Course Outcome (COs) of ME Department	
Department of Mechanical Engineering	
3ME1A	**Mechanics of Solids-I Year of study: 2017-18**
CO1	Predict mechanical behavior of the member by determining the stresses, strains and deflections produced by the loads up to the elastic limit.
CO2	Solve the stresses in determinate and indeterminate, homogeneous and composite bars under concentrated loads, self weight and thermal loads
CO3	Construct Shear Force and Bending Moment diagrams for statically determinate beam due to concentrated load, uniformly distributed load, uniformly varying load and couple.
CO4	Determine bending and shear stresses in machine elements
CO5	Evaluate Slope and Deflection of Statically Determine beams subjected to concentrated load, uniformly distributed load, uniformly varying load and couple and also strain load energy in members subjected to Gradual, sudden and impact loads
CO6	Estimate stresses, strain and deformations in determine shafts of solid and hollow, homogeneous and composite circular cross section subjected to twisting moment also critical load of columns under various end conditions.
CO7	Design the components subjected to various loadings with the help of various theories of failures.
3ME2A	**Material Science & Engineering Year of study: 2017-18**
CO1	Apply core concepts in Materials Science to solve engineering problems.
CO2	Interpret about material fundamental and material processing.
CO3	Distinguish the defects in crystal and its effect on crystal properties.
CO4	Figure out the different mechanical properties of material by studying different destructive and non- destructive testing.
CO5	Articulate and utilize corrosion prevention strategies and estimate corrosion behavior of materials and components
CO6	Acknowledge the importance of surface modification and study the different surface modification methods.
CO7	Perceive the basics of Powder metallurgy and application of powder metallurgy
CO8	Select proper metal, alloys, non metal and powder metallurgical component for specific application requirement.
3ME3A	**Engineering Thermodynamics Year of study: 2017-18**
CO1	Apply various laws of thermodynamics to various processes and real systems.
CO2	Demonstrate a basic understanding of the nature of the Thermodynamic processes for pure substances and ideal gases
CO3	Demonstrate a basic understanding of the First Law of Thermodynamics and its application to systems and control volumes.
CO4	Demonstrate a basic knowledge of the Second Law of Thermodynamics and its application to systems and control volumes
CO5	Apply the concept of Entropy, Calculate heat, work and other important thermodynamic properties for various ideal gas processes.
CO6	Demonstrate ability to evaluate the thermal performance of different heat engines and refrigeration cycles through the calculation of their thermal efficiency or coefficient of performance.
3ME4A	**Manufacturing Processes Year of study: 2017-18**
CO1	Select appropriate Manufacturing Processing to manufacture any component.
CO2	Interpret foundry practices like pattern making, mold making, Core making and Inspection of defects.
CO3	Differentiate various metal forming processes such as Hot and Cold Working, Rolling, Forging, Extrusion and Drawing Processes.
CO4	Classify different plastic molding processes, Extrusion of Plastic and Thermoforming.
CO5	Select appropriate Joining Processes to join Work piece.
CO6	Design different sheet metal working processes
CO7	Perceive the basics of Powder metallurgy and application of powder metallurgy
CO8	Perceive the basics of Rapid Prototyping and Plastic Technology.
CO9	Implement the Knowledge of Gained Subject in Industry
3ME5A	**Object Oriented Programming Year of study: 2017-18**
CO1	Understand how C++ improves C with object-oriented features.
CO2	Learn how to write inline functions for efficiency and performance.
CO3	Learn the syntax and semantics of the C++ programming language.
CO4	Learn how to implement copy constructors and class member functions.
CO5	Understand the concept of data abstraction and encapsulation
CO6	Learn how to overload functions and operators in C++.

