression and interpolation.
	To apply the knowledge of these methods to solve practical problems.	Implement various numerical methods for differentiation and Integration
	To transform various methods into Computer Programs.	Apply various methods to solve engineering problems with Ordinary differential equations.
		Understand the methods to solve Partial differential equations involved in Engineering Problems.
	1. To gain knowledge of different types of stresses, strains and deformation induced in mechanical components due to external loads.	1. Apply concepts of analysis of mechanical elements to obtain solution to various types of loading and stresses induced in real time engineering problems.
	2. To study shear force and bending moment distribution for different types of loads and support conditions.	2. Draw shear force and bending moment diagrams for simple beams subjected to various loads and support conditions.

Analysis of Mechanical El	3. To study the distribution of various stresses and deformation in mechanical elements.	3. Compute and analyze bending and shear stresses in mechanical components.
	4. To study the analytical and graphical method to solve the problems in principal planes and stresses.	4. Determine plane stress, principal stress .maximum shear stress and their orientations using analytical method and Mohr's circle.
	5. To study the effect of component dimensions and shape on stresses and deformations.	5. Analyze the effect of deflection in beams.
	6. To study the buckling, and strain energy effect in mechanical elements	6. Evaluate buckling and strain energy in beams subject to various types of loading
Fluid and Turbo Machine	To learn the working principles of Impulse water turbines and also to study its velocity triangles .To study design parameters related to Turbines	Classify and understand working principle of rotodynamic machines and Reciprocating compressor.
	To learn the working principles of Reaction water turbines and also to study its velocity trianglesstudy design parameters related to Turbines	Remember Euler's equation of rotodynamic machines
	To understand the concept of Centrifugal pumps and its construction. To understand NPSH terms related to centrifugal pumps	Remember Euler's equation of rotodynamic machines
	To illustrate the concept of Reciprocating Air Compressors. To understand various parameters related to Air Compressors.	Apply the theoretical knowledge to solve numerical problems, select the machinesfor particular application.
	To illustrate the concept of centrifugal compressor, Axial compressors. To understand variousparameters related to rotodynamic air compressors	Analyze the machines to evaluate the performance.
	To discuss the working of Gas Turbines, and Jet engine and know its various configurations. To determine the efficiencies of gas turbines	
Theory of Machines – I	1. To represent kinematic behavior of different machine elements and mechanisms	1.Understand different types of mechanisms and their applications
	2. To select various Power transmitting devices.	2. Analyze kinematic theories of mechanism,
	3. To explain types of Cam with followers and select according to their applications	3.Design cam with follower for different applications

	4. To compare types of Governing mechanisms	4.Select different power transmitting elements according to application
	5. To analyze effect of friction in Mechanisms and machines	5.Select different governing mechanisms according to application
Machine Tools and Proces	To introduce different methods of Molding and Casting.	Identify various kinds of machine tools of previous and present era tools
	To introduce forming and Plastic Shaping processes.	Describe construction and working of basic machine tools.
	To study various Metal Removal Processes and Machine tools.	Demonstrate their understanding of plastic processing, injection moulding, extrusion and thermoforming.
	To study Nonconventional Machining.	Analyze the concept, mechanism of material removal with respect different processes.
	To study gear manufacturing processes.	In position to appreciate the merits of non-traditional machining and its applications in industries.
Testing and Measuremen	1. to gain knowledge of different types of measuring instruments for mechanical engineering	1. Understand basic constriction of working of various instruments
	2. to study and calibration of various measuring instruments	2. Select the various of types of instruments for the measurement system
Computer Aided Drafting	1. To understand importance of CAD tool	1. Draw 2D drawings and 3D models of simple components.
	2. To Develop an ability to create 2-D drawings	2. Analyze and interpret production Drawing
	3. To Create 3-D models of machine components	3. Use modern engineering techniques, tools and skills for engineering practice.
	4. To Create assembly of simple machine components with industrial approach.	4. Develop the skills for drafting using CAD software and get the knowledge to enhance the CAD utilities.
Computer Graphics	To introduce student about computer graphics leading to the ability to understand contemporary.	To acquire the knowledge of basics of computer graphics
	To study basic concepts of computer graphics techniques, focusing on 3D modeling, Image synthesis.	To Apply basic programming in C for line, rectangle, circle etc for different shapes.
	To study physical significance of Curves and Surfaces.	To recognize the importance of using three dimensional transformations like translation, scaling and rotating.
		To Analyzing the hidden unwanted parts in graphics and do the program on animation

