Department of Mechanical Engineering

Course Number	Course Outcomes
	Second Year 2018 ODD Sem
MEC301	**Applied Mathematics -III**
MEC301.1	Demonstrate the ability of using Laplace Transform in solving the Ordinary Differential Equations and Partial Differential Equations
MEC301.2	Demonstrate the ability of using Fourier Series in solving the Ordinary Differential Equations and Partial Differential Equation
MEC301.3	Solve initial and boundary value problems involving ordinary differential equations
MEC301.4	Identify the analytic function, harmonic function, orthogonal trajectories
MEC301.5	Apply bilinear transformations and conformal mappings
MEC301.6	Identify the applicability of theorems and evaluate the contour integrals
MEC302	**Thermodynamics**
MEC302.1	Demonstrate application of the laws of thermodynamics to wide range of systems.
MEC302.2	Write steady flow energy equation for various flow and non-flow thermodynamic systems
MEC302.3	Compute heat and work interactions in thermodynamics systems
MEC302.4	Demonstrate the interrelations between thermodynamic functions to solve practical problems.
MEC302.5	Use steam table and mollier chart to compute thermodynamics interactions
MEC302.6	Compute efficiencies of heat engines, power cycles etc.
MEC303	**Strength of Materials**
MEC303.1	Demonstrate fundamental knowledge about various types of loading and stresses induced.
MEC303.2	Draw the SFD and BMD for different types of loads and support conditions.
MEC303.3	Analyse the stresses induced in basic mechanical components.
MEC303.4	Estimate the strain energy in mechanical elements.
MEC303.5	Analyse the deflection in beams.
MEC303.6	Analyse buckling and bending phenomenon in columns, struts and beams.
MEC304	**Production Process-I**
MEC304.1	Demonstrate understanding of casting process
MEC304.2	Illustrate principles of forming processes
MEC304.3	Demonstrate applications of various types of welding processes.
MEC304.4	Differentiate chip forming processes such as turning, milling, drilling, etc.
MEC304.5	Illustrate the concept of producing polymer components and ceramic components.
MEC304.6	Distinguish between the conventional and modern machine tools.
MEC305	**Materials Technology**
MEC305.1	Identify various crystal imperfections, deformation mechanisms, and strengthening mechanisms
MEC305.2	Demonstrate understanding of various failure mechanisms of materials.
MEC305.3	Interpret Iron-Iron carbide phase diagram, and different phases in microstructures of materials at different conditions.
MEC305.4	Select appropriate heat treatment process for specific applications.
MEC305.5	Identify effect of alloying elements on properties of steels
MEC305.6	Illustrate basics of composite materials, Nano- materials and smart materials.
MEL301	**Computer Aided Machine Drawing**
MEL301.1	Visualize and prepare detail drawing of a given object.
MEL301.2	Read and interpret the drawing

MEL301.3	Draw details and assembly of different mechanical systems.
MEL301.4	Convert detailed drawing into assembly drawing using modelling software
MEL301.5	Convert assembly drawing into detailed drawing using modelling software
MEL301.6	Prepare detailed drawing of any given physical object/machine element with actual measurements
MEL302	**Strength of Materials**
MEL302.1	Analyse the stress - strain behaviour of materials
MEL302.2	Measure ultimate tensile/compression strength of material
MEL302.3	Measure torsional strength of material
MEL302.4	Perform impact test using Izod and Charpy method
MEL302.5	Measure the hardness of materials.
MEL302.6	Perform flexural test with central and three point loading conditions
MEL303	**Materials Technology**
MEL303.1	Demonstrate the understanding of the procedure to prepare samples for studying microstructure using microscope (metallography)
MEL303.2	Interpret different phases present in different plain carbon steels and cast irons.
MEL303.3	Perform different heat treatment processes for a steel and observe microstructures in these conditions
MEL303.4	Identify effects of Annealing, Normalizing and Hardening on microstructure of medium carbon steel
MEL303.5	Determine hardenability of steel using Jominy end Quench test
MEL303.6	Determine S-N curve by Fatigue Test
MEL304	**Machine Shop Practice-I**
MEL304.1	Operate various machines like lathe, shaper etc.
MEL304.2	Perform plain turning, taper turning, and screw cutting etc. on lathe machine.
MEL304.3	Perform machining operations on shaper.
MEL304.4	Demonstrate metal joining process like compressive welding.
MEL304.5	Perform forging operations
MEL304.6	Perform shaping operations

