Course Outcomes of Department of Mechanical Engineering

Course Name	Engineering Mathematics – III
Course Code	17MAT31
CO1	Know the use of periodic signals and Fourier series to analyze circuits and system communications.
CO2	Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier Transform and z-transform.
CO3	Employ appropriate numerical methods to solve algebraic and transcendental equations.
CO4	Apply Green's Theorem, Divergence Theorem and Stokes' theorem in various applications in the field of electro-magnetic and gravitational fields and fluid flow problems.
CO5	Determine the extremals of functionals and solve the simple problems of the calculus of variations.
Course Name	Materials Science
Course Code	17ME32
CO1	Describe the mechanical properties of metals, their alloys and various modes of failure.
CO2	Understand the microstructures of ferrous and non-ferrous materials to mechanical properties
CO3	Explain the processes of heat treatment of various alloys.
CO4	Understand the properties and potentialities of various materials available and material selection procedures
CO5	Know about composite materials and their processing as well as applications.
Course Name	Basic Thermodynamics
Course Code	17ME33
CO1	Explain thermodynamic systems, properties, Zeroth law of thermodynamics, temperature scales and energy interactions
CO2	Determine heat, work, internal energy, enthalpy for flow & non flow process using First and Second Law of Thermodynamics
CO3	Interpret behavior of pure substances and its applications to practical problems
CO4	Determine change in internal energy, change in enthalpy and change in entropy using TD relations for ideal gases
CO5	Calculate Thermodynamics properties of real gases at all ranges of pressure, temperatures using modified equation of state including Vander Waals equation, Redlich Wong equation and Beattie
Course Name	Mechanics of Materials
Course Code	17ME34
CO1	Understand simple, compound, thermal stresses and strains their relations, Poisson’s ratio, Hooke’s law, mechanical properties including elastic constants and their relations.
CO2	Determine stresses, strains and deformations in bars with varying circular and rectangular cross-sections subjected to normal and temperature loads
CO3	Determine plane stress, principal stress, maximum shear stress and their orientations using analytical method and Mohr’s circle
CO4	Determine the dimensions of structural members including beams, bars and rods using Energy methods and also stress distribution in thick and thin cylinders
CO5	Draw SFD and BMD for different beams including cantilever beams, simply supported beams and overhanging beams subjected to UDL, UVL, Point loads and couples
CO6	Determine dimensions, bending stress, shear stress and its distribution in beams of circular, rectangular, symmetrical I and T sections subjected to point loads and UDL

CO7	Determine the dimensions of shafts based on torsional strength, rigidity and flexibility and also elastic stability of columns using Rankin's and Euler's theory
Course Name	Metal Casting and Welding
Course Code	15ME35A
CO1	Describe the casting process, preparation of Green, Core, dry sand molds and Sweep, Shell, Investment and plaster molds.
CO2	Explain the Pattern, Core, Gating, Riser system and Jolt, Squeeze, Sand Slinger Molding Machines.
CO3	Compare the Gas fired pit, Resistance, Coreless, Electrical and Cupola Metal Furnaces.
CO4	Compare the Gravity, Pressure die, Centrifugal, Squeeze, slush and Continuous Metal mold castings.
CO5	Explain the Solidification process and Casting of Non-Ferrous Metals.
CO6	Describe the Metal Arc, TIG, MIG, Submerged and Atomic Hydrogen Welding processes used in manufacturing.
CO7	Explain the Resistance spot, Seam, Butt, Projection, Friction, Explosive, Thermit, Laser and Electron Beam Special type of welding process used in manufacturing.
CO8	Describe the Metallurgical aspects in Welding and inspection methods for the quality assurance of components made of casting and joining process
Course Name	Computer Aided Machine Drawing
Course Code	17ME36A
CO1	Sections of pyramids, prisms, cubes, cones and cylinders resting on their bases in 2D
CO2	Orthographic views of machine parts with and without sectioning in 2D.
CO3	Sectional views for threads with terminologies of ISO Metric, BSW, square and acme, sellers and American standard threads in 2D.