		To choose the different of curves and surfaces
Workshop Practice – IV	To study Machine layout, installation of Machine Tools, selection of Tools.	Understand Machine layout, method of Machine Tool installation, selection of Tools for various machining operation.
	To study Lathe Machine, Drilling Machine, Milling Machine.	Understand Construction, Mechanism and Application of Lathe Machine, Drilling Machine, and Milling Machine.
	To study machining operations and prepare Job with its process sheet on Lathe machine.	Understand machining operations and prepare Job with plain turning, taper turning, external threading and knurling operation along with its process sheet
	To study basics of CNC and VMC Machine	Understand basics of CNC and VMC Machine
Control Engineering	Student should be able to understand control system, its types andapplications.	To understand control system, its type andapplications
	Student should be able to model physicalsystem.	To model physicalsystem.
	Student should be able to determine system stability and systemresponse.	To determine system stability and systemresponse.
	Student should be able to use MATLAB software to analyze controlsystem	To understand various controlactions.
		To use MATLAB software to analyze controlsystem
Theory of Machine - II	1. understand the basic theory on gears.	1. Identify the various types of gears.
	2. analyze the various types of gear trains used for transmission of motion and power.	2. Select a gear drive for practical purpose.
	3. study the gyroscopic effect on different vehicles, aero plane and ship.	3. Analyze the gyroscopic effects for practical life.
	4. study and analyze the problems on balancing of rotary masses.	4. Solve a balancing problem
	5. study the force analysis of simple mechanisms.	5. Do the balancing of practical devices to reduce vibration.
	6. study turning moment diagram.	6. Do force analysis of mechanisms.
	Studentswilllearnaboutwhatisheattransfer, what are the modes of heat transfer and their basic laws, and analysis of heat transfer problems in conduction, convection, radiation and combined modes.	Formulate basic equations for heat transferproblems.

Heat and Mass Transfer	Theywillalsolearngeneral ordifferential equations for conduction and radiation as well as governing equations of convection so that students can solve real time heat transfer problem.	Apply heat transfer principles to design and evaluate performance of thermal systems
	Studentswilllearnabout design and analysis of heat exchanger devices by using LMTD and NTU approach	Calculate the effectiveness and ratingof heat exchangers.
		Calculate heat transfer byradiation between objects withsimple geometries
		Calculate and evaluate the impact of boundary conditions on the solutions of heat transfer problems.
		Evaluate the relative contributions of different modes of heat transfer.
Machine Design - I	Study basic principles of machine design.	Apply basic principles of machine design
	Understand the principles involved in evaluating the dimensions of a component to satisfy functional and strength requirements	Design machine elements on the basis of strength concept
		Use design data books and standard practice
	Learn use of catalogues and design data book.	Select machine elements from Manufacturer's catalogue
Manufacturing Engineerir	Study of metal cutting technology including the process, measurements.	Identify and select proper cutting tool with respect to work piece materials
	Design and selection of various cutting tools and their industrial specifications	Identify and select proper cutting tool with respect to work piece materials
	Study of Geometry of various cutting tools.	Identify parameters of single and multipoint cutting tools.
	ntroduce the students to design practices of toolings (Jigs and Fixtures)	Design and Draw Jig and Fixture.
	Study of various press working tools	Select and design dies for press working operations.
	Study of various aspects of CNC machine technology and its tooling.	Understand and apply CNC Technology
	UnderstandParametric Modeling Fundamentals and Procedure	Understand and read engineering Drawings.
	Developan ability to create constrained 2-D Sketches	Prepare solid and surface models from 2D drawings.
	Create Solid Models of machine components	Prepare assemblies and BOM.

