Department of First Year Engineering:
Semester – I

CO of the Course "Engineering Mathematics-I"	
CO1	To Perform matrix operations. Solve the matrix equation using elementary matrix operations. To use systems of linear equations and matrix in engneering filed and the eigen values and corresponding eigenvector
CO2	To understand how to write complex numbers in polar form, and use to find roots of equtions and compute exponential and integrals powers of complex numbers. To apply De-Moivre's theorem to determine roots of polynomial and can express hyperbolic, inverse hyperbolic functions
CO3	To understand the convergence and divergence of infinite series and to evaluate successive differentiation
CO4	To be able to write expansion of function. To solve the limit of a function at a point or at infinity numerically by using L'Hospital's Rule.
CO5	TO evaluate partial derivatives and can implement to estimate maxima and minima of multivariable function.
CO6	To understand the applications of partial differentiation. To estimate maxima and minima of multivariable function.
CO of the Course "Engineering Physics"	
CO1	Describe the interference in thin films and explore few engineering applications. Explain diffraction of light and develop hands-on experience.
CO2	Summarize the fundamentals of acoustics and extend it to identify the problems in architectural acoustics. Understand the basics of ultrasonic's and estimate the applications in diverse fields.
CO3	Know fundamental principles and working of laser. Explain working of semiconductor, ruby and He-Ne laser system. Extend it to understand the applications of laser in diverse fields Understand basics of polarization and discover its few real-life applications.
CO4	Understand basics of Solid State Physics. On this basis, discuss functioning of few semiconductor devices. Demonstrate it in practical experiments.
CO5	Illustrate significance of Wave Particle Duality to realize the behavior of microscopic systems. Deduce Schrodinger's equations and apply it to one quantum mechanical problem

CO6	Summarize basics of superconductors and explore their technological applications in diverse fields. Describe few methods of synthesis of nanoparticles. Understand their physical properties. Estimate their applications in diverse fields.
CO of the Course "Engineering Chemistry"	
CO1	Student will able to analyze water sample & methods to improving quality of water & its utilization in industry.
CO2	Able to apply electro analytical techniques for qualitative and quantitative analysis of substance
CO3	Able to select specific polymer on the basis of their structure, properties & specific industrial application.
CO4	Able to classify the fossil fuel on the basis of their properties & applications.
CO5	Student will understand uses of allotropes & compound of C & H such as nano material & its modern applications.
CO6	Student will be able to identify types of corrosion & its prevention methods
CO of the Course "Basic Civil and Environmental Engineering"	
CO1	Understand principles of basic civil engineering and environmental engineering.
CO2	Use of basic as well as modern materials including their recycling in construction.
CO3	Use of modern survey equipments and application of GIS to sudy and prepare maps
CO4	Understand concept of ecology and ecosystem.
CO5	Know the concept of human impacts on environment, Environmental pollution & energy resources.
CO6	Learn various techniques of harnessing energy, environmental impact assessment(EIA) and built environment.
CO of the Course "Basic Electronics Engineering"	
CO1	To introduce the basics of semiconductors, diode circuits and it's applications.

CO2	To introduce Transistor Family, working and characteristics of transistor circuits and their applications.
CO3	To understand the working of Operational amplifier as Amplifier & Comparator & to learn it's Applications.
CO4	To study of logic gates and their usage in digital circuits. Understand Sequential & Combinational circuits.
CO5	To expose the students to working of some power electronics devices, transducers and application of transducers.
CO6	To introduce basic aspects of electronic communication system. Modulation Techniques & Mobile communication.
CO of the Course "Engineering Graphics"	
CO1	To learn about different types of lines, letters & projection of points, straight lines.
CO2	To know the projection of planes. (Triangle, pentagon, hexagon, circle etc.)
CO3	To know the projection of solids. (Cube, cylinder, prisms, cone etc.)
CO4	Ability to draw engineering curves & development of different types of surfaces.
CO5	Demonstrate the ability to draw orthographic projections of various solids.
CO6	Ability to draw isometric projection of various solids.
CO of the Course "Fundamentals of Programming Language-I"	
CO1	To learn and acquire the art of programming language.
CO2	To understand basics of all programming language.
CO3	Problem solving skills using computers
CO4	To learn basic of C programming
Semester –II	
CO of the Course "Engineering Mathematics-II"	
CO1	To introduce the formation of Differential equation from the given physical problems and to solve first order ordinary differential equation by

	various methods.
CO2	How to use the knowledge of first order ordinary differential equation in different engineering applications.
CO3	To find the Fourier series representation of a function of one variable and to find half-range Fourier series for even/odd functions.
CO4	To know the fundamental theorem of calculus and be able to use it for evaluating definite integrals and derivatives of integrals with variable limits of integration. To be able to do curve tracing of functions
CO5	To solve applied problems by using principles of Sphere, cone and cylinders.
CO6	To set up and evaluate multiple integrals for regions in the 3D
CO of the Course "Engineering Mechanics"	
CO1	Have a basic understanding of the laws and principles of mechanics.
CO2	To understand the concepts components of a force in rectangular or nonrectangular coordinates.
CO3	Understand and be able to Draw complete and correct free-body diagrams and write the appropriate equilibrium equations from the free-body diagram.
CO4	Understand and be able to apply forces in trusses and in general frame structures.
CO5	The ability to analyses and solve simple problems in mechanics.Understanding of the assumptions and limitations of the approaches used.
CO6	Understand and be able to apply other basic dynamics concepts - the Work-Energy principle, Impulse- Momentum principle and the coefficient of restitution
CO of the Course "Fundamentals of Programming Language-II"	
CO1	To learn and aquire the art of programming language.
CO2	To understand foundation of microcontroller and microprocessor
CO3	To understand basic of embedded C
CO4	understand the basics of advanced programming platforms
CO5	to understand intallation process of various operating systems

CO of the Course "Basic Mechanical Engineering"	
CO1	To know about different types of mechanical elements & Power transmission devices.
CO2	To know about different mechanical properties, selection of engineering materials used in manufacturing industries.
CO3	Students will be able to understand manufacturing processes and applications.
CO4	Able to explain the working of different types of operations on machines.
CO5	Enable students to distinguish different processes around them by applying knowledge in thermodynamics.
CO6	Able to explain the working of different types of power plants, power producing and power absorbing devices.
CO of the Course "Basic Electrical Engineering"	
CO1	Calculate energy consumption in electrical systems.
CO2	Basic knowledge about the Electric and Magnetic circuits, electromagnetism
CO3	Understand & demonstrate fundamentals of electromagnetism for working of single phase transformer & electrostatics
CO4	Apply knowledge of ac fundamentals to analyze series & parallel ac circuits
CO5	Use the concept of poly phase ac circuit to analyze three phase star, delta circuits
CO6	Apply the network theorems to analyze dc circut
CO7	To observe the electric safety aspect and conservation efforts

Department of Mechanical Engineering:

Semester –III

CO of the Course "Engineering Mathematics III"	
CO1	Solve higher order linear differential equations and apply to modeling and analyzing mass spring systems.
CO2	Apply Laplace transform and Fourier transform techniques to solve differential equations involved in engineering applications.
CO3	Apply statistical methods in testing and quality control.
CO4	Perform vector differentiation and integration, analyze the vector fields and apply to fluid flow problems.
CO5	Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.
CO6	Apply the concept of numerical integration in various applications.
CO of the Course "Manufacturing Process-I "	
CO1	Understand and analyze foundry practices like pattern making, mold making, Core making and Inspection of defects
CO2	Understand and analyze Hot and Cold Working, Rolling, Forging, Extrusion and Drawing Processes.
CO3	Understand different plastic molding processes, Extrusion of Plastic and Thermoforming
CO4	Understand different Welding and joining processes and its defects
CO5	Understand, Design and Analyze different sheet metal working processes
CO6	Understand the constructional details and Working of Centre Lathe
CO of the Course "Computer Aided Machine Drawing"	
CO1	Understand the importance of CAD in the light of allied technologies such as CAM,CAE, FEA, CFD, PLM.
CO2	Understand the significance of parametric technology and its application in 2D
CO3	Understand the significance of parametric feature-based modeling and its application in3D machine components modeling.