CO4	Hexagonal and square headed bolt and nut with washer, stud bolts with nut and lock nut, flanged nut, slotted nut, taper and split pin for locking counter sunk head screw, grub screw, Allen screw assemblies in 2D
CO5	Parallel key, Taper key, and Woodruff Key as per the ISO standards in 2D
CO6	single and double riveted lap joints, butt joints with single/double cover straps, cotter and knuckle joint for two rods in 2D
CO7	Sketch split muff, protected type flanged, pin type flexible, Oldham's and universal couplings in 2D
CO8	assemblies from the part drawings with limits ,fits and tolerance given for Plummer block, Ram bottom safety valve, I.C. Engine connecting rod,Screw Jack, Tailstock of lathe, Machine Vice and Lathe square tool post in 2D and 3D
Course Name	MATERIALS TESTING LAB
Course Code	17MEL37A
CO1	Acquire experimentation skills in the field of material testing.
CO2	Develop theoretical understanding of the mechanical properties of materials by performing experiments
CO3	Apply the knowledge to analyze a material failure and determine the failure inducing agent/s.
CO4	Apply the knowledge of testing methods in related areas.
CO5	Know how to improve structure/behavior of materials for various industrial applications.
Course Name	FOUNDRY AND FORGING LAB
Course Code	17MEL38A
CO1	Demonstrate various skills of sand preparation, molding.
CO2	Demonstrate various skills of forging operations
CO3	Work as a team keeping up ethical principles.
Course Name	ENGG. MATHEMATICS – IV

Course Code	17MAT41
CO1	Solve first and second order ordinary differential equation arising in flow problems using single step and multistep numerical methods
CO2	Illustrate problems of potential theory, quantum mechanics and heat conduction by employing notions and properties of Bessel's functions and Legendre's polynomials.
CO3	Explain the concepts of analytic functions, residues, poles of complex potentials and describe conformal and Bilinear transformation arising in field theory and signal processing.
CO4	Develop probability distribution of discrete, continuous random variables and joint probability distribution occurring in digital signal processing, information theory and design engineering.
CO5	Demonstrate testing of hypothesis of sampling distributions and illustrate examples of Markov chains related to discrete parameter stochastic process.
Course Name	KINEMATICS OF MACHINES
Course Code	17ME42
CO1	Identify mechanisms with basic understanding of motion.
CO2	Comprehend motion analysis of planar mechanisms, gears, gear trains and cams.
CO3	Carry out motion analysis of planar mechanisms, gears, gear trains and cams.
Course Name	APPLIED THERMODYNAMICS
Course Code	17ME43
CO1	Apply thermodynamic concepts to analyze the performance of gas power cycles including propulsion systems.
CO2	Evaluate the performance of steam turbine components.
CO3	Understand combustion of fuels and combustion processes in I C engines including alternate fuels and pollution effect on environment.
CO4	Apply thermodynamic concepts to analyze turbo machines.
CO5	Determine performance parameters of refrigeration and air-conditioning systems.
CO6	Understand the principles and applications of refrigeration systems.
CO7	Analyze air-conditioning processes using the principles of psychrometry and Evaluate cooling and heating loads in an airconditioning system.
CO8	Understand the working, applications, relevance of air and identify methods for performance improvement.
Course Name	FLUID MECHANICS
Course Code	17ME44
CO1	Identify and calculate the key fluid properties used in the analysis of fluid behavior.
CO2	Understand and apply the principles of pressure, buoyancy and floatation
CO3	Apply the knowledge of fluid statics, kinematics and dynamics while addressing problems of mechanical and chemical engineering.
CO4	Understand and apply the principles of fluid kinematics and dynamics.
CO5	Understand the concept of boundary layer in fluid flow and apply dimensional analysis to form dimensionless numbers in terms of input output variables.
CO6	Understand the basic concept of compressible flow and CFD
Course Name	MACHINE TOOLS & OPERATION
Course Code	17ME45B
CO1	Explain the construction & specification of various machine tools
CO2	Describe various machining processes pertaining to relative motions between tool & work piece

CO3	Discuss different cutting tool materials, tool nomenclature & surface finish
CO4	Apply mechanics of machining process to evaluate machining time.
CO5	Analyze tool wear mechanisms and equations to enhance tool life and minimize machining cost.
Course Name	MECHANICAL MEASUREMENT & METROLOGY
Course Code	17ME46B
CO1	Understand the objectives of metrology, methods of measurement, selection of measuring instruments, standards of measurement and calibration of end bars.
CO2	Describe slip gauges, wringing of slip gauges and building of slip gauges, angle measurement using sine bar, sine center, angle gauges, optical instruments and straightness measurement using Autocollimator.