CAD/CAM Laboratory	Create assembly model with drafting.	Conversion of 3D Models into orthographic views.
	Create solid models using surfacing technique.	Know the process of CAD data exchange between the software
	UnderstandComputer Aided Manufacturing.	Understand the basics of Computer Aided Manufacturing.
Workshop Practice - V	1. Understand and perform the various machining operations.	1. Select the suitable machining operations and prepare process sheet to manufacture a component and implement the same.
	2. Implement principles of metrology.	2. Control key dimensions on a component using principles of metrology and assembly
	3. Design the sequence of various processes required to manufacture the components	
Mini-Project- I	To train the students for team work to realize an engineering task	Work in a group on specific assignment.
	To practice the steps involved for the selection, execution and reporting of the project.	Think creatively to come out with feasible solution for engineering real life problem
	To train the students to apply their engineering knowledge to real life problem solving.	Communicate required information and develope ideas
		Design basic mechanical components
Enterprises Resource Plar	1.know the basics ,evolution,importance of ERP	1.Understand the structure of an ERP system and know how process chains in materials management, production, controlling and sales are implemented in an ERP system
	2.correlate ERPand related technology	2.Implementation and customize an ERP system using the appropriate modeling methods, that are Entity Relationship Modeling (ERM) and Event-Driven Process Chains (EPC)
	3.understand manufacturing perspectives of ERP	3.Understand the customization of an ERP system and customize essential parts of materials management, production, controlling and sales in SAP ECC

	4.know business modules of ERP	4.Understand software design issues in state-of-the-art business software and realize the importance of project management in an ERP implementation project
	5. UNDESTAND THE KEY IMPLEMENTATION ISSUES AND SOME POPULAR PRODUCTS IN ERP	5.Understand what to expect, and not to expect, from a consultant implementing an ERP system
	6. understand implementation of ERPpackage	6.Understand the importance of IT governance in long-term relationships with a software vendor, such as SAP
Industrial Management a	State various functions of management	Apply the concepts of Industrial management and operations research approaches. Know various functional areas of management.
	Know Production and marketing functional area of management.	They will analyses issues in Managing operations and projects and various approaches to resolve those issues.
	Aware about norms of SSI, Industrial safety, MIS.	Formulate and solve a wide variety of applications and problems that can be addressed using Operations Research techniques as Linear programming problems.
	Apply Various Models of Operation Research Such as Linear Programming Model, Assignment Model, Transportation Model, Network Model and Sequencing Model.	Formulate and solve a wide variety of applications and problems that can be addressed using Operations Research techniques as Transportation and Assignment problems.
		Apply the various techniques of Project Management such as Network Model and Sequencing Model.
Industrial Fluid Power	To impart knowledge about the fundamentals ofHydraulic and pneumatic system	Do analysis of performance of Hydraulic and pneumatic system
	To prepare the students to study different pumps and compressors in hydraulic and pneumatic system.	Demonstrate Hydraulic and pneumatic system
	To educate the students about hydraulic fluidsandcharacteristics of fluids.	Apply Hydraulic and pneumatic system fundamentals to industrial applications
	To impart knowledge about various control valves and its functions	Demonstrate knowledge about the fundamentals of Hydraulic and pneumatic system
	To enable the students to design components of Hydraulic and pneumatic system	

Metrology and Quality Co	Understand the use of standards in measurement, gauges and tolerances	Identify and use various measuring instruments and select appropriate instrument for particular feature measurement.
	Understand the principle/s, construction, working and use of comparators and angle measuring instruments.	Distinguish and understand quality assurance and quality control. They can use control charts and sampling plans to manufacturing and service sector problems.
	Study the advanced methods in metrology and measurement of surface roughness	Learn advanced techniques of metrology in various industrial applications.
	Study the methods used for the measurement of screw threads and gears.	Prepare and understand drawings with general dimensions, tolerances and surface finish
	Understand the concept of quality control and SQC techniques.	
	Apply knowledge of measuring instruments in actual industry practice.	
Machine Design - II	1.Design machine elements subjected to fluctuating loading	1.Design machine elements subjected to fluctuating loading.
	2.Study the significance of interaction of manufacturing, assembly, and material election	2.Understand the effect and contribution of manufacturing, assembly, and material election
	3.Study effect of wear considerations and their relevance to design	3.Understand effect of tribological considerations on design
	4.Study and select rolling contact bearings used for mechanical systems	4.Select rolling contact bearings from manufacturer's catalogue
	5.Design hydrodynamic bearing using raimondi and boyd's method and heat balance	5.Design sliding contact bearings used in various mechanical systems
	6.Design various types of gears using strength and wear considerations.	Design various types of gears such as spur, helical, bevel and worm gear.6.
Internal Combustion Engi	Study constructional details and various types of internal combustionengine.	Demonstrate engine construction, function of various parts of theengine and classify I.C.Engines.
	Understand and analyze thermodynamic cycles of ICengines.	Demonstrate combustionmechanism.
	Understand combustion phenomenon in SI engine and Clengines.	Demonstrate importance and functions of various systems on theengine.