3ME6A	**Advanced Engineering Mathematics Year of study: 2017-18**	
CO1	Know how root finding techniques can be used to solve practical engineering problems.	
CO2	Apply the analytical technique to express periodic function as a Fourier sine and cosine series.	
CO3	Analyze and solve engineering problems using Laplace Series.	
CO4	Analyze and solve engineering problems using Fourier series.	
CO5	Identify an appropriate probability distribution for a given discrete or continuous random variable and use its properties to calculate probabilities.	
CO6	Apply the concept of numerical analysis to find the relative strengths and weaknesses of each computation method and know which are most applicable for given problem.	
3ME7A	**Material Science & Testing Lab Year of study: 2017-18**	
CO1	Understand and verify various microstructure of steel using microscope.	
CO2	Determine tensile, compressive, shear and bending stress of test specimen on Universal Testing Machine.	
CO3	Determine Young's Modulus of metal specimen and will plot stress strain curve.	
CO4	Determine hardness of different materials using hardness testing machines.	
CO5	Determine strength of materials using toughness testing machine.	
CO6	Observe various crystal structures using models and correlates with actual phenomenon.	
3ME8A	**Basic Mechanical Engineering Lab Year of study: 2017-18**	
CO1	Do hands on assembling and disassembling of SI & CI Engine.	
CO2	Do hands on assebling and disassembling of bicycle & sewing machine	
CO3	Understand working principles & classification of boiler and their accessories.	
CO4	Understand working principles & classification of pumps.	
3ME9A	**Production Practice-I Year of study: 2017-18**	
CO1	Perform various machining operations like step turning, taper turning using compound rest, tailstock offset method	
CO2	Understand different testing of moulding sand and design of pattern for a casting. Also get exposure to Moisture content test and Clay content test.	
CO3	Perform the design of pattern and manufacturing the designed pattern and use that pattern to get a casting for the designed one.	
CO4	Understand different welding processes like arc welding, gas welding along with various safety aspects in welding.	
3ME10A	**Computer Programming Lab Year of study: 2017-18**	
CO1	Understand how C++ improves C with object-oriented features.	
CO2	Learn how to write inline functions for efficiency and performance.	
CO3	Learn the syntax and semantics of the C++ programming language.	
CO4	Learn how to implement copy constructors and class member functions.	
CO5	Understand the concept of data abstraction and encapsulation	
CO6	Learn how to overload functions and operators in C++.	
4ME1A	**Kinematics of Machine Year of study: 2017-18**	
CO1	Do velocity, acceleration and force analysis of different mechanisms, power transmitting elements.	
CO2	Understand commonly used mechanism for industrial application.	
CO3	Get competency in drawing velocity and acceleration diagram for simple and complex mechanism.	
CO4	Get analytical competency in solving kinematic problems using complex algebra method.	
CO5	Get competency in graphical and analytical method for solving problems in static and dynamic force analysis.	
CO6	Get competency in conducting laboratory experiments for finding moment of inertia of rigid bodies, verification of displacement relation for Hookes joints, to measure power transmitted and absorbed by dynamometer and brakes respectively.	
CO7	Understand working principles of various types of brakes, clutches and dynamometers.	
CO8	Apply knowledge in the field of automobile, aerospace and naval industries, where mechanisms and moving members force and kinematic analysis and power transmitting elements play vital role.	
4ME2A	**Fluid Mechanics and Machines Year of study: 2017-18**	