CO3	Explain tolerance, limits of size, fits, geometric and position tolerances, gauges and their design.
CO4	Understand the principle of Johnson Mikrokator, sigma comparator, dial indicator, LVDT, back pressure gauges, Solex comparators and Zeiss Ultra Optimeter.
CO5	Describe measurement of major diameter, minor diameter, pitch, angle and effective diameter of screw threads by 2 – wire, 3 – wire methods, screw thread gauges and tool maker's microscope.
CO6	Explain measurement of tooth thickness using constant chord method, addendum comparator methods and base tangent method, composite error using gear roll tester and measurement of pitch, concentricity, run out and involute profile.
CO7	Understand laser interferometers and Coordinate measuring machines.
CO8	Explain measurement systems, transducers, intermediate modifying devices and terminating devices.
CO9	Describe functioning of force, torque, pressure, strain and temperature measuring devices.
Course Name	MECHANICAL MEASUREMENTS AND METROLOGY LAB
Course Code	15MEL47 B
CO1	To calibrate pressure gauge, thermocouple, LVDT, load cell, micrometer
CO2	To measure angle using Sine Center/ Sine Bar/ Bevel Protractor, alignment using Autocollimator/ Roller set.
CO3	To demonstrate measurements using Optical Projector/Tool maker microscope, Optical flats..
CO4	To measure cutting tool forces using Lathe/Drill tool dynamometer..
CO5	To measure Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using gear tooth vernier/Gear tooth micrometer.
CO6	To measure surface roughness using Tally Surf/ Mechanical Comparator.
Course Name	MACHINE SHOP
Course Code	17MEL48B
CO1	Perform turning , facing , knurling , thread cutting, tapering , eccentric turning and allied operations keyways / slots , grooves etc using shaperkeyways / slots , grooves etc usingshaper
CO2	Perform gear tooth cutting using milling machine
CO3	Understand the formation of cutting tool parameters of single point cutting tool using bench grinder / tool and cutter grinder, Surface Milling/Slot Milling
CO4	Demonstrate precautions and safety norms followed in Machine Shop
CO5	Exhibit interpersonal skills towards working in a team
Course Name	Management and Engineering Economics
Course Code	15ME51

CO1	Understand needs, functions, roles, scope and evolution of Management
CO2	Understand importance, purpose of Planning and hierarchy of planning and also analyze its types
CO3	Discuss Decision making, Organizing, Staffing, Directing and Controlling
CO4	Select the best economic model from various available alternatives
CO5	Understand various interest rate methods and implement the suitable one.
CO6	Estimate various depreciation values of commodities
CO7	Prepare the project reports effectively
Course Name	Dynamics of Machinery
Course Code	15ME52
CO1	Determine the forces and couples for static and dynamic conditions of four bar and slider crank mechanisms to keep the system in equilibrium
CO2	Determine magnitude and angular position of balancing masses under static and dynamic condition of rotating masses in same and different lanes.
CO3	Determine unbalanced primary, secondary forces and couples in single and multi-cylinder engine.
CO4	Determine sensitiveness, isochronism, effort and power of porter and hartnell governors.
CO5	Determine gyroscopic couple and effects related to 2, 4 wheeler, plane disc, ship and aeroplanes
CO6	Understand types of vibration, SHM and methods of finding natural frequencies of simple mechanical systems.
CO7	Determine equation of motion, natural frequency, damping factor, logarithmic decrement of damped free vibration (SDOF) systems.
CO8	Determine the natural frequency, force and motion transmissibility of single degree freedom systems
CO9	Determine equation of motion of rotating and reciprocating unbalance systems, magnification factor, and transmissibility of forced vibration (SDOF) systems
Course Name	Turbo Machines
Course Code	15ME53
CO1	Able to give precise definition of turbomachinery
CO2	Identify various types of turbo machinery
CO3	Apply the Euler's equation for turbomachinery to analyse energy transfer in turbomachines
CO4	Understand the principle of operation of pumps, fans, compressors and turbines.
CO5	Perform the preliminary design of turbomachines (pumps, rotary compressors and turbines)
CO6	Analyze the performance of turbo machinery.
Course Name	Design of Machine Elements - I
Course Code	15ME54
CO1	Describe the design process, choose materials.
CO2	Apply the codes and standards in design process.