CO4	Ability to create 3D assemblies that represent static or dynamic Mechanical Systems.
CO5	Ability to ensure manufacturability and proper assembly of components and assemblies.
CO6	Ability to communicate between Design and Manufacturing using 2D drawings
CO of the Course "Thermodynamics"	
CO1	Apply various laws of thermodynamics to various processes and real systems
CO2	Apply the concept of Entropy, Calculate heat, work and other important thermodynamic properties for various ideal gas processes
CO3	Estimate performance of various Thermodynamic gas power cycles and gas refrigeration cycle and availability in each case.
CO4	Estimate the condition of steam and performance of vapour power cycle and vapour compression cycle
CO5	Use Psychromertic charts and estimate various essential properties related to Psychrometry and processes
CO6	Use Psychromertic charts and estimate various essential properties related to
CO of the Course "Material Science (MS)"	
CO1	Understand the basic concepts and properties of Material.
CO2	Detect the defects in crystal and its effect on crystal properties.
CO3	Define the mechanical properties of materials and conduct destructive and non destructive tests to evaluate and test the properties of materials.
CO4	Understand corrosion and suggest various means to prevent corrosion
CO5	Understand various surface modification processes.
CO6	Select proper metal, alloys, nonmetal and powder metallurgical component for specific requirement.
CO of the Course "Strength of Materials (SOM)"	
CO1	Demonstrate fundamental knowledge about various types of loading and

	stresses induced.
CO2	Draw SFD and BMD for different types of loads and support conditions.
CO3	Compute Moment of Inertia of Symmetric & unsymmetrical structural sections. Apply Bending theory, Evaluate bending stress, draw bending stress distribution diagram for Symmetric & unsymmetrical sections and design beam based on bending theory.
CO4	Analyze buckling and bending phenomenon in columns and beams.
CO5	Determine Stresses, strain & deformations in determinate shafts of homogeneous & composite circular cross section subjected to twisting moment.
CO6	Determine & understand the principal stresses on various oblique plane. Analyze the different failure theory and how to calculate the stresses strain energy and to design the application on these theories.
Semester IV	
CO of the Course "Fluid Mechanics (FM)"	
CO1	Describe and determine various properties of fluid for operating conditions encountered in fluid engineering problems
CO2	Determine total pressure and couple exerted by static fluid on plan and curved surfaces encountered in dam structures and stability of floating objects.
CO3	Describe various types of flow and their physics and determine velocity, acceleration stream function and velocity potential at any point in a flow field to recognize conditions of possibilities of fluid flow.
CO4	Discuss physics and the governing equations associated with laminar and turbulent flows to analyze and design flow measuring devices and pipe flow systems
CO5	Discuss physics of laminar and turbulent flows in external flow to determine drag and lift forces on surfaces of stationary and moving objects
CO6	Develop mathematical correlation for complex flow phenomenon in terms of dimensionless parameters.
CO of the Course "Soft Skills (SS)"	
CO1	Improved communication, interaction and presentation of ideas.

CO2	Right attitudinal and behaviouralchange
CO3	Developed right-attitudinal and behavioral change
CO4	Write resume and will be aware of corporate/Business Etiquettes
CO5	Team building capabilities and imrpoved Teamwork
CO of the Course "Theory of Machines – I (TOM-I)"	
CO1	Construct and demonstrate the working of planar mechanisms to be used in industrial applications.
CO2	Determine the mass moment of inertia of rigid bodies having symmetric and irregular shape.
CO3	Determine static and dynamic forces on components of slider crank mechanism.
CO4	Differentiate between different power absorbing and transmitting devices like Clutch, Brake and Dynamometer and calculate torque.
CO5	Analyze velocity and acceleration of simple mechanism by analytical and graphical methods.
CO of the Course "Engineering Metallurgy (EM)"	
CO1	Describe how metals and alloys formed and how the properties change due to microstructure
CO2	Apply core concepts in Engineering Metallurgy to solve engineering problems.
CO3	Conduct experiments, as well as to analyze and interpret data
CO4	Apply engineering Knowledge to prepare the heat treatment cycles, time & temp. required calculations for conduction of heat treatment as per requirement.
CO5	Possess the skills and techniques necessary for modern materials engineering practice.
CO6	Recognize how metals can be strengthened by alloying, cold-working, and heat treatment.
CO of the Course "Applied Thermodynamics (ATD)"	
CO1	Classify I.C engines construction and materials used, working principle and

	explain losses encountered in fuel air and actual cycle.
CO2	Analyze requirements of carburation, stages of combustion in SI engines, theory of abnormal combustion and combustion chambers for SI engine.
CO3	Evaluate fuel injection system, stages of combustion in CI engines, theory of abnormal combustion and combustion chambers for CI engine.
CO4	Evaluate performance of IC engines and results of the tests.
CO5	Explain systems necessary for efficient operation of IC engines and get familiar with emissions, norms and controlling techniques.
CO6	Explain the classification and working of air compressors and evaluate the performance of reciprocating air compressor.
Semester V	
CO of the Course "Design of Machine elements-I"	
CO1	Ability to analyze the stress-strain, of Machine Elements to understand, identify, quantify the failure modes.
CO2	Ability to Design Power Screw for Various Applications.
CO3	Ability to design fasteners and welded joints subjected to different loading conditions
CO4	Ability to design various Springs for strength and stiffness.
CO5	Select standard data and components by using Design Data Books, Codes and Standards for avoiding failure of machine components.
CO6	Ability to understand the actual mechanism of different failure of mechanical component
CO of the Course "Heat Transfer"	
CO1	Analyze the various modes of heat transfer and implement the basic heat conduction equations for steady one dimensional thermal system.
CO2	Implement the general heat conduction equation to thermal systems with and without internal heat generation and transient heat conduction.
CO3	Analyze the heat transfer rate in natural and forced convection and evaluate through experimentation investigation.
CO4	Interpret heat transfer by radiation between objects with simple geometries.
CO5	Analyze the heat transfer equipment and investigate the performance.

CO of the Course "Theory of Machines II”	
CO1	Student will be able to understand fundamentals of gear theory which will be the prerequisite for gear design..
CO2	Student will be able to perform force analysis of Spur, Helical, Bevel, Worm and Worm gear
CO3	The student to analyze speed and torque in epi-cyclic gear trains which will be the prerequisite for gear box design.
CO4	Student will be able to design cam profile for given follower motions and understand cam Jump phenomenon, advance cam curves
CO5	The student will synthesize a four bar mechanism with analytical and graphical method
CO6	a. The student will analyze the gyroscopic couple or effect for stabilization of Ship Aeroplane and Four wheeler vehicle. b. Student will choose appropriate drive for given application (stepped / step-less).
CO of the Course “Turbo Machine”	
CO1	Classify turbo machines along with its applications and discuss impulse momentum principle to evaluate performance parameters for flat, inclined plate, curved vane and series of vanes.
CO2	Analyze impulse water turbine with design aspects, selection criteria, performance parameters and characteristics for its use in hydroelectric power plant
CO3	Differentiate reaction water turbines, draft tube types, governing mechanism, with design aspects, selection criteria and determine performance parameters and characteristics
CO4	Discuss steam nozzle, impulse, and reaction steam turbine with governing mechanism, selection criteria, losses and evaluate performance parameters for its use in thermal power plant.
CO5	Classifyrotodynamic, centrifugal pump, heads, cavitation, priming, along with multi staging, system resistance curve and evaluate performance with design aspects and selection criteria for household and industrial application.
CO6	Discuss the construction and working of centrifugal and axial flow compressor with its analysis.

CO of the Course ”Metrology & Quality Control”	
CO1	Understand the methods of measurements, selection of measuring instruments/ standards of measurements, carry out data collection and its analysis.
CO2	Explain tolerance, limits of size, fits, geometrics and position tolerances and gauge design.
CO3	Understand and use/apply quality control techniques/ statistical tools appropriately.
CO4	Develop an ability of problem solving decision making by identifying and analyzing the cause for variation and recommend suitable corrective actions for quality improvement.
CO of the Course ”Skill Devlopment”	
CO1	To develop the skill for required in shop floor working.
CO2	To have knowledge of the different tools and tackles used in machine assembly shop.
CO3	Use of theoretical knowledge in practice
CO4	Practical aspect of the each component in the assembly of the machine
Semester VI	
CO of the Course ”Numerical Methods and Optimization ”	
CO1	Understand the concept of errors and mathematical accuracy
CO2	Learn the basic concept of numerical solution of Algebraic and linear
CO3	simultaneous equations
CO4	Generate Solutions for real life problem using optimization techniques
CO5	Use appropriate Numerical Methods to solve complex mechanical engineering problems and analyze research problem
CO6	Understand the Numerical solution of ordinary differential equations and partial
CO of the Course “Design of Machine Element-II”	