CO1	Demonstrate basic knowledge of fluid properties (for Newtonian and Non-Newtonian fluids)	
CO2	Demonstrate the capability to produce analytical solutions to various simple problems	
CO3	Demonstrate indepth knowledge of dynamics of fluid flow and governing non dimensional parameters	
CO4	Apply concepts of mass, momentum and energy to different cases	
CO5	Have basic idea of boundary layer in both turbulent and laminar flow regime	
CO6	Use of Bernoulli's equation for solutions in fluids	
CO7	Determination of forces drag and lift on immersed bodies	
4ME3A	**Machining and Machine Tools Year of study: 2017-18**	
CO1	Understand the cutting tool geometry, mechanism of chip formation and mechanics of orthogonal cutting.	
CO2	To gain knowledge of grinding and different methods of grinding.	
CO3	To learn about concept of tool life etc.	
4ME4A	**Design of Machine Element-I Year of study: 2017-18**	
CO1	Understand the fundamental scientific principles of mechanical design (stress, strain, material properties, failure theories, fatigue phenomena, fracture mechanics) and their importance and use in design analysis	
CO2	Develop practical experience with the function, design and analysis of actual machine components including prediction of their life and failure	
CO3	Practice systematic approaches to mechanical design and analysis procedures	
4ME5A	**Industrial Engineering Year of study: 2017-18**	
CO1	Apply industrial engineering concept in industrial environment	
CO2	Understand different concepts regarding Organization and Productivity in industries.	
CO3	Manage and implement different concepts involved in work and method study and understanding of work contents in different situations.	
CO4	Undertake small case study based project works regarding work measurement and time study.	
CO5	Planning and controlling of production system and use of modern forecasting and management techniques for different types of industries.	
CO6	Understand various cost accounting and financial management practices widely applied in industries.	
CO7	Develop capacities in integrating knowledge of design along with other aspects of value addition in the conceptualization and manufacturing stage of various products.	
4ME6A	**IC Engine Year of study: 2017-18**	
CO1	Engines classification and applications (propulsion, power production, cogeneration) Performance criteria, sizing and influence of atmospheric conditions. Gas exchange processes, supercharging and turbo charging, Formation, characteristics, vaporization and combustion of sprays.	
CO2	Combustion in Spark-Ignition and Compression-Ignition engines. Classical and alternative fuels P-theta and P-V diagrams - Heat release rate. Pollutant formation and control: NOx, CO, HC etc. particulates. Engine heat transfer and cooling systems.	
CO3	Outline emission formation mechanism of IC engines, its effects and the legislation standards	
CO4	Understand working principles of instrumentation used for engine performance and emission parameters.	
CO5	Understand the latest developments in IC Engines and alternate fuels.	
4ME7A	**Dynamics of Machine Lab Year of study: 2017-18**	
CO1	Distinguish kinematic and kinetic motion.	
CO2	Identify the basic relations between distance, time, velocity, and acceleration.	
CO3	Create a schematic drawing of a real-world mechanism	
CO4	Determine the degrees-of-freedom (mobility) of a mechanism	
CO5	Design basic gear trains.	
CO6	Design basic cam systems	
4ME8A	**Fluid Mechanics Lab Year of study: 2017-18**	
CO1	Identify, name, and characterize flow patterns and regimes	
CO2	Understand basic units of measurement, convert units, and appreciate their magnitudes	
CO3	Utilize basic measurement techniques of fluid mechanics	
CO4	Discuss the differences among measurement techniques, their relevance and applications	