CO3	Analyze the behavior of machine components under static, impact, fatigue loading using failure theories.
CO4	Design shafts, joints, couplings.
CO5	Design of riveted and welded joints.
CO6	Design of threaded fasteners and power screws
Course Name	Non Traditional Machining
Course Code	15ME554

CO1	Understand the compare traditional and non-traditional machining processand recognize the need for Non-traditional machining process.
CO2	Understand the constructional features, performance parameters, process characteristics, applications, advantages and limitations of USM, AJM and WJM.
CO3	Identify the need of Chemical and electro-chemical machining process along with the constructional features, process parameters, process characteristics, applications, advantages and limitations
CO4	Understand the constructional feature of the equipment, process parameters, process characteristics, applications, advantages and limitations EDM & PAM
CO5	Understand the LBM equipment, LBM parameters, and characteristics. EBM equipment and mechanism of metal removal, applications, advantages and limitations LBM & EBM.
Course Name	AUTOMATION AND ROBOTICS
Course Code	15ME563
CO1	Classify various types of automation &manufacturing systems
CO2	Discuss different robot configurations, motions, drive systems and its performance parameters.
CO3	Describe the basic concepts of control systems, feedback components, actuators and power transmission systems used in robots.
CO4	Explain the working of transducers, sensors and machine vision systems.
CO5	Discuss the future capabilities of sensors, mobility systems and Artificial Intelligence in the field of robotics
Course Name	FLUID MECHANICS & MACHINERY LAB
Course Code	15MEL57
CO1	Perform experiments to determine the coefficient of discharge of flow measuring devices.
CO2	Conduct experiments on hydraulic turbines and pumps to draw characteristics
CO3	Test basic performance parameters of hydraulic turbines and pumps and execute the knowledge in real life situations
CO4	Determine the energy flow pattern through the hydraulic turbines and pumps
CO5	Exhibit his competency towards preventive maintenance of hydraulic machines
Course Name	ENERGY LAB
Course Code	15MEL58
CO1	Perform experiments to determine the properties of fuels and oils.
CO2	Conduct experiments on engines and draw characteristics.
CO3	Test basic performance parameters of I.C. Engine and implement the knowledge in industry
CO4	Identify exhaust emission, factors affecting them and report the remedies
CO5	Determine the energy flow pattern through the I C Engine
CO6	Exhibit his competency towards preventive maintenance of IC engines.
Course Name	Finite Element Analysis
Course Code	15ME61
CO1	Understand the concepts behind formulation methods in FEM.
CO2	Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.
CO3	Develop element characteristic equation and generation of global equation.
CO4	Able to apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts, heat transfer, fluid flow, axi symmetric and dynamic problems and solve them displacements, stress and strains induced.

Course Name	Computer integrated Manufacturing
Course Code	15ME62
CO1	Able to define Automation, CIM, CAD, CAM and explain the differences between these concepts.Solve simple problems of transformations of entities on computer screen.
CO2	Explain the basics of automated manufacturing industries through mathematical models and analyze different types of automated flow lines.
CO3	Analyze the automated flow linesto reduce down time and enhance productivity.
CO4	Explain the use of different computer applications in manufacturing, and able to prepare part programs for simple jobs on CNC machine tools and robot programming.
CO5	Visualize and appreciate the modern trends in Manufacturing like additive manufacturing, Industry 4.0 and applications of Internet of Things leading to Smart Manufacturing.
Course Name	Heat Transfer
Course Code	15ME63
CO1	Understand the basic modes of heat transfer.
CO2	Compute temperature distribution in steady-state and unsteady-state heat conduction
CO3	Understand and interpret heat transfer through extended surfaces.
CO4	Interpret and compute forced and free convective heat transfer.
CO5	Explain the principles of radiation heat transfer and understand the numerical formula for heat conduction problems.
CO6	Design heat exchangers using LMTD and NTU methods.
Course Name	Design of Machine Elements -II
Course Code	15ME64
CO1	Apply engineering design tools to product design.
CO2	Design mechanical systems involving springs,belts and pulleys.
CO3	Design different types of gears and simple gear boxes for different applications.
CO4	Design brakes and clutches.
CO5	Design hydrodynamic bearings for different applications.
CO6	Select Anti friction bearings for different applications using the manufacturers,catalogue.