CO1	Design and analyze Gears to avoid bending and pitting failure for constant speed gear box.
CO2	Design sliding contact bearing and Select rolling contact bearing on the basis of dynamic loading for various applications.
CO3	Ability to design belt drives and selection of belt, rope and chain drives.
CO4	Select standard data and components by using Design Data Books, Codes and Standards for avoiding failure of machine components.
CO5	Ability to import different application of gears for suitable industrial use.
CO6	Ability to import different applications of bearing for industrial use.
CO of the Course "Refrigeration and Air Conditioning"	
CO1	Demonstrate the fundamental Principles of Thermodynamics and working principal of R.A.C. methods
CO2	Analyze the performance of the different Refrigeration cycle using P-h chart & property table & select appropriate for application.
CO3	Select the appropriate refrigerant with respect to properties, application & environmental issues by comparative study.
CO4	Analyze & Design appropriate air-conditioning system for any application
CO5	Illustrate and analyze the principles and working of various equipment & safety controls & select in RAC system
CO6	Demonstrate duct system design methods by solving simple numerical.
CO of the Course "Mechatronics"	
CO1	Identification of key elements of mechatronics system and its representation in terms of block diagram
CO2	Understanding the concept of signal processing and use of interfacing systems such as ADC, DAC, digital I/O
CO3	Interfacing of Sensors, Actuators using appropriate DAQ micro-controller
CO4	Time and Frequency domain analysis of system model (for control application)
CO5	PID control implementation on real time systems
CO6	Development of PLC ladder programming and implementation of real life system.

Semester VII	
CO of the Course "Hydraulics & Pneumatics"	
CO1	Understand the concept, basic working principle,basic energy conversion and storage units in hydraulic system.
CO2	Identify various applications of hydraulic & pneumatic systems
CO3	Selection of appropriate components required for hydraulic and pneumatic systems
CO4	Analyse hydraulic and pneumatic systems for industrial/mobile applications
CO5	Design a system according to the requirements
CO6	Develop and apply knowledge to various applications
CO of the Course "CADCAM and Automation"	
CO1	Apply homogeneous transformation matrix for geometrical transformations of 2D CAD entities for basic geometric transformations.
CO2	Use analytical and synthetic curves and surfaces in part modeling
CO3	Do real times analysis of simple mechanical elements like beams, trusses, etc. and comment on safety of engineering components using analysis software.
CO4	Generate CNC program for Turning / Milling and generate tool path using CAM software
CO5	Demonstrate understanding of various rapid manufacturing techniques and develop competency in designing and developing products using rapid manufacturing technology
CO6	Understand the robot systems and their applications in manufacturing industries.
CO of the Course "Dynamic of Machinery"	
CO1	Implement balancing technique to complete balancing of rotating & reciprocating masses in multi cylinder inline & radial engines.
CO2	Express the fundamentals of vibrations and estimate natural frequencies for single DOF un-damped and damped free vibratory systems.
CO3	Formulate analytical competency to judge the response to forced vibrations due to harmonic excitation, base excitation and excitation due to

	reciprocating and rotary unbalance
CO4	Formulate mathematical model and estimate natural frequencies, mode shapes (Eigen values and Eigen vectors) for DOF undamped free longitudinal and transverse vibratory systems.
CO5	Choose suitable vibration measuring instrument for industrial / real life applications and select suitable method for vibration control
CO6	Interpret noise, its measurement and reduction techniques for industry and day to day life problems
CO of the Course "Elective-I Finite Element Method"	
CO1	To explain the fundamentals of FEA pertaining to structural and heat transfer domain.
CO2	To formulate and solve 1D element structural problems involving bars, beams, trusses, frames and steady state heat transfer problems.
CO3	To construct and solve 2D element problems involving triangular, quadrilateral, axi-symmetric, Iso-parametric & higher order elements.
CO4	To evaluate appropriate FEA technique to solve dynamic vibrational problems.
CO5	To demonstrate the use of FEA software applied to solve structural and heat transfer problems.
CO of the Course "Elective-II Automobile Engineering"	
CO1	Classify I.C engines construction and materials used, working principle and explain losses encountered in fuel air and actual cycle.
CO2	Analyze requirements of carburetion , stages of combustion in SI engines, theory of abnormal combustion and combustion chambers for SI engine.
CO3	Evaluate fuel injection system, stages of combustion in CI engines, theory of abnormal combustion and combustion chambers for CI engine.
CO4	Evaluate performance of IC engines and results of the tests.
CO5	Explain systems necessary for efficient operation of IC engines and get familiar with emissions, norms and controlling techniques.
CO6	Explain the classification and working of air compressors and evaluate the performance of reciprocating air compressor.
Semester VIII	

CO of the Course "Energy Engineering"	
CO1	Describe the power generation scenario, the layout components of thermal power plant and analyze the improved Rankin cycle, Cogeneration cycle
CO2	Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and method to control the same
CO3	Recognize the layout, component details of hydroelectric power plant and nuclear power plant
CO4	Realize the details of diesel power plant, gas power plant and analyze gas turbine power cycle
CO5	Emphasize the fundaments of non-conventional power plants
CO6	Describe the different power plant electrical instruments and basic principles of economics of power generation.
CO of the Course "Mechanical System Design"	
CO1	The student will understand the difference between component level design and system level design.
CO2	Ability to design various mechanical systems like pressure vessels, machine tool gear boxes, material handling systems, etc. for the specifications stated/formulated.
CO3	Ability to learn optimum design principles and apply it to mechanical components.
CO4	Ability to handle system level projects from concept to product.
CO of the Course "Industrial Engineering"	
CO1	Describe different aspect of industrial engineering and productivity improvement techniques.
CO2	Apply different concepts of method study to improve the work content
CO3	describe and analyze techniques of work measurement and time study
CO4	Illustrate different aspect of work system design and production planning control
CO5	Identify various cost accounting and financial management practices applicable in different industries
CO6	Apply concept of engineering economy, ergonomics and industrial safety practices.

CO of the Course "Advanced Manufacturing Process"	
CO 1	Classify and analyze special forming processes
CO 2	Analyze and identify applicability of advanced joining processes
CO 3	Understand and analyze the basic mechanisms of hybrid non-conventional machining techniques
CO4	Select appropriate micro and nano fabrication techniques for engineering applications
CO5	Understand and apply various additive manufacturing technology for product development
CO6	Understand material characterization techniques to analyze effects of chemical composition, composition variation, crystal structure, etc.
CO of the Course "Product Design and Development"	
CO1	Understand essential factors for product design
CO2	Design product as per customer needs and satisfaction
CO3	Understand Processes and concepts during product development
CO4	Understand methods and processes of Forward and Reverse engineering
CO5	Carry various design processes as DFA, DFMEA, design for safety
CO6	Understand the product life cycle and product data management

ELECTRONICS & TELECOMMUNICATION

Semester –III

CO of the Course" Signal & System"	
CO1	Apply the knowledge of linear algebra topics like vector space, basis, dimension, inner product, norm and orthogonal basis to signals.
CO2	Analyse the spectral characteristics of continuous-time periodic and a periodic signals using Fourier analysis.
CO3	Classify systems based on their properties and determine the response of LSI system using convolution
CO4	Analyze system properties based on impulse response and Fourier analysis
CO5	Apply the Laplace transform and Z- transform for analyze of continuous-time and discrete-time signals and systems
CO6	Understand the process of sampling and the effects of under sampling.
CO of the Course "Electronic Devices and Circuits"	
CO1	Apply the knowledge of basic semiconductor material physics and understand fabrication processes.
CO2	Analyse the characteristics of various electronic devices like diode ,transistor etc.
CO3	Classify and Analyze the various circuit configurations of Transistor and MOSFETs
CO4	Illustrate the qualitative knowledge of Power electronic Devices.
CO5	Become Aware of the latest technological changes in Display Devices.
CO6	Design some circuits
CO of the Course"Electrical Circuits and Machines"	
CO1	Apply the knowledge of basic circuital law and simplify the network using reduction techniques
CO2	Analyze the circuit using Kirchhoff's law and Network simplification theorems
CO3	Infer and evaluate transient response, Steady state response, network functions

CO4	Obtain the maximum power transfer to the load , and Analyze the series resonant and parallel resonant circuit
CO5	evaluate two-port network parameters , design attenuators and equalizers
CO6	Synthesize one port network using Foster and Cauer Forms.
CO of the Course"Data Structures and Algorithms"	
CO1	Student will be able to choose appropriate data structure as applied to specified problem definition
CO2	Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
CO3	Students will be able to apply concepts learned in various domains like DBMS, compiler construction etc.
CO4	Students will be able to use linear and non-linear data structures like stacks, queues , linked list etc.
CO5	Understand various terminologies and traversals of trees and use them for various applications
CO6	Write and understand the programs that use arrays & pointers in C
CO of the Course"Digital Electronics"	
CO1	Apply the knowledge of Boolean Algebra and simplification of Boolean expressions to deduce optimal digital networks.
CO2	Study and examine the SSI, MSI and Programmable combinational networks.
CO3	Study and investigate the sequential networks suing counters and shift registers; summarize the performance of logic families with respect to their speed, power consumption, number of ICs and cost.
CO4	Work out SSI and MSI digital networks given a state diagram based on Mealy and Moore configurations.
CO5	Code combinational and sequential networks using Virology HDL.
CO6	Design of Digital Circuit
CO of the Course "Electronic Measuring Instruments and Tools"	
CO1	Understand fundamental of various electrical measurements.