	Impart knowledge about various systems on the ICengines.	Demonstrate need and methods of enginetesting.
	Impart knowledge about various engine performance characteristics and itstesting.	Understand the impact of vehicular pollution and ways to reduce or control thepollution.
Computer Integrated Mar	To Provide basic foundation in computer aided design / manufacturing	To Compare and Represent 2-D and 3-D entities
	To Understand the fundamentals used to create and manipulate geometric models	To Apply transform techniques on 2-D and 3-D entities
	To Get acquainted with the basic CAD software designed for geometric modeling	To Examine CNC program for production of components
	To Learn working principles of NC machines CNC control and part programming	To Express the principles and methods of Rapid Prototyping
Workshop Practice -VI	1. Understand and perform the various machining operations.	1. Select the suitable machining operations and prepare process sheet to manufacture a component and implement the same.
	2. Implement principles of metrology.	2. Control key dimensions on a component using principles of metrology and assembly
	3. Design the sequence of various processes required to manufacture the components	
Mini-Project- II	To train the students for team work to realize an engineering task	Work in a group on specific assignment.
	To practice the steps involved for the selection, execution and reporting of the project.	Think creatively to come out with feasible solution for engineering real life problem
	To train the students to apply their engineering knowledge to real life problem solving.	Communicate required information and develope ideas
		Design basic mechanical components
	Study basic refrigeration cycles and Psychrometry	Demonstrate an understanding of the need and importance of HVAC technology, the typical and some advanced and innovative schematic designs, and the goals of HVAC engineering and HVAC systems.

Refrigeration and Air Con	Performance Evaluation of Refrigeration and Air Conditioning Systems	Demonstrate an understanding thermal comfort conditions with respect to temperature and humidity and human clothing and activities and its impact on human comfort, productivity, and health.
	Enable the students to analyze and solve refrigeration related problems by applying principles of mathematics, science and engineering	Demonstrate an understanding of psychrometrics and its application in HVAC engineering and design and will practice or observe psychrometric measurements.
		Demonstrate an understanding of heat transfer in buildings with a given architectural design and its application to heating and cooling load estimation especially including thermal lag effects by conducting a detailed annual load analysis for a representative building and present the results of this analysis in a formal report possibly including recommendations for energy conservation
		Demonstrate an understanding of the engineering and operation of vapor compression and possibly heat-driven refrigeration systems and evaporative cooling systems and understand contemporary issues of ozone depletion and global warming potential with respect to refrigeration systems.
Mechanical System Desig	1.Study the concept of aesthetics, ergonomics and creativity considerations in product	1.Incorporate aesthetic, ergonomic and creativity considerations in industrial product
	2.Study design of various mechanical systems such as pressure vessel, brakes, clutches, machine tool gear box, I.C. Engine components etc.	2.Design different systems such as Pressure vessel, Brakes, Clutches, Machine tool Gear
		box and I. C. Engine Components etc.
	3.Study the concepts of optimization of mechanical systems /elements.	3.Optimize design of various components/systems in mechanical engineering
		4.Use IS Codes, Design data books, Handbooks required for system design .