CO7	Develop proficiency to generate production drawings using CAD software
CO8	Become good design engineers through learning the art of working in a team with morality and ethics.
Course Name	AUTOMOBILE ENGINEERING
Course Code	15ME655
CO1	To identify the different parts of an automobile and it’s working
CO2	To understand the working of transmission and braking systems
CO3	To comprehend the working of steering and suspension systems
CO4	To learn various types of fuels and injection systems
CO5	To know the cause of automobile emissions ,its effects on environment and methods to reduce the emissions.
Course Name	Total Quality Management
Course Code	15ME664
CO1	Explain the various approaches of TQM

CO2	Infer the customer perception of quality
CO3	Analyze customer needs and perceptions to design feedback systems.
CO4	Apply statistical tools for continuous improvement of systems
CO5	Apply the tools and technique for effective implementation of TQM.
Course Name	Heat Transfer Lab
Course Code	15MEL67
CO1	Perform experiments to determine the thermal conductivity of a metal rod
CO2	Conduct experiments to determine convective heat transfer coefficient for free and forced convection and correlate with theoretical values.
CO3	Estimate the effective thermal resistance in composite slabs and efficiency in pin-fin
CO4	Determine surface emissivity of a test plate
CO5	Estimate performance of a refrigerator and effectiveness of fin
CO6	Calculate temperature distribution of study and transient heat conduction through plane wall, cylinder and fin using numerical approach.
Course Name	Modeling and Analysis Lab (FEA)
Course Code	15MEL68
CO1	Demonstrate the basic features of an analysis package
CO2	Use the modern tools to formulate the problem, and able to create geometry, descritize, apply boundary condition to solve problems of bars, truss, beams, plate to find stress with differentloading conditions
CO3	Demonstrate the deflection of beams subjected to point, uniformly distributed and varying loads further to use the available results to draw shear force and bending moment diagrams
CO4	Analyze the given problem by applying basic principle to solve and demonstrate 1D and 2D heat transfer with conduction and convection boundary conditions
CO5	Carry out dynamic analysis and finding natural frequencies for various boundary conditions and also analyze with forcing function
Course Name	ENERGY ENGINEERING
Course Code	15ME71
CO1	Summarize the basic concepts of thermal energy systems,
CO2	Identify renewable energy sources and their utilization.
CO3	Understand the basic concepts of solar radiation and analyze the working of solar PV and thermal systems.
CO4	Understand principles of energy conversion from alternate sources including wind, geothermal, ocean, biomass, biogas.
CO5	Understand the concepts and applications of fuel cells, thermoelectric convertor and MHD generator.
CO6	Identify methods of energy storage for specific applications
Course Name	FLUID POWER SYSTEMS
Course Code	15ME72
CO1	Identify and analyse the functional requirements of a fluid power transmission system for a given application.
CO2	Visualize how a hydraulic/pneumatic circuit will work to accomplish the function.
CO3	Design an appropriate hydraulic or pneumatic circuit or combination circuit like electrohydraulics, electro-pneumatics for a given application.
CO4	Select and size the different components of the circuit.

CO5	Develop a comprehensive circuit diagramby integrating the components selected for the given application.
Course Name	CONTROL ENGINEERING
Course Code	15ME73
CO1	Recognize control system and its types, control actions
CO2	Determine the system governing equations for physical models(Electrical, Thermal, Mechanical, Electro Mechanical)
CO3	Calculate the gain of the system using block diagram and signal flow graph
CO4	Illustrate the response of 1st and 2nd order systems
CO5	Determine the stability of transfer functions in complex domain and frequency domain
CO6	Employ state equations to study the controllability and observability
Course Name	TRIBOLOGY
Course Code	15ME742
CO1	To educate the students on theimportance of friction, the related theories/laws of sliding and rolling friction and the effect of viscosity of lubricants.
CO2	To expose the students to the consequences of wear, wear mechanisms, wear theories and analysis of wear problems.
CO3	Tomake the students understand the principles of lubrication, lubrication regimes, theories of hydrodynamic and the advanced lubrication techniques.
CO4	To expose the students to the factors influencing the selection of bearing materials fordifferent sliding applications.
CO5	To introduce the concepts of surface engineering and its importance in tribology.
Course Name	MECHATRONICS
Course Code	15ME753
CO1	Illustrate various components of Mechatronics systems.
CO2	Assess various control systems used in automation.