CO2	Understand and describe specifications, features and capabilities of electronic instruments
CO3	Finalize the specifications of instrument and select an appropriate instrument for given measurement.
CO4	Carry out required measurement using various instruments under different setups.
CO5	Able to compare measuring instruments for performance parameters
CO6	Select appropriate instrument for the measurement of electrical parameter professionally
Semester IV	
CO of the Course"Integrated Circuits"	
CO1	Infer the DC and AC characteristics of operational amplifiers and its effect on output and their compensation techniques.
CO2	Elucidate and design the linear and non-linear applications of an opamp and special application Ics.
CO3	Explain and compare the working of multivibrators using special application IC 555 and general purpose opamp.
CO4	Classify and comprehend the working principle of data converters.
CO5	Illustrate the function of application specific ICs such as Voltage regulators,
CO6	PLL and its application in communication.
CO of the Course"Control Systems"	
CO1	Write the mathematical model for electrical and mechanical systems and find the transfer function using block diagram reduction technique and signal flow graphs
CO2	Analyze transient and steady state response of first order and second order systems using standard test signals and analyze steady state error.
CO3	Analyze about the stability of the systems by applying RH criteria and root locus techniques.
CO4	Analyze the stability of the system using frequency domain techniques such as Nyquist and Bode plots.

CO5	Analyze the stability of the system using root locus and bode plot
CO6	Analyze electrical and mechanical systems
CO of the Course"Analog Communication"	
CO1	Analyze energy and power spectral density of the signal.
CO2	Express the basic concepts of analog modulation schemes
CO3	Analyze different characteristics of receiver.
CO4	Calculate bandwidth and power requirements for analog systems.
CO5	Evaluate analog modulated waveform in time /frequency domain and also find modulation index.
CO6	Develop understanding about performance of analog communication systems
CO of the Course"Object Oriented Programming"	
CO1	Specify simple abstract data types and design implementations, using abstraction functions to document them.
CO2	Recognise features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity
CO3	Name and apply some common object-oriented design patterns and give examples of their use.
CO4	Design applications with an event-driven graphical user interface.
CO5	Identify the relative merits of different algorithmic designs.
CO6	Implement, test and debug solutions in C++.
CO of the Course"Engineering MIII"	
CO1	Understand the use of periodic signals and Fourier series to analyze circuits
CO2	Demonstrate Fourier Transform as a tool for solving Integral equations.
CO3	Use Method of Least Square for appropriate Curves
CO4	Choose appropriate Numerical methods to solve Algebraic and Transcendental equations
CO5	Demonstrate the concept of Interpolation and Numerical Integration

CO6	Apply Z Transform to solve Difference Equation
CO of the Course"employability skill development"	
CO1	Have skills and preparedness for aptitude tests
CO2	Be equipped with essential communication skills (writing, verbal and non-verbal)
CO3	Master the presentation skill and be ready for facing interviews.
CO4	Build team and lead it for problem solving
Semester: V	
CO of the Course"Digital Communication"	
CO1	Student Understand working of waveform coding techniques and understand their performance.
CO2	Apply the knowledge of signals and system and evaluate the performance of digital communication system in the presence of noise.
CO3	Describe and analyze the digital communication system with spread spectrum modulation.
CO4	Perform the time and frequency domain analysis of the signals in a digital communication system.
CO5	Analyze the performance of a baseband and pass band digital communication system in terms of
CO6	Perform the time and frequency domain analysis of the signals in a digital communication system.
CO of the Course"Digital Signal Processing"	
CO1	The student will be capable of calibrating and resolving different frequencies existing in any signal
CO2	The student will be in position to understand use of different transforms and analyze the discrete time signals and systems.
CO3	The student will realize the use of LTI filters for filtering different real world signals.

CO4	The student will be in a position to design and implement multistage sampling rate converter.
CO5	Design FIR and IIR type digital filters.
CO6	Compare the architectures of DSP and General Purpose Processors.
CO of the Course"Microcontroller &Applications"	
CO1	Learn architecture, features of typical Microcontroller and understand use of various hardware and software tools for developing embedded system applications
CO2	To understand the applications of Microprocessors and Microcontrollers
CO3	To understand need of microcontrollers in embedded system.
CO4	To understand architecture and features of typical Microcontroller
CO5	To learn interfacing of real world input and output devices
CO6	To study various hardware and software tools for developing applications
CO of the Course"Electromagnetic &Transmission lines"	
CO1	State the fundamental laws of Electrostatics and solve critical problems of Electrostatics
CO2	Classify the basic Magneto static theorems and laws and infer the magnetic properties of matter.
CO3	Summarize the concepts of electrodynamics & to derive and discuss the Maxwell's equations.
CO4	Discuss the behavior of Electric fields in matter and Polarization concepts
CO5	Derive the different derivations applicable to current density and capacitance and solving the same using Poisson's and laplace's
CO6	Formulate the wave equation and solve it for uniform plane wave in different media.
CO of the Course"Mechatronics"	
CO1	Understand Develop a simulation model for simple physical systems and explain mechatronics design process
CO2	Outline appropriate sensors and actuators for an engineering application
CO3	Write simple microcontroller programs

CO4	Understand linearization of nonlinear systems and elements of data acquisition
CO5	Understand various applications of design of Mechatronic systems
CO6	Understand principles of sensors their characteristics
CO of the Course"Employability Skills in Electronics Design"	
CO1	To teach the student , the art of applying basic concepts for designing electronic systems
CO2	To imbibe good design practices for robust design of electronic systems
CO3	To highlight the importance and significance of customer specifications/requirements
CO4	To teach electronic circuit function verification with an EDA tool
CO5	To create an interest in the field of electronic design as a prospective career option
Semester: VI	
CO of the Course"Power Electronics"	
CO1	Knowledge of basic construction and operation of power devices (such as MOSFET, IGBT, SCR & Triac).
CO2	Design & implement a triggering / gate drive circuit and Protection circuit for a power devices.
CO3	Know about design & analyze AC to DC Power converter.
CO4	Know about design & analyze DC to AC and AC to AC Power converters.
CO5	Know about design & analyze DC to DC Power converter.
CO6	Utilize power converters in different industrial applications.
CO of the Course"Information Theory Coding and Communication Network"	
CO1	Apply method for error control
CO2	Understanding of fundamental concepts of data communication and networking
CO3	Design a channel coding scheme

CO4	Data compression scheme using suitable source coding technique
CO5	To understand various channel coding techniques
CO6	information theoretic analysis of communication system
CO of the Course"Business Management"	
CO1	Get the idea about new developments in management.
CO2	Get the idea about new developments in management.
CO3	Understand the basic concepts in commerce, trade and industry.
CO4	Understand modern business practices and forms.
CO5	He will be exposed to modern business world.
CO6	Understand procedures and functioning of various business organizations
CO of the Course"Advanced Processor"	
CO1	Become familiar with importance and applications of advance microprocessor
CO2	Understand architecture of ARM processor
CO3	Understand instruction set of ARM processor
CO4	Be able to write hybrid (assembly & C) program for ARM microprocessor
CO5	Analyze given program to find out program output
CO6	Be able to interface input/output devices like Keyboard, LED, LCD, sensors with ARM7TDMI
CO of the Course"System Programming and Operating System"	
CO1	Student gain difference between operating system
CO2	Learn the important Linux/UNIX library functions and system calls.
CO3	Obtain a foundation for an advanced course in operating systems
CO4	learn the C language and get experience programming in C.
CO5	Understanding the basic set of commands and utilities in Linux/UNIX systems.
CO6	learn to develop software for Linux/UNIX systems.