Finite Element Analysis	1. Define the basic finite element formulation techniques.	1. Elaborate the fundamental concepts, equations of equilibrium, Stress-strain relations and the principle of potential energy and approximations of differentials equations.
	2. Derive the finite element equations for 1d, 2d and 3d problems.	2. Develop the key concepts of finite element formulations by considering the 1D problem just as Shape function, element stiffness and boundary conditions.
	3. Formulate and solve basic problems in heat transfer, solid mechanics and fluid	3. Apply the finite element formulations for two dimensional plane stress and plane strain problems using constant strain triangle.
	mechanics.	
	4. Develop the computer program based on finite element methods.	4. Demonstrate the modelling aspects of axisymmetric solids subjected to axisymmetric loading.
	5. Use commercial software's to solve basic engineering problems in heat transfer, solid	5. Understand the Galerkin formulation for steady state heat transfer, torsion and potential flow.
	mechanics and fluid mechanics.	
AE(Elective-I)	1. Describe importance and basic knowledge of automobile engineering.	1. Explain components of automobile.
	2. Classify various automobile layouts and bodies.	2. Distinguish various types of automobile lay outs as per drive given to wheels.
	3. Demonstrate automobile systems, wheels and tyres and automobile electrical and electronic systems for understanding construction and working principle.	3. Identify types of automobile bodies and materials used for the same.
	4. Enable students to analyze and solve problems on automobile system by focus and critical thinking.	4. Demonstrate various automobile systems like clutch, gearbox final drive, brake, steering suspension wheels and Tyres, and its construction and working
	5. Demonstrate use of modern trends, techniques and skill to fulfill industrial needs by arranging industrial visit.	5. Demonstrate various electrical and electronic systems like lighting, starting charging electronic controlled management system and its construction and working principle, sensors used in automobile

		6. Solve the problems related with various resistances for the automobile, engine power calculation.
		7. Explain modern trends, techniques used in industries
IPD(Elective-II)	1. Explain the product development process,Challenges, Quality Aspects, Market Research in product development	1.Find the Customer Needs for a Quality Product through Market Research in product development process, Concept Generation, Selection and Testing.
	2.Identify the Customer Needs,Product Specification through Concept Generation, Selection and Testing.	2. Describe basics of Product Architecture, Prototyping and Cost and Value Engineering.
	3. Interpret Product Architecture and Design for Manufacturing &Assembly,Prototyping, Cost and Value Engineering.	3.Select the Standard Ergonomics and Industry Safety parameters in Product Design.
	4. Interpret the Ergonomics and Industry Safety with standards and Explain Product Data Management	
Total Quality Managemer	Know the concept of total quality and role of quality assurance.	Understand importance of assuring quality in the service or manufacturing sector and explain Quality assurance system
	Understand planning and controlling techniques for quality	Identify and solve the quality related problems in manufacturing or service sector at various stages by using various TQM tools and technique
	Know the reliability approach for quality	. Calculate reliability of system
	Realize benefits of taguchi's quality philosophy	Understand vendor rating and select suitable vendor
	Understand the key issues and some popular approaches to TQM implementation	Interpret various quality attributes and discuss the various quality approaches.
	Understand the current trends in TQM	Comment on quality using Taguchi Philosophy
Industrial Training	Familiar the students to realize an industrial work.	Comprehend the knowledge gained in the course work
		Create, select, learn and apply appropriate techniques, resources, and modern engineering tools

Project Phase -I	1. Embed the skill in group of students to work independently on a topic/ problem/ experimentation selected by them and encourage them to think independently on their own to bring out the conclusion under the given circumstances of the curriculum period in the budget provided with the guidance of the faculty.	1. Improve the professional competency and research aptitude in relevant area.
	2. Encourage creative thinking process to help them to get confidence by planning and carrying out the work plan of the project and to successfully complete the same, through observations, discussions and decision making process.	2. Develop the work practice in students to apply theoretical and practical tools/techniques to solve real life problems related to industry and current research.
Mechatronics	Produce competent Mechanical engineers with comprehensive knowledge of Mechatronics to enable them to apply the relevant knowledge and technologies for the design and realization of innovative systems and products.	Understand the importance of integration of Mechanical, Electronics and Control in the design of Mechatronics system.
	Supply qualified personnel to meet the requirement of specialist in Mechatronics.	Understand key elements of sensors and transducers and interfacing the same with problem under consideration through PLC.
	Prepare Mechanical Engineering students for advanced graduate studies in Mechatronics, Manufacturing engineering and related field.	
Energy and Power Engine	1. Acquire the knowledge of renewable sources of energy and utilization.	1. Demonstrate need of different energy sources and their importance
	2. Enable the student to estimate the potential of energy sources.	2. Analyze the utilization of solar, wind energy etc.
	3. Study various power stations , Performance and economic analysis	3. Comprehend various equipments/systems utilized in power plants