CO3	Develop mechanical, hydraulic, pneumatic and electrical control systems.
Course Name	DESIGN LABORATORY
Course Code	15MEL76
CO1	To understand the working principles of machine elements such as Governors, Gyroscopes etc.,
CO2	To identify forces and couples in rotating mechanical system components.
CO3	To identify vibrations in machine elements and design appropriate damping methods and to determine the critical speed of a rotating shaft.
CO4	To measure strain in various machine elements using strain gauges.
CO5	To determine the minimum film thickness, load carrying capacity, frictional torque and pressure distribution of journal bearing.
CO6	To determine strain induced in a structural member using the principle of photo-elasticity.
Course Name	COMPTER INTEGRATED MANUFACTURING LAB
Course Code	15MEL77
CO1	Generate CNC Lathe part program for Turning, Facing, Chamfering, Grooving, Step turning, Taper turning, Circular interpolation etc.
CO2	Generate CNC Mill Part programming for Point to point motions, Line motions, Circular interpolation, Contour motion, Pocket milling- circular, rectangular, Mirror commands etc.
CO3	Use Canned Cycles for Drilling, Peck drilling, Boring, Tapping, Turning, Facing, Taper turning Thread cutting etc.
CO4	Simulate Tool Path for different Machining operations of small components using CNC Lathe & CNC Milling Machine.

CO5	Use high end CAM packages for machining complex parts; use state of art cutting tools and related cutting parameters; optimize cycle time.
CO6	Understand & write programs for Robotcontrol;understand the operating principles of hydraulics, pneumatics and electropneumatic systems. Apply this knowledge to automate &improve efficiency of manufacturing.
Course Name	OPERATIONS RESEARCH
Course Code	15ME81
CO1	Understand the meaning, definitions, scope, need, phases and techniques of operations research.
CO2	Formulate as L.P.P and derive optimal solutions to linear programming problems by graphical method, Simplex method, Big-M method and Dual Simplex method.
CO3	Formulate as Transportation and Assignment problems and derive optimum solutions for transportation, Assignment and travelling salesman problems.
CO4	Solve problems on game theory for pure and mixed strategy under competitive environment
CO5	Solve waiting line problems for M/M/1 and M/M/K queuing models.
CO6	Construct networkdiagrams and determine critical path, floats for deterministic and PERT networks including crashing of Networks.
CO7	Determine minimum processing times for sequencing of n jobs-2 machines, n jobs-3machines,n jobs-m machinesand 2 jobs-n machines using Johnson's algorithm.
Course Name	ADDITIVE MANUFACTURING
Course Code	15ME82
CO1	Understand the different process of Additive Manufacturing. using Polymer, Powder and Nano materials manufacturing.
CO2	Analyse the different characterization techniques.
CO3	Describe the various NC, CNC machine programing and Automation techniques.
Course Name	PRODUCT LIFE CYCLE MANAGEMENT
Course Code	15ME835
CO1	Explain the various strategies of PLM and Product Data Management
CO2	Describe decomposition of product design and model simulation
CO3	Apply the concept of New Product Development and its structuring.
CO4	Analyze the technological forecasting and the tools in the innovation.
CO5	Apply the virtual product development and model analysis
Course Name	Engineering Economy
Course Code	10ME71
CO1	Summarize the basic concepts of thermal energy systems, renewable energy sources and their utilization
CO2	Understand the basic concepts of solar radiation and analyze the working of solar PV and thermal systems.
CO3	Understand principles of energy conversion from alternate sources including wind, geothermal, ocean, biomass, biogas
CO4	Understand the concepts and applications of fuel cells, thermoelectric convertor and MHD generator.
CO5	Identify methods of energy storage for specific applications
Course Name	Mechanical Vibrations
Course Code	10ME72
CO1	Formulate the mathematical models in vibrations using different principles for undamped and damped mechanical Systems
CO2	Determine solution for damped free vibrations systems and infer the solutions for different amount of damping

CO3	Interpret the physical and design considerations of forced vibrations and isolators in Vibration and frequency measuring instruments
CO4	Analyze the critical speed of shaft and determine the principle mode of vibration for two DOF systems
CO5	Evaluate the natural frequencies of Multi DOF Systems using various numerical techniques
Course Name	Hydraulics And Pneumatics
Course Code	10ME73
CO1	Describe the working principle and performance parameters of various hydraulic and pneumatic components and systems
CO2	Design hydraulic and pneumatic circuits for mechanical engineering applications
CO3	Analyze performance evaluation of fluid power systems and propose improvements
CO4	Illustrate self-learning capability in the field of Fluid Power Systems.