CO of the Course"Power Electronics"	
CO1	Design & implement a triggering / gate drive circuit for a power device
CO2	Understand, perform & analyze different controlled converters
CO3	Evaluate battery backup time & design a battery charger.
CO4	Design & implement over voltage / over current protection circuit.
CO of the Course"Mini Project and Seminar"	
CO1	Understand, plan and execute a Mini Project with team.
CO2	Implement electronic hardware by learning PCB artwork design, soldering techniques
CO3	Prepare a technical report based on the Mini project
CO4	Deliver technical seminar based on the Mini Project work carried out
Semester –VII	
CO of the Course VLSI Design & Technology	
CO1	Write effective HDL coding for digital design
CO2	Apply knowledge of real time issues in digital design
CO3	Model digital circuit with HDL, simulate, synthesis and prototype in PLDs.
CO4	Design CMOS circuits for specified applications
CO5	Analyze various issues and constraints in design of an ASIC
CO6	Apply knowledge of testability in design and build self test circuit
CO of the Course"Computer Networks & Security"	
CO1	Understand fundamental underlying principles of computer networking
CO2	Describe and analyze the hardware, software, components of a network
CO3	Analyze the requirements for a given organizational structure
CO4	Have a basic knowledge of installing and configuring networking applications.
CO5	Specify and identify deficiencies in existing protocols, and then go onto

	select new and better protocol
CO6	Have a basic knowledge of the use of cryptography and network security.
CO of the Course"Radiation and Microwave Techniques"	
CO1	Differentiate various performance parameters of radiating elements
CO2	Analyze various radiating elements and arrays
CO3	Apply the knowledge of waveguide fundamentals in design of transmission lines
CO4	Design and set up a system consisting of various passive microwave components.
CO5	Analyze tube based and solid state active devices along with their applications.
CO6	Measure various performance parameters of microwave components
CO of the Course"Digital Image and Video Processing"	
CO1	Develop and implement basic mathematical operations on digital images.
CO2	Analyze and solve image enhancement and image restoration problems
CO3	Identify and design image processing techniques for object segmentation and recognition.
CO4	Represent objects and region of the image with appropriate method.
CO5	Apply 2-D data compression techniques for digital images.
CO6	Explore video signal representation and different algorithm for video processing
CO of the Course"Electronic Product Design"	
CO1	Understand various stages of hardware, software and PCBdesign.
CO2	Importance of product test &testspecifications
CO3	Special design considerations and importance ofdocumentation
CO4	To learn the different considerations of analog, digital and mixed circuitdesign
Semester: VIII	

CO of the Course"Mobile Communication"	
CO1	To understand switching techniques for voice and data traffic
CO2	To nurture students with knowledge of traffic engineering to design networks
CO3	To realize importance of cellular concepts and its propagation mechanism.
CO4	To understand architecture of GSM system.
CO of the Course"Broadband Communication Systems"	
CO1	To understand the three primary components of a fiber-optic communication system.
CO2	To understand the system design issues and the role of WDM components in advanced light wave systems.
CO3	To understand the basics of orbital mechanics and the look angles from ground stations to the satellite
CO4	To apply subject understanding in Link Design
CO of the Course"Audio Video Engineering"	
CO1	1. Apply the fundamentals of Analog Television and Colour Television standards.
CO2	2. Explain the fundamentals of Digital Television, DTV standards and parameters
CO3	3. Study and understand various HDTV standards and Digital TV broadcasting systems
CO4	acquainted with different types of analog, digital TV and HDTV systems
CO5	4. Understand acoustic fundamentals and various acoustic systems.
CO of the Course"Wireless Networks "	
CO1	To study the evolving wireless technologies and standards
CO2	To understand the architectures of various access technologies such as 3G, 4G, WiFi etc
CO3	To understand various protocols and services provided by next generation

	netwoks
CO4	Understand the transmission of voice and data through various networks
Department of Computer Engineering	
Semester –I	
CO of the Course "Discrete Mathematics"	
CO1	Illustrate concept of set theory, proposition & mathematical induction.
CO2	Discuss the basic concepts associated with relation, functions and their applications.
CO3	Explaining possible outcomes of elementary combinatorial processes such as permutation and combination and calculating the probabilities.
CO4	Explain concept in graph theory &apply algorithm to solve various mathematical problems.
CO5	Illustrate basic terminology in trees & apply algorithms to find minimum spanning tree.
CO6	To identify and prove the properties of groups and rings.
CO of the Course "Digital Electronics and Logic Design"	
CO1	Realize and simplify Boolean Algebraic assignments for designing digital circuits using K- Maps
CO2	Design and implement Sequential and Combinational digital circuits as per the specifications
CO3	Apply the knowledge to appropriate IC as per the design specifications.
CO4	Design simple digital systems using VHDL .
CO5	Develop simple embedded system for simple real world application.
CO6	To understand and compare the functionalities, properties and applicability of Logic Families
CO of the Course "Data Structures and Algorithms"	
CO1	To survey & understand algorithmic strategies & give presentations using open source documentation tools like Latex.

CO2	To adapt algorithms that develops SRS in the different UG projects.
CO3	To design write mathematical modeling of algorithms for problem solving and resolve the real time problems.
CO4	To solve problems of multi-core or distributed or concurrent/Parallel/Embedded environments
CO5	To find specific algorithms for a number of important computational problems like sorting, searching, and graphs, ...etc,
CO6	To understand the concept of NP-complete problems and Different techniques to deal with them.
CO of the Course "Computer Organization and Architecture"	
CO1	Analyze the principles of computer architecture using examples drawn from commercially available computers
CO2	Evaluate various design alternatives in processor organization
CO3	Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os and Outline the structure, function and characteristics of Computer system
CO4	Recognize and observe various functional units and describe the components of digital computer and do case studies, documentation of Intel 8086 operation types.
CO5	Identify the elements of modern instruction sets and judge the impact on processor design
CO6	Identify memory hierarchy, its performance and compare different methods for computer I/O and examine Pentium IV
CO of the Course "Object Oriented Programming"	
CO1	Analyzing the basic concepts of Object Oriented Programming.
CO2	Depicting the features of Object Oriented Programming
CO3	Studying the basic concept of Virtual Function and their use.
CO4	To understand the concept of Templates and Exception Handling
CO5	Study of Files and Streams.
CO6	Illustrate the Standard Template Library.
CO of the Course "Theory of Computation"	

CO1	Design, manipulate, and reason about formal computational models, such as automata and Turing machines
CO2	Identify relations between classes of computational problems, formal languages, and computational models
CO3	Apply mathematical knowledge and logic in solving problems
CO4	Illustrate various Turing machine and related hypotheses
CO5	Analyze deeper and broader concepts of grammar, parsing and push down automata.
CO6	Apply NP-completeness concepts to create proofs regarding the computational complexity of novel problems
CO of the Course "Database Management Systems"	
CO1	Identify structure of database system using data models and design E-R Model for given requirements and convert the same into database tables.
CO2	Describe database techniques such as SQL & PL/SQL.
CO3	Use latest database concepts such as NoSQL.
CO4	Explain transaction Management in relational database System.
CO5	Describe different database architecture and analyses the use of appropriate architecture in real time environment.
CO6	Use advanced database Programming concepts Big Data – HADOOP
CO of the Course "Software Engineering and Project Management"	
CO1	Decide on a process model for a developing a software project
CO2	Classify software applications and Identify unique features of various domains
CO3	Design test cases of a software system.
CO4	Understand basics of IT Project management.
CO5	Understand basics of IT Project management, Plan, schedule and execute a project considering the risk management.
CO6	Apply quality attributes in software development life cycle.
CO of the Course "Information Systems & Engineering Economics"	
CO1	Understand the need, usage and importance of an Information System to

	an organization.
CO2	Understand the activities that are undertaken while managing, designing, planning, implementation, and deployment of computerized information system in an organization.
CO3	Further the student would be aware of various Information System solutions like ERP, CRM, Data warehouses and the issues in successful implementation of these technology solutions in any organizations
CO4	Outline the past history, present position and expected performance of a company engaged in engineering practice or in the computer industry.
CO5	Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.
CO6	Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives.
CO of the Course "Computer Network"	
CO1	Analyze the requirements for a given organizational structure to select the most appropriate networking architecture, topologies, transmission mediums, and technologies
CO2	Demonstrate design issues, flow control and error control
CO3	Illustrate applications of Computer Network capabilities, selection and usage for various sectors of user community.
CO4	Demonstrate different routing and switching algorithms and to analyze it.
CO5	Analyze data flow between TCP/IP model using Application, Transport and Network Layer Protocols.To identify hardware and the its related standard .
CO6	Illustrate Client-Server architectures and prototypes by the means of correct standards and technology.
CO of the Course "Design and Analysis of Algorithms"	
CO1	To survey & understand algorithmic strategies & give presentations using open source documentation tools like Latex.
CO2	To adapt algorithms that develops SRS in the different UG projects.
CO3	To design write mathematical modeling of algorithms for problem solving and resolve the real time problems.
CO4	To solve problems of multi-core or distributed or