	4. Understand the new trends in power and energy sectors.	4. Illustrate power plant economics
Noise and Vibration	Study basic concepts of vibration analysis	Develop mathematical model to represent dynamic system.
	Acquaint with the principles of vibration measuring instruments	Estimate natural frequency of mechanical element/system.
	Create awareness about principles of sound level measurement and noise	Analyze vibratory response of mechanical element/system.
		Estimate the parameters of vibration isolation system.
		Carryout measurement of various vibration parameters.
		Understand relevance of noise in mechanical systems.
Industrial Engineering (El	Introduce students to the concept of integration of various resources	Analyze and design new method of performing job.
	Acquaint the students with tools and technique of industrial engineering.	Measure and estimate standard time for job.
	Analyze and design new method of performing job.	Understand different types of plant layouts.
	Understand work measurement techniques	Interpret job evaluation and merit rating.
IAR	Introduce automation and basic elements of automated systems.	Design techniques for the analysis and control of discrete event system
	Get knowledge of advanced automated and levels of automations	Apply knowledge of automation tools and other equipments for manufacturing and assembly components
	Introduce the industrial robotics and its applications	Operate in research and development centre for automation
	Knowledge of programming associated with robo-control	Identify efficiencies and limitation and provide in depth evaluation of robotic system for automated manufacturing applications
	Enable the students to analyze and solve cryogenics related problems by applying principles of mathematics, science and engineering.	Describe: different Cryogenic systems.
	Prepare students to use modern tools, techniques and skills to fulfill industrial needs related to low temperature systems.	Understand and interpret the analysis report in the field of Cryogenic.

Cryogenics	Effective communication skill to demonstrate cryogenics theories.	Apply knowledge of mathematics, science, and engineering for the needs in Cryogenic
	Develop a professional approach to lifelong learning in the cryogenics to include the awareness of social and environment issues associated with engineering practices.	Design systems as per the desired needs based on economical, social, and environmental issues associated with engineering practices.
	Develop a professional approach to lifelong learning in the cryogenics to include the awareness of social and environment	Communicate required information to develop various ideas related to design/research in different Cryogenic systems.
Project Phase -II	1. Embed the skill in group of students to work independently on a topic/ problem/ experimentation selected by them and encourage them to think independently on their own to bring out the conclusion under the given circumstances of the curriculum period in the budget provided with the guidance of the faculty.	1. Improve the professional competency and research aptitude in relevant area.
	2. Encourage creative thinking process to help them to get confidence by planning and carrying out the work plan of the project and to successfully complete the same, through observations, discussions and decision making process.	2. Develop the work practice in students to apply theoretical and practical tools/techniques to solve real life problems related to industry and current research.

Program Specific Outcome (PSO) of all departments	

Name of Program	Program Code	PSO
Chemical Engineering	625050710	1. Identify, analyze, design and develop solutions to Chemical Engineering problems of practical importance to industry and society.
		2. Demonstrate sound understanding of Chemical Engineering fundamentals to solve problems through the use of modern experimental methods, computer aided design and simulations software.

Civil Engineering	625019110	1 To design and execute cost effective civil engineering solutions for sustainable development.
mputer Science Engineeri	625024210	1. Develop applications, troubleshoot the problem, and provide novel solution in view the lastest technological achievements.
		2. Come up with the innovative ideas and awareness drives for the upliftment of the society and exhibit professional ethics.
nmics & Telecommunicati	625037210	Communication engineering to fulfil the societal needs.
		2. Apply fundamental knowledge of communication engineering to design and develop Electronics and communication system to cater need of industry
Mechanical Engineering	625061210	1. Student will be able to design and manufacture components and system as per requirement.
		2. Student will be able to apply this knowledge in thermal science and management practice as entrepreneur

Engineering Graduates will be able to:

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **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.

PO3. **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.

PO4. **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.

PO5. **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.

PO6. **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.

PO7. **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.

PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **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.

PO11. **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.

PO12**. 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.