CO5	Measure fluid pressure and relate it to flow velocity
CO6	Demonstrate practical understanding of the equations of Bernoulli
CO7	Demonstrate practical understanding of friction losses in internal flows
CO8	Demonstrate practical understanding of boundary layers, separation, drag, and lift
CO9	Compare the results of analytical models introduced in lecture to the actual behavior of real fluid flows and draw correct and sustainable conclusions
CO10	Demonstrate the ability to produce a working model through hands-on experience in fluid mechanics design and explain its operation in terms of what was learned in the course.
4ME9A	**Production practice-II Year of study: 2017-18**
CO1	Distinguish between single and multi point cutting tool.
CO2	Identify Single point cutting tool with nomenclature having various angles.
CO3	Cut Single and multi start Metric & square thread on Lathe.
CO4	Cut spur gear on milling machine by using simple indexing mechanism.
CO5	Understand various milling cutters and their profiles.
4ME10A	**Design of Machine Element-I Year of study: 2017-18**
CO1	Design Cotter & Knuckle joint
CO2	Design Shaft and coupling.
CO3	Design of Beam & Lever.
4ME11A	**Thermal Engineering-I Year of study: 2017-18**
CO1	Differentiate between SI & CI Engines.
CO2	Differentiate between 2-stroke & 4-stroke Engines.
CO3	Understand theoretical and actual working cycles of SI & CI Engines.
CO4	Demonstrate steering system.
CO5	Demonstrate Ignition & Fuel Supply System.
5ME1A	**Heat Transfer Year of study: 2017-18**
CO1	Understand the basic laws of heat transfer.
CO2	Account for the consequence of heat transfer in thermal analyses of engineering systems.
CO3	Analyze problems involving steady state heat conduction in simple geometries.
CO4	Develop solutions for transient heat conduction in simple geometries.
CO5	Understand the fundamentals of convective heat transfer process. I.e. Natural, forced and mixed convection in various type of flow. i.e. internal and external flow.
CO6	Analyze heat exchanger performance by using the method of log mean temperature difference and heat exchanger performance by using the method of heat exchanger effectiveness.
CO7	Calculate radiation heat transfer between surfaces.
CO8	To solve complex problems where heat and mass transfer processes are combined with chemical reactions, as in combustion.
5ME2A	**Dynamics of Machine Year of study: 2017-18**
CO1	Understand the functioning of governor with detailed classifications.
CO2	Understand the gyroscopic effects in ships, aero planes and road vehicles.
CO3	Analyze balancing problems in rotating and reciprocating machinery.
CO4	Understand gear nomenclature with gear train concept.
5ME3A	**Measurement & Metrology Year of study: 2017-18**
CO1	Perform Linear and Angular measurements.
CO2	Understand the concept of Slip gauges.
CO3	Perform tests to measures gear tooth profiles and screw threads.
CO4	To measure flatness and surface defects in the given test specimen
CO5	Force measurements during turning, drilling and milling operations.
5ME4A	**Quality Assurance & Reliability Year of study: 2017-18**

CO1	Attain the basic techniques of quality improvement, fundamental knowledge of statistics and probability	
CO2	Understand techniques to assess and improve process and/or product quality and reliability.	
CO3	Use control charts to analyze for improving the process quality	
CO4	Describe different sampling plans	
CO5	Acquire basic knowledge of total quality management	
CO6	Understand the concepts of reliability and maintainability	

5ME5A	**SFEE Year of study: 2017-18**	
CO1	Understand individual, interpersonal and group processes that influence behavior within teams and organizations.	
CO2	Identify and apply sociological concepts and theories to understand social phenomena.	
CO3	Apply knowledge of mathematics, economics, and engineering principles to solve engineering problems	
CO4	Understand the major capabilities and limitations of cash flow analysis for evaluating proposed capital investments.	
CO5	Recognize, formulate, analyse and solve cash flow models in practical situations. Understand the assumptions underlying these models, and the effects on the modelling process when these assumptions do not hold.	
CO6	Develop the ability to account for time value of money using engineering economy factors and formulas, as well as the implications and importance of considering taxes, depreciation, and inflation.	
CO7	Apply engineering economic techniques on solving engineering problems by using computer tools such as spreadsheets.	

5ME6.1A	**CAD & Graphics Year of study: 2017-18**	
CO1	Familiar with computer graphics and coordinate systems.	
CO2	Understand parametric representation of space & surface curves like spline curve, Bezier curve, B Spline curves.	
CO3	Understand the concept of 2-Dimensional & 3-Dimensional transformation.	

5ME6.2A	**Automobile Engineering Year of study: 2017-18**	
CO1	Understand the Construction, working and other details about Internal Combustion Engines used in automobiles	
CO2	Identify Construction, working, preventive maintenance, trouble shooting and diagnosis of various Automobile Systems.	
CO3	Understand importance and features of different systems like axle, differential, brakes, steering, suspension, and balancing etc.	
CO4	Identify Modern technology and safety measures used in Automotive Vehicles	

5ME6.3A	**Statistics for Decision Making Year of study: 2017-18**	
CO1	Express real life problems in statistical terms	
CO2	Deal with numerical and quantitative issues in business	
CO3	Enable the use of statistical, graphical and algebraic techniques wherever relevant	
CO4	Calculate and interpret the components of a time series and economic index numbers	
CO5	Familiar with Simple regression analysis and probability model with multiple linear regression.	