	concurrent/Parallel/Embedded environments
CO5	To find specific algorithms for a number of important computational problems like sorting, searching, and graphs, ...etc,
CO6	To adapt algorithm that solves dynamic and greedy approach..
CO of the Course "High Performance Computing"	
CO1	Write case studies in Business Analytic and Intelligence using mathematical models
CO2	Present a survey on applications for Business Analytic and Intelligence
CO3	Provide problem solutions for multi-core or distributed, concurrent/Parallel environments
CO4	Develop time and space efficient algorithms
CO5	To learn & use the new tools and technologies used for designing a compiler apply algorithmic strategies while solving problems
CO6	Develop problem solving abilities using Mathematics
CO of the Course "Artificial Intelligence and Robotics"	
CO1	Apply suitable Intelligent agents for various AI applications.
CO2	Design smart system using different search techniques like heuristic,informed and uninformed .
CO3	Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem.
CO4	Apply the suitable algorithms to solve AI problems. .
CO5	Describe various machine learning techniques and develop smart system application.
CO6	Relate machine learning techniques to embedded systems.
CO of the Course "Elective-I: "Sotware Architechture and Design"	
CO1	Perform the analysis and design of an application
CO2	Ability to specify functional semantics of an application.

CO3	Evaluate software architectures.
CO4	Select and use appropriate architectural styles and software design patterns.
CO5	Identify interaction between quality attributes and software architecture
CO6	Principles about software design and software architecture
CO of the Course "Elective-II: "Mobile Communication"	
CO1	Justify the Mobile Network performance parameters and design decisions.
CO2	Choose the modulation technique for setting up mobile network.
CO3	Formulate GSM/CDMA mobile network layout considering futuristic requirements which conforms to the technology.
CO4	Use the 3G/4G technology based network with bandwidth capacity planning
CO5	Percept to the requirements of next generation mobile network and mobile applications.
CO6	Apply design parameters for setting up mobile network.
Department of Computer Engineering	
Semester –II	
CO of the Course "Software Design Methodologies and Testing"	
CO1	To understand and apply software design methods
CO2	To select and apply architectural design using UML for a given software system
CO3	To choose and apply design patterns
CO4	To understand and apply different software testing models
CO5	To analyzing and apply different software testing strategies
CO6	To design test cases and apply modern software testing tools for client server, Distributed, mobile applications.
CO of the Course "High Performance Computing"	
CO1	To transform algorithms in the computational area to efficient programming code for modern computer architectures

CO2	To write, organize and handle programs for scientific computations
CO3	To create presentation using tools for performance optimization and debugging.
CO4	To present analysis of code with respect to performance, suggest and implement performance improvements.
CO5	To present test cases to solve problems for multi-core or distributed, concurrent/Parallel environment.
CO of the Course "Cyber Security"	
CO1	Critical understanding of basic characteristics, components and policies of information security.
CO2	Analyze and select the appropriate encryption technique and security standard for addressing the problems.
CO3	Analyze public key cryptography, key management to design and implement authentication services
CO4	Able to analyze advanced security requirements, issues and technologies
CO5	Master the characteristic of intrusion detection system and firewall tools.
CO6	Be familiar with network security with the perspective of Hacking and countermeasures
CO of the Course "Business Analytic and Intelligence"	
CO1	Illustrate the technical concepts of Business Intelligence & the role of mathematical model in it.
CO2	Demonstrate Concepts, methodologies and technologies behind DSS
CO3	Summarize the model & technologies of Data Warehouse
CO4	Analyze, Design the Data Analytics Model &select the technique of BI processing
CO5	Design and Manage the BI systems with ethics using engineering practice
CO6	Dealing with Contemporary Tools for Business Analytics & Intelligence with applications indifferent domain
CO of the Course "Design & Analysis of Algorithms"	
CO1	Understand the fundamentals of algorithm designs.

CO2	Solve a problem using an algorithm and evaluate its correctness
CO3	Describe, apply and analyze the complexity of certain divide and conquer, greedy, and dynamic programming, backtracking and branch and bound algorithm techniques to solve problems
CO4	Develop Understand the concepts of time and space complexity, worst case, average case and best case complexities
CO5	Analyze the asymptotic performance of algorithms.
CO6	Describe the classes P, NP, and NP-Complete and be able to prove that a certain problem is NP-Complete.
CO of the Course "Systems Programming & Operating System"	
CO1	Analyze and synthesize of assembler
CO2	Analyze and synthesize macro Processor
CO3	Use tools like LEX & YACC.
CO4	Implement operating system functions
CO5	Implement memory management functions of OS.
CO6	Implement different process scheduling algorithm.
CO of the Course "Embedded Systems & Internet of Things"	
CO1	Understand the basic concepts of Embedded System and IOT
CO2	Choose different design methodologies for embedded IoT
CO3	Implement an architectural design for IoT for specified requirements
CO4	Classify various IoT protocols and different security models.
CO5	Compare Web of Things and Cloud of Things
CO6	Choose between available technologies and devices for IoT implementation.
CO of the Course "Software Modeling and Design "	
CO1	To analyze the problem statement (SRS) and choose proper design technique for designing web-based or desktop application
CO2	To design and analyze an application using UML modeling as fundamental tool.

CO3	To apply design patterns to understand reusability design.
CO4	To decide and apply appropriate modern tool for designing and modeling.
CO5	To decide and apply appropriate modern testing tool for testing web-based or desktop application.
CO of the Course "Web Technology"	
CO1	To understand web and technologies that makes the web pages.
CO2	To understand the use of JavaScript and jQuery
CO3	To learn the Installation of Tomcat Server and execution of programs on server side.
CO4	Learn about creating, forming forms.
CO5	Develop web based application using suitable client side and server-side web technologies
CO6	Analyze and compare the difference between SOAP,REST and EJB
CO of the Course "Engineering Mathematics III"	
CO1	Apply knowledge of higher order linear differential equations to electrical circuits.
CO2	Solve problems related to Fourier transform, Z-Transform and applications to Signal and Image processing.
CO3	Apply statistical methods like correlation, regression analysis, Curve Fitting for analysis to extract information from research data and data of applied to machine intelligence.
CO4	Perform vector differentiation and integration to analyze the vector fields and apply to compute line, surface and volume integrals.
CO5	Apply probability theory for Estimation, predication and decision making to the real time data
CO6	Apply knowledge of Cauchy's Integral Formula to evaluate complex line integrals and to evaluate real definite integrals by Residue Theorem and also understand the concept of conformal mapping required in Image processing, Digital filters and Computer graphics
CO of the Course "Computer Graphics"	

CO1	To use different computer graphics algorithm to do elementary graphic operations
CO2	To use different computer graphics algorithms and concept to develop animation
CO3	To use scientific and strategic approach to develop gaming programs
CO4	To use concepts of computer graphics to solve complex problems in the domain of Computer Graphics
CO5	To develop the capability to know the concepts related to Computer Vision and Virtual reality
CO6	To grasping the main aspects of two dimensional graphics together with a basic exposition to three dimensional graphics.
CO of the Course "Advanced Data Structures"	
CO1	To apply appropriate advanced data structure and efficient algorithms to approach the problems of various domain.
CO2	To design the algorithms to solve the programming problems
CO3	To use effective and efficient data structures in solving various Computer Engineering domain problems.
CO4	To analyze the algorithmic solutions for resource requirements and optimization
CO5	To use appropriate modern tools to understand and analyze the functionalities confined to the data structure usage.
CO6	To build the logic to use appropriate data structure in logical and computational solutions
CO of the Course "Microprocessor"	
CO1	To learn basic programming Model of Advanced microprocessor.
CO2	To learn the architecture and management of instructions in advanced microprocessor.
CO3	To understand the protection mechanism in advanced microprocessor
CO4	To identify interrupts, Exception in Input/output operations.
CO5	To understand debugging and testing techniques confined to 80386 DX
CO6	Implement parallel processing and math Co-processor

CO of the Course "Principles of Programming Languages"	
CO1	To analyze the strengths and weaknesses of programming languages for program development
CO2	To classify the different data types and construct the structure of computation.
CO3	To analyse the comparisons of various programming languages.
CO4	To understand the basic of Object Oriented Programming Language.
CO5	To demonstrate the principles Object Oriented Programming using java.
CO6	To use the concept of exception handling and develop a program using applet.