CO5	Students to select the appropriate hydraulic and pneumatic actuating system for the different integrated applications.
Course Name	Operation Research
Course Code	10ME74
CO1	Understand the meaning, definitions, scope, need, phases and techniques of operations research.
CO2	Formulate as L.P.P and derive optimal solutions to linear programming problems by graphical method, Simplex method, Big-M method and Dual Simplex method
CO3	Formulate as Transportation and Assignment problems and derive optimum solutions for transportation, Assignment and travelling salesman problems
CO4	Construct networkdiagrams and determine critical path, floats for deterministic and PERT networks including crashing of Networks
CO5	Determine minimum processing times for sequencing of n jobs-2 machines, n jobs-3machines,n jobs-m machinesand 2 jobs-n machines using Johnson's algorithm.
Course Name	Total Quality Management
Course Code	10ME758
CO1	Understand the philosophy and core value to TQM and to determine the voice of customers and its impact on quality.
CO2	Apply and evaluate best practices for attainment of total quality
CO3	Understand the methodologies to enhance the management process such as bench marking, business process reengineering
CO4	Choose the framework to evaluate the performance excellence of organization and to determine the set of performance indicators
CO5	Measure cost of poor quality and to identify the areas of improvement.
Course Name	Design Laboratory
Course Code	10MEL77
CO1	To understand the working principles of machine elements such as Governors, Gyroscopes etc.
CO2	To identify forces and couples in rotating mechanical system components.
CO3	To identify vibrations in machine elements and design appropriate damping methods and to determine the critical speed of a rotating shaft
CO4	To identify the strain induced in a structural member using the principle of photo-elasticity.
CO5	To determine the minimum film thickness, load carrying capacity, frictional torque and pressure distribution of journal bearing
Course Name	CIM & Automation Lab
Course Code	10MEL78
CO1	Given a English language description of the problem &/or a schematic representation of the problem, Identify the various Manufacturing process associated with the problem & develop an initial generic solution using the G & M codes

CO2	Identify & virtually simulate various concepts of CIM such as CNC, FMS, Automation, Industrial Robots, ASRS and Hydraulics & Pneumatics
CO3	Apply the manufacturing specific G & M codes to the given problem & to simulate the same using the FANUC Package
CO4	Analyse the simplicity/complexity of the problem. Breakdown the sequence of manufacturing process & task involved.
CO5	Develop a Program for the Robot & CNC to execute various tasks and manufacturing process respectively considering the manufacturing & task precedence constraints
Course Name	Operation Management
Course Code	10ME81
CO1	Gain an understanding and appreciation of principles and applications relevant to planning, design and operation of manufacturing/ service firms
CO2	Develop necessary skills to effectively analyze and synthesize many inter-relationship in production systems.
CO3	Gain ability to recognize the situations in production systems environment that suggests use of quantitative methods to assist in decision making
CO4	Understand aggregate planning and master scheduling techniques
CO5	Choose a frame work of inventory control and enterprise resource planning through MRP-II
Course Name	Control Engineering
Course Code	10ME82
CO1	Identify various test signals, compensators and control systems.
CO2	Develop mathematical models for simulation of mechanical, electrical and hydraulic control systems in order to obtain system response for given input test signals
CO3	Integrate each sub system for a desired control system and obtain the relevant transfer functions
CO4	Predict the stability of a control system employing nyquist, polar, bode and root locus plots as stability criteria.
CO5	Develop block diagrams and signal flow graphs for different applications of control system.
Course Name	Automotive Engineering
Course Code	10ME844
CO1	Identify the different self-propelled systems that are employed in the design of the automobile
CO2	Distinguish the properties of fuels and lubricants, fuel supply systems that are ideal for the operations of an i.c engine.
CO3	Able to apply the concept of power trains, drive to wheels, suspension and braking systems to achieve better controllability of an automobile.
CO4	Hypothesize the formation of automobile pollutions in si and ci engines and improve the performance of automotive system through various test procedures and enhancing techniques
CO5	Assess the construction, working principle of various types of transmissions of an automobile.