5ME7A	**Heat Transfer Lab Year of study: 2017-18**	
CO1	Understand the basic laws of heat transfer.	
CO2	Account for the consequence of heat transfer in thermal analyses of engineering systems.	
CO3	Analyze problems involving steady state heat conduction in simple geometries.	
CO4	Develop solutions for transient heat conduction in simple geometries.	
CO5	Understand the fundamentals of convective heat transfer process. I.e. Natural, forced and mixed convection in various type of flow. i.e. internal and external flow.	
CO6	Analyze heat exchanger performance by using the method of log mean temperature difference and heat exchanger performance by using the method of heat exchanger effectiveness.	
CO7	Calculate radiation heat transfer between surfaces.	
CO8	To solve complex problems where heat and mass transfer processes are combined with chemical reactions, as in combustion.	

5ME8A	**Dynamics of Machine Lab Year of study: 2017-18**	
CO1	Understand Roll, Pitch and Yaw motions.	
CO2	Understand functioning of various governing systems.	
CO3	Perform static and dynamic wheel balancing of an automobile.	
CO4	Differentiate between sliding mesh, constant mesh and synchro mesh gear boxes.	

5ME9A	**Production Engineering Lab Year of study: 2017-18**
CO1	Perform Linear and Angular measurements.
CO2	Understand the concept of Slip gauges.
CO3	Perform tests to measures gear tooth profiles and screw threads.
CO4	To measure flatness and surface defects in the given test specimen
CO5	Force measurements during turning, drilling and milling operations.
5ME10A	**PEDM Year of study: 2017-18**
CO1	Determine what a profession is and how it differs from work in general
CO2	Determine what characterizes a professional and distinguishes one from a nonprofessional
CO3	Understand what morality is and how it connects to professional ethics
CO4	Understand the features of moral reasoning, moral explanations and the role of moral theories
6ME1A	**Design of Machine Element-II Year of study: 2017-18**
CO1	Understand and apply principles of gear design to spur gears and industrial spur gear boxes
CO2	Become proficient in Design of Helical and Bevel Gear
CO3	Develop capability to analyze Rolling contact bearing and its selection from manufacturer's Catalogue
CO4	Become proficient in Design of Spring and IC Engine components.
CO5	Achieve an expertise in design of Sliding contact bearing in industrial applications.
6ME2A	**Newer Machining Methods Year of study: 2017-18**
CO1	Aware about all non-conventional manufacturing processes
CO2	Dealt with details about the mechanism of material removal, sources of energy used for material removal, working principle, the set up or equipment and relative advantages and disadvantages.
CO3	Get exposure on Micro and Nano Machining.
6ME3A	**Mechatronics Year of study: 2017-18**
CO1	Understand the concept of key elements of mechatronics system.
CO2	Create representation of mechatronics system into block diagram & concept of transfer function, reduction and analysis
CO3	Understand Principle of Sensors, its characteristics & identification of Interfacing of Sensors /Actuators to DAQ micro-controller
CO4	Understand PLC Programming & implement in real life system
CO5	Perform the job of an automation engineer and consultant to help the industries.
6ME4A	**Vibration Engineering Year of study: 2017-18**
CO1	Construct the equations of motion for free-body diagrams.
CO2	Solve for the motion and the natural frequency of (a) a freely vibrating single degree of freedom undamped motion and (b) a freely vibrating single degree of freedom damped motion
CO3	Construct the governing differential equation and its solution for a vibrating mass subjected to an arbitrary force.
CO4	Obtain the complete solution for the motion of one, two and three degrees of freedom vibratory systems (damped or undamped) that is subjected to non-periodic forcing functions.
CO5	Solve vibration problems that contain multiple degrees of freedom.
6ME5A	**Steam Engineering Year of study: 2017-18**
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	Understand the concepts of pressure and velocity compounding.
6ME6.1 A	**Non Destructive Techniques Year of study: 2017-18**
CO1	List and define different defects that occur in welding shown through Non-Destructive Examination/Destructive Testing
CO2	Identify the types of equipment used for each Non-Destructive and Destructive Examination
CO3	Eexplain the purpose of the Equipment, Application, and standard techniques required to perform major non-destructive and destructive examinations of welds