Department of Mechanical Engineering:

Semester –III

CO of the Course "Engineering Mathematics III"	
CO1	Solve higher order linear differential equations and apply to modeling and analyzing mass spring systems.
CO2	Apply Laplace transform and Fourier transform techniques to solve differential equations involved in engineering applications.
CO3	Apply statistical methods in testing and quality control.
CO4	Perform vector differentiation and integration, analyze the vector fields and apply to fluid flow problems.
CO5	Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.
CO6	Apply the concept of numerical integration in various applications.
CO of the Course "Manufacturing Process-I "	
CO1	Understand and analyze foundry practices like pattern making, mold making, Core making and Inspection of defects
CO2	Understand and analyze Hot and Cold Working, Rolling, Forging, Extrusion and Drawing Processes.
CO3	Understand different plastic molding processes, Extrusion of Plastic and

	Thermoforming
CO4	Understand different Welding and joining processes and its defects
CO5	Understand, Design and Analyze different sheet metal working processes
CO6	Understand the constructional details and Working of Centre Lathe
CO of the Course "Computer Aided Machine Drawing"	
CO1	Understand the importance of CAD in the light of allied technologies such as CAM,CAE, FEA, CFD, PLM.
CO2	Understand the significance of parametric technology and its application in 2D
CO3	Understand the significance of parametric feature-based modeling and its application in3D machine components modeling.
CO4	Ability to create 3D assemblies that represent static or dynamic Mechanical Systems.
CO5	Ability to ensure manufacturability and proper assembly of components and assemblies.
CO6	Ability to communicate between Design and Manufacturing using 2D drawings
CO of the Course "Thermodynamics"	
CO1	Apply various laws of thermodynamics to various processes and real systems
CO2	Apply the concept of Entropy, Calculate heat, work and other important thermodynamic properties for various ideal gas processes
CO3	Estimate performance of various Thermodynamic gas power cycles and gas refrigeration cycle and availability in each case.
CO4	Estimate the condition of steam and performance of vapour power cycle and vapour compression cycle
CO5	Use Psychromertic charts and estimate various essential properties related to Psychrometry and processes
CO6	Use Psychromertic charts and estimate various essential properties related to
CO of the Course "Material Science (MS)"	

CO1	Understand the basic concepts and properties of Material.
CO2	Detect the defects in crystal and its effect on crystal properties.
CO3	Define the mechanical properties of materials and conduct destructive and non destructive tests to evaluate and test the properties of materials.
CO4	Understand corrosion and suggest various means to prevent corrosion
CO5	Understand various surface modification processes.
CO6	Select proper metal, alloys, nonmetal and powder metallurgical component for specific requirement.
CO of the Course "Strength of Materials (SOM)"	
CO1	Demonstrate fundamental knowledge about various types of loading and stresses induced.
CO2	Draw SFD and BMD for different types of loads and support conditions.
CO3	Compute Moment of Inertia of Symmetric & unsymmetrical structural sections. Apply Bending theory, Evaluate bending stress, draw bending stress distribution diagram for Symmetric & unsymmetrical sections and design beam based on bending theory.
CO4	Analyze buckling and bending phenomenon in columns and beams.
CO5	Determine Stresses, strain & deformations in determinate shafts of homogeneous & composite circular cross section subjected to twisting moment.
CO6	Determine & understand the principal stresses on various oblique plane. Analyze the different failure theory and how to calculate the stresses strain energy and to design the application on these theories.
	Semester IV
CO of the Course "Fluid Mechanics (FM)"	
CO1	Describe and determine various properties of fluid for operating conditions encountered in fluid engineering problems
CO2	Determine total pressure and couple exerted by static fluid on plan and curved

	surfaces encountered in dam structures and stability of floating objects.
CO3	Describe various types of flow and their physics and determine velocity, acceleration stream function and velocity potential at any point in a flow field to recognize conditions of possibilities of fluid flow.
CO4	Discuss physics and the governing equations associated with laminar and turbulent flows to analyze and design flow measuring devices and pipe flow systems
CO5	Discuss physics of laminar and turbulent flows in external flow to determine drag and lift forces on surfaces of stationary and moving objects
CO6	Develop mathematical correlation for complex flow phenomenon in terms of dimensionless parameters.
CO of the Course "Soft Skills (SS)"	
CO1	Improved communication, interaction and presentation of ideas.
CO2	Right attitudinal and behaviouralchange
CO3	Developed right-attitudinal and behavioral change
CO4	Write resume and will be aware of corporate/Business Etiquettes
CO5	Team building capabilities and imrpoved Teamwork
CO of the Course "Theory of Machines – I (TOM-I)"	
CO1	Construct and demonstrate the working of planar mechanisms to be used in industrial applications.
CO2	Determine the mass moment of inertia of rigid bodies having symmetric and irregular shape.
CO3	Determine static and dynamic forces on components of slider crank mechanism.
CO4	Differentiate between different power absorbing and transmitting devices like Clutch, Brake and Dynamometer and calculate torque.
CO5	Analyze velocity and acceleration of simple mechanism by analytical and graphical methods.

CO of the Course "Engineering Metallurgy (EM)"	
CO1	Describe how metals and alloys formed and how the properties change due to microstructure
CO2	Apply core concepts in Engineering Metallurgy to solve engineering problems.
CO3	Conduct experiments, as well as to analyze and interpret data
CO4	Apply engineering Knowledge to prepare the heat treatment cycles, time & temp. required calculations for conduction of heat treatment as per requirement.
CO5	Possess the skills and techniques necessary for modern materials engineering practice.
CO6	Recognize how metals can be strengthened by alloying, cold-working, and heat treatment.
CO of the Course "Applied Thermodynamics (ATD)"	
CO1	Classify I.C engines construction and materials used, working principle and explain losses encountered in fuel air and actual cycle.
CO2	Analyze requirements of carburation, stages of combustion in SI engines, theory of abnormal combustion and combustion chambers for SI engine.
CO3	Evaluate fuel injection system, stages of combustion in CI engines, theory of abnormal combustion and combustion chambers for CI engine.
CO4	Evaluate performance of IC engines and results of the tests.
CO5	Explain systems necessary for efficient operation of IC engines and get familiar with emissions, norms and controlling techniques.
CO6	Explain the classification and working of air compressors and evaluate the performance of reciprocating air compressor.
	Semester V
CO of the Course "Design of Machine elements-I"	
CO1	Ability to analyze the stress-strain, of Machine Elements to understand, identify, quantify the failure modes.
CO2	Ability to Design Power Screw for Various Applications.

CO3	Ability to design fasteners and welded joints subjected to different loading conditions
CO4	Ability to design various Springs for strength and stiffness.
CO5	Select standard data and components by using Design Data Books, Codes and Standards for avoiding failure of machine components.
CO6	Ability to understand the actual mechanism of different failure of mechanical component
CO of the Course ”Heat Transfer”	
CO1	Analyze the various modes of heat transfer and implement the basic heat conduction equations for steady one dimensional thermal system.
CO2	Implement the general heat conduction equation to thermal systems with and without internal heat generation and transient heat conduction.
CO3	Analyze the heat transfer rate in natural and forced convection and evaluate through experimentation investigation.
CO4	Interpret heat transfer by radiation between objects with simple geometries.
CO5	Analyze the heat transfer equipment and investigate the performance.
CO of the Course "Theory of Machines II”	
CO1	Student will be able to understand fundamentals of gear theory which will be the prerequisite for gear design..
CO2	Student will be able to perform force analysis of Spur, Helical, Bevel, Worm and Worm gear
CO3	The student to analyze speed and torque in epi-cyclic gear trains which will be the prerequisite for gear box design.
CO4	Student will be able to design cam profile for given follower motions and understand cam Jump phenomenon, advance cam curves
CO5	The student will synthesize a four bar mechanism with analytical and graphical method

CO6	a. The student will analyze the gyroscopic couple or effect for stabilization of Ship Aeroplane and Four wheeler vehicle. b. Student will choose appropriate drive for given application (stepped / step-less).
CO of the Course "Turbo Machine"	
CO1	Classify turbo machines along with its applications and discuss impulse momentum principle to evaluate performance parameters for flat, inclined plate, curved vane and series of vanes.
CO2	Analyze impulse water turbine with design aspects, selection criteria, performance parameters and characteristics for its use in hydroelectric power plant
CO3	Differentiate reaction water turbines, draft tube types, governing mechanism, with design aspects, selection criteria and determine performance parameters and characteristics
CO4	Discuss steam nozzle, impulse, and reaction steam turbine with governing mechanism, selection criteria, losses and evaluate performance parameters for its use in thermal power plant.
CO5	Classifyrotodynamic, centrifugal pump, heads, cavitation, priming, along with multi staging, system resistance curve and evaluate performance with design aspects and selection criteria for household and industrial application.
CO6	Discuss the construction and working of centrifugal and axial flow compressor with its analysis.
CO of the Course "Metrology & Quality Control"	
CO1	Understand the methods of measurements, selection of measuring instruments/ standards of measurements, carry out data collection and its analysis.
CO2	Explain tolerance, limits of size, fits, geometrics and position tolerances and gauge design.
CO3	Understand and use/apply quality control techniques/ statistical tools appropriately.
CO4	Develop an ability of problem solving decision making by identifying and analyzing the cause for variation and recommend suitable corrective actions for quality improvement.

CO of the Course ”Skill Devlopment”	
CO1	To develop the skill for required in shop floor working.
CO2	To have knowledge of the different tools and tackles used in machine assembly shop.
CO3	Use of theoretical knowledge in practice
CO4	Practical aspect of the each component in the assembly of the machine
	Semester VI
CO of the Course ”Numerical Methods and Optimization ”	
CO1	Understand the concept of errors and mathematical accuracy
CO2	Learn the basic concept of numerical solution of Algebraic and linear
CO3	simultaneous equations
CO4	Generate Solutions for real life problem using optimization techniques
CO5	Use appropriate Numerical Methods to solve complex mechanical engineering problems and analyze research problem
CO6	Understand the Numerical solution of ordinary differential equations and partial
CO of the Course “Design of Machine Element-II”	
CO1	Design and analyze Gears to avoid bending and pitting failure for constant speed gear box.
CO2	Design sliding contact bearing and Select rolling contact bearing on the basis of dynamic loading for various applications.
CO3	Ability to design belt drives and selection of belt, rope and chain drives.
CO4	Select standard data and components by using Design Data Books, Codes and Standards for avoiding failure of machine components.
CO5	Ability to import different application of gears for suitable industrial use.
CO6	Ability to import different applications of bearing for industrial use.

CO of the Course "Refrigeration and Air Conditioning"	
CO1	Demonstrate the fundamental Principles of Thermodynamics and working principal of R.A.C. methods
CO2	Analyze the performance of the different Refrigeration cycle using P-h chart & property table & select appropriate for application.
CO3	Select the appropriate refrigerant with respect to properties, application & environmental issues by comparative study.
CO4	Analyze & Design appropriate air-conditioning system for any application
CO5	Illustrate and analyze the principles and working of various equipment & safety controls & select in RAC system
CO6	Demonstrate duct system design methods by solving simple numerical.
CO of the Course "Mechatronics"	
CO1	Identification of key elements of mechatronics system and its representation in terms of block diagram
CO2	Understanding the concept of signal processing and use of interfacing systems such as ADC, DAC, digital I/O
CO3	Interfacing of Sensors, Actuators using appropriate DAQ micro-controller
CO4	Time and Frequency domain analysis of system model (for control application)
CO5	PID control implementation on real time systems
CO6	Development of PLC ladder programming and implementation of real life system.
Semester VII	
CO of the Course "Hydraulics & Pneumatics"	
CO1	Understand the concept, basic working principle,basic energy conversion and storage units in hydraulic system.
CO2	Identify various applications of hydraulic & pneumatic systems
CO3	Selection of appropriate components required for hydraulic and pneumatic systems

CO4	Analyse hydraulic and pneumatic systems for industrial/mobile applications
CO5	Design a system according to the requirements
CO6	Develop and apply knowledge to various applications
CO of the Course "CADCAM and Automation"	
CO1	Apply homogeneous transformation matrix for geometrical transformations of 2D CAD entities for basic geometric transformations.
CO2	Use analytical and synthetic curves and surfaces in part modeling
CO3	Do real times analysis of simple mechanical elements like beams, trusses, etc. and comment on safety of engineering components using analysis software.
CO4	Generate CNC program for Turning / Milling and generate tool path using CAM software
CO5	Demonstrate understanding of various rapid manufacturing techniques and develop competency in designing and developing products using rapid manufacturing technology
CO6	Understand the robot systems and their applications in manufacturing industries.
CO of the Course "Dynamic of Machinery"	
CO1	Implement balancing technique to complete balancing of rotating & reciprocating masses in multi cylinder inline & radial engines.
CO2	Express the fundamentals of vibrations and estimate natural frequencies for single DOF un-damped and damped free vibratory systems.
CO3	Formulate analytical competency to judge the response to forced vibrations due to harmonic excitation, base excitation and excitation due to reciprocating and rotary unbalance
CO4	Formulate mathematical model and estimate natural frequencies, mode shapes (Eigen values and Eigen vectors) for DOF undamped free longitudinal and transverse vibratory systems.
CO5	Choose suitable vibration measuring instrument for industrial / real life applications and select suitable method for vibration control
CO6	Interpret noise, its measurement and reduction techniques for industry and day to day life problems

CO of the Course "Elective-I Finite Element Method"	
CO1	To explain the fundamentals of FEA pertaining to structural and heat transfer domain.
CO2	To formulate and solve 1D element structural problems involving bars, beams, trusses, frames and steady state heat transfer problems.
CO3	To construct and solve 2D element problems involving triangular, quadrilateral, axi-symmetric, Iso-parametric & higher order elements.
CO4	To evaluate appropriate FEA technique to solve dynamic vibrational problems.
CO5	To demonstrate the use of FEA software applied to solve structural and heat transfer problems.
CO of the Course "Elective-II Automobile Engineering"	
CO1	Classify I.C engines construction and materials used, working principle and explain losses encountered in fuel air and actual cycle.
CO2	Analyze requirements of carburetion , stages of combustion in SI engines, theory of abnormal combustion and combustion chambers for SI engine.
CO3	Evaluate fuel injection system, stages of combustion in CI engines, theory of abnormal combustion and combustion chambers for CI engine.
CO4	Evaluate performance of IC engines and results of the tests.
CO5	Explain systems necessary for efficient operation of IC engines and get familiar with emissions, norms and controlling techniques.
CO6	Explain the classification and working of air compressors and evaluate the performance of reciprocating air compressor.
	Semester VIII
CO of the Course "Energy Engineering"	
CO1	Describe the power generation scenario, the layout components of thermal power plant and analyze the improved Rankin cycle, Cogeneration cycle
CO2	Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and method to control the same
CO3	Recognize the layout, component details of hydroelectric power plant and

	nuclear power plant
CO4	Realize the details of diesel power plant, gas power plant and analyze gas turbine power cycle
CO5	Emphasize the fundaments of non-conventional power plants
CO6	Describe the different power plant electrical instruments and basic principles of economics of power generation.
CO of the Course "Mechanical System Design"	
CO1	The student will understand the difference between component level design and system level design.
CO2	Ability to design various mechanical systems like pressure vessels, machine tool gear boxes, material handling systems, etc. for the specifications stated/formulated.
CO3	Ability to learn optimum design principles and apply it to mechanical components.
CO4	Ability to handle system level projects from concept to product.
CO of the Course "Industrial Engineering"	
CO1	Describe different aspect of industrial engineering and productivity improvement techniques.
CO2	Apply different concepts of method study to improve the work content
CO3	describe and analyze techniques of work measurement and time study
CO4	Illustrate different aspect of work system design and production planning control
CO5	Identify various cost accounting and financial management practices applicable in different industries
CO6	Apply concept of engineering economy, ergonomics and industrial safety practices.
CO of the Course "Advanced Manufacturing Process"	
CO 1	Classify and analyze special forming processes

CO 2	Analyze and identify applicability of advanced joining processes
CO 3	Understand and analyze the basic mechanisms of hybrid non-conventional machining techniques
CO4	Select appropriate micro and nano fabrication techniques for engineering applications
CO5	Understand and apply various additive manufacturing technology for product development
CO6	Understand material characterization techniques to analyze effects of chemical composition, composition variation, crystal structure, etc.
CO of the Course "Product Design and Development"	
CO1	Understand essential factors for product design
CO2	Design product as per customer needs and satisfaction
CO3	Understand Processes and concepts during product development
CO4	Understand methods and processes of Forward and Reverse engineering
CO5	Carry various design processes as DFA, DFMEA, design for safety
CO6	Understand the product life cycle and product data management