CO4	Go to specific Code, Standard, or Specification related to each testing method
CO5	Have the knowledge and essential skills to identify strengths and weaknesses in materials used in fabrication.
6ME6.2 A	**Design and Manufacturing of Plastic Products Year of study: 2017-18**
CO1	Understand basic designing and manufacturing of plastic products.
CO2	Aware of various available plastic materials and their properties.
CO3	Get familiar with injection molding process.
CO4	Understand post processing machining operations of plastic products.
6ME6.3 A	**Maintenance MAnagement Year of study: 2017-18**
CO1	Maintenance management skill
CO2	Need of safety devices
CO3	Increase the productivity of the plant at minimal cost
CO4	Failure analysis of plant machineries
CO5	Concept of tribology, conditioning monitoring
CO6	Concept of maintainability and availability of mechanical components and systems
6ME7A	**Machine Design Practice-II Year of study: 2017-18**
CO1	Design mechanical components under fatigue loading.
CO2	Design helical compression, tension and torsional springs.
CO3	Design of bolts subjected to variable stresses.
CO4	Design of spur, bevel and helical gears.
6ME8A	**Industrial Engineering Lab-I Year of study: 2017-18**
CO1	Draw OC Curves and differentiate between producer's and consumer's risk.
CO2	Understand techniques to assess and improve process and/or product quality and reliability.
CO3	Use control charts to analyze for improving the process quality.
6ME9A	**Mechatronics Year of study: 2017-18**
CO1	Study of analog & digital multimeter, signal generator.
CO2	Do displacement and speed measurements using capacitive, inductive and magnetic pick up.
CO3	Perform load measurement using load cell and temperature using thermocouple, thermistor & RTD.
CO4	Develop an understanding of PLC ladder diagram related to industrial automation systems and measure its performance.
6ME10A	**Vibration Engineering Lab Year of study: 2017-18**
CO1	Design on experiment to measure the periodic time of free-vibrations of single degree and multi degree of freedom system
CO2	Analyze the mechanical vibrations to determine the material properties of mechanical elements used
CO3	Understand the fundamental of vibration measurement in the real world.
7ME1A	**Finite Element Method Year of study: 2017-18**
CO1	Recognize the significance and importance of finite element methods to the professional design engineer.

CO2	Provide a theoretical understanding on the fundamentals of finite element methods for small displacement linear elastic analysis
CO3	Provide experience on how to develop good models and how to interpret the numerical results in design.
7ME2A	**Regrigeration and Air Conditioning Year of study: 2017-18**
CO1	Understand various refrigeration cycles and evaluate performance using Mollier charts and/ or refrigerant property tables.
CO2	Illustrate the fundamental principles and applications of refrigeration and air conditioning system
CO3	Obtain cooling capacity and coefficient of performance by conducting test on vapor compression refrigeration systems
CO4	Present the properties, applications and environmental issues of different refrigerants
CO5	Estimate the condition of steam and performance of vapour power cycle and vapour compression cycle.
CO6	Calculate cooling load for air conditioning systems used for various applications
CO7	Use Psychometric charts and estimate various essential properties related to Psychrometry and processes.
CO8	Operate and analyze the refrigeration and air conditioning systems.
7ME3A	**Operation ResearchYear of study: 2017-18**
CO1	Apply and analyze mathematical optimization functions to various applications
CO2	Recognize the importance and value of Operations Research and mathematical modeling in solving practical problems in industry by Linear programming problems
CO3	Understand the mathematical tools that are needed to formulate & solve transportation problems for optimization
CO4	Formulate & analyze a managerial decision problem into a mathematical model using game theory & investment analysis
CO5	Use mathematical models to solve the inventory & replacement problems.
CO6	Understand queuing & sequencing models and apply them to real-life problems.
CO7	Use network models and techniques for effective decisions–making.
CO8	Apply the knowledge & tools of operation research in various industries like marketing, material handling etc.
7ME4A	**Turbomachine Year of study: 2017-18**
CO1	Explain the working principles of turbomachines and apply it to various types of machines
CO2	Determine the velocity triangles in turbomachinery stages operating at design and offdesign conditions
CO3	Perform the preliminary design of turbomachines (pumps, compressors, turbines) on a 1- D basis
CO4	Determine the off-design behavior of turbines and compressors and relate it to changes in the velocity triangles
CO5	Recognize relations between choices made early in the turbomachinery design process and the final components and operability
7ME5A	**Operation Management Year of study: 2017-18**
CO1	Demonstrate an understanding of fundamental operations concepts, key principles of its management, and relevant analysis approaches
CO2	Demonstrate the ability to understand a real-world unstructured problem, and gather necessary information and data to formulate into a structured problem
CO3	Demonstrate ability to develop quantitative and qualitative analysis framework and solution methods, and appropriately implement them to obtain meaningful solutions
CO4	Demonstrate ability to identify strengths and weaknesses of alternative solutions and obtain relevant managerial insights.
7ME6.1 A	**Micro and Nano Manufacturing Year of study: 2017-18**
CO1	Acquire the baseline knowledge about the theory and methods of various microfabrication techniques based on photolithography, and the ability to apply for developing the MEMS/NEMS devices
CO2	Design the basic level of MEMS/NEMS devices
CO3	Do evaluation of subsurface damage in nano and micromachining
7ME6.2 A	**Robotics Year of study: 2017-18**
CO1	Design automatic manufacturing cells with robotic control using the principle behind robotic drive system, end effectors, sensor, machine vision robot kinematics and programming.
CO2	Explain the basic concepts of working of robot analyze the function of sensors in the robot
CO3	Write program to use a robot for a typical application
CO4	Use Robots in different applications

7ME6.3 A	**CNC Machines & Programming Year of study: 2017-18**
CO1	Familiar with historical development of NC machining, NC hardware and software systems.
CO2	Write the program in APT language.
CO3	Understand the concept of CAPP system and their industrial application.
7ME7 A	**Thermal Engineering -II Year of study: 2017-18**
CO1	Conduct constant speed and variable speed tests on IC engines and interpret their performance.
CO2	Estimate energy distribution by conducting heat balance test on IC engines
CO3	Evaluate performance parameters of steam power plant
CO4	Determine performance parameters of refrigeration and air-conditioning systems
CO5	Evaluate the performance of turbomachines.
7ME8 A	**Finite Element Method Lab Year of study: 2017-18**
CO1	Apply finite element method to solve problems in solid mechanics, fluid mechanics and heat transfer.
CO2	Formulate and solve problems in one dimensional structures including trusses, beams and frames.
CO3	Formulate FE characteristic equations for two dimensional elements and analyze plain stress, plain strain, axi-symmetric and plate bending problems.
CO4	Implement *and* solve the finite element formulations using MATLAB
8ME1A	**Computer Integrated Manufacturing Year of study: 2017-18**
CO1	Describe various types of automation and production concepts
CO2	Create basic and advanced CNC programs from imported CAD data using several CAM systems
CO3	Use effectively CAD / CAM systems in order to produce the final NC code for the manufacturing of various mechanical parts and carry out exchange of data between CAD and CAM systems
CO4	Understand GT system with part classification and coding system.
CO5	Demonstrate various modern computer aided material handling sytems.
8ME2A	**Laws for Engineers Year of study: 2017-18**
CO1	Aware themselves to constitutional laws along with technical knowledge.
CO2	Aware about laws related to human rights and labour laws.
CO3	Aware about laws related to intellectual property and law relating to copyright in India.
8ME3A	**Power Generation Year of study: 2017-18**
CO1	Describe sources of energy and types of power plants.
CO2	Analyze different types of steam cycles and it's efficiencies in a steam power plant.
CO3	Describe basic working principles of gas turbine and diesel engine power plants. Define the performance characteristics and components of such power plants.
CO4	List types, principles of operations, components and applications of steam turbines, steam generators, condensers, feed water and circulating water systems.
CO5	Estimate different efficiencies associated with power plant systems.
8ME4.1A	**Product Development and Launching Year of study: 2017-18**
CO1	Identify and analyse the strategic elements of product development processes.
CO2	Develop a product innovation charter.
CO3	Apply idea generation techniques
CO4	Assess the challenges and opportunities associated with the launch of new products
CO5	Propose a framework suitable for the management of a new product development process.
8ME4.2A	**Computational Fluid Dynamics Year of study: 2017-18**

CO1	Demonstrate the ability to use modern CFD software tools to build flow geometries, generate an adequate mesh for an accurate solution, select appropriate solvers to obtain a flow solution, and visualize the resulting flow field.	
CO2	Demonstrate the ability to analyze a flow field to determine various quantities of interest, such as flow rates, heat fluxes, pressure drops, losses, etc., using flow visualization and analysis tools.	
CO3	Demonstrate the ability to simplify a real fluid-flow system into a simplified model problem, to select the proper governing equations for the physics involved in the system, to solve for the flow, to investigate the fluid-flow behavior, and to understand the results.	
8ME4.3A	**Total Quality Management Year of study: 2017-18**	
CO1	Develop an understanding on quality management philosophies and frameworks.	
CO2	Adopt TQM methodologies for continuous improvement of quality.	
CO3	Measure the cost of poor quality, process effectiveness and efficiency to identify areas for improvement.	
CO4	Apply benchmarking and business process reengineering to improve management processes.	
CO5	Determine the set of indicators to evaluate performance excellence of an organization	
8ME5A	**CAM Lab Year of study: 2017-18**	
CO1	Create the G-code program (with a standard computer post processor) of a work-piece on a standard numerically controlled machine tool with CNC controls.	
CO2	Create basic and advanced CNC programs from imported CAD data using several CAM systems.	
CO3	Use effectively CAD / CAM systems in order to produce the final NC code for the manufacturing of various mechanical parts and carry out exchange of data between CAD and CAM systems	
CO4	Compare the operation and programming of CNC machine tool using manual programming	
CO5	Compare the operation and programming of CNC machine tool using CAM systems	
8ME6A	**CAD Lab Year of study: 2017-18**	
CO1	Become proficient in a feature-based, parametric CAD software package such as Pro/ENGINEER. The student is able to use sketcher and part modules for computer aided design and drafting of engineering components.	
CO2	Write programs for transformation of objects for display and for design of curves and surfaces.	
CO3	Know the different techniques of graphical representation for simple parts and assemblies: sketching, dihedral system, topographic maps, axonometric and cavalier perspective and CAD.	
8ME7A	**Industrial Engineering Lab-II Year of study: 2017-18**	
CO1	Apply industrial engineering concept in industrial environment.	
CO2	Understand different concepts regarding Organization and Productivity in industries.	
CO3	Manage and implement different concepts involved in work and method study and understanding of work contents in different situations.	
CO4	Undertake small case study based project works regarding work measurement and time study.	
CO5	Develop capacities in integrating knowledge of design along with other aspects of value addition in the conceptualization and manufacturing stage of various products.	