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Course Number	Course Outcomes
	Second Year 2019 Even Sem
MEC401	**Applied Mathematics -IV**
MEC401.1	Solve the system of linear equations using matrix algebra with its specific rules
MEC401.2	Demonstrate basics of vector calculus
MEC401.3	Apply the concept of probability distribution and sampling theory to engineering problems
MEC401.4	Apply principles of vector calculus to the analysis of engineering problems
MEC401.5	Identify, formulate and solve engineering problems
MEC401.6	Illustrate basic theory of correlations and regression
MEC402	**Fluid Mechanics**
MEC402.1	Define properties of fluids and classification of fluids
MEC402.2	Evaluate hydrostatic forces on various surfaces and predict stability of floating bodies
MEC402.3	Formulate and solve equations of the control volume for fluid flow systems
MEC402.4	Apply Bernoulli's equation to various flow measuring devices
MEC402.5	Calculate resistance to flow of incompressible fluids through closed conduits and over surfaces
MEC402.6	Apply fundamentals of compressible fluid flows to relevant systems
MEC403	**Industrial Electronics**
MEC403.1	Illustrate construction, working principles and applications of power electronic switches
MEC403.2	Identify rectifiers and inverters for dc and ac motor speed control
MEC403.3	Develop circuits using OPAMP and timer IC555
MEC403.4	Identify digital circuits for industrial applications
MEC403.5	Illustrate the knowledge of basic functioning of microcontroller
MEC403.6	Analyse speed-torque characteristics of electrical machines for speed control
MEC404	**Prodction Process-II**
MEC404.1	Demonstrate understanding of metal cutting principles and mechanism
MEC404.2	Identify cutting tool geometry of single point and multipoint cutting tool
MEC404.3	Demonstrate various concepts of sheet metal forming operations
MEC404.4	Demonstrate concepts and use of jigs and fixtures
MEC404.5	Illustrate various non-traditional machining techniques
MEC404.6	Illustrate concepts and applications of additive manufacturing
MEC405	**Kinematics of Machinery**
MEC405.1	Define various components of mechanisms
MEC405.2	Develop mechanisms to provide specific motion
MEC405.3	Draw velocity and acceleration diagrams of various mechanisms
MEC405.4	Draw Cam profile for the specific follower motion
MEC405.5	Analyse forces in various gears
MEC405.6	Select appropriate power transmission for specific application
MEL401	**Data Base and Information Retrieval**
MEL401.1	Identify data models and schemes in DBMS
MEL401.2	Demonstrate the features of database management systems and Relational database
MEL401.3	Use SQL- the standard language of relational databases
MEL401.4	Demonstrate understanding of functional dependencies and design of the database
MEL401.5	Design graphical user Interface for specific application
MEL401.6	Create visual software entities
MEL402	**Fluid Mechanics**
MEL402.1	Calibrate different gauges
MEL402.2	Measure hydrostatic forces

MEL402.3	Verify the Archimedes Principle
MEL402.4	Calibrate Venturimeter, Orificemeter and Pitot tube
MEL402.5	Verify the Bernoulli's Principle
MEL402.6	Read manometers and maintain them
MEL403	**Industrial Electronics**
MEL403.1	Demonstrate characteristics of various electrical and electronics components
MEL403.2	Develop simple applications built around these components
MEL403.3	Identify use of different basic gates
MEL403.4	Identify and use digital circuits for industrial applications
MEL403.5	Built and demonstrate basic parameter measurement using microcontroller
MEL403.6	Test and Analyse speed-torque characteristics of electrical machines for speed control.
MEL404	**Kinematics of Machinery**
MEL404.1	Draw velocity diagram by instantaneous center method
MEL404.2	Draw velocity and acceleration diagrams for four bar mechanism by relative method.
MEL404.3	Draw velocity and acceleration diagrams for Slider crank mechanism by relative method
MEL404.4	Draw Cam profile for the specific follower motion
MEL404.5	Plot displacement-time, velocity-time, acceleration-time cam profiles
MEL404.6	Develop and build mechanisms to provide specific motion
MEL405	**Machine Shop Practice-II**
MEL405.1	Operate lathe machine
MEL405.2	Perform shaping operations
MEL405.3	Perform finishing operations on grinding machine
MEL405.4	Perform milling operations.
MEL405.5	Perform precision turning
MEL405.6	Perform drilling and threading operations

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Course Number	Course Outcomes
	Third Year 2018 ODD Sem
MEC501	**Internal Combustion Engines**
MEC501.1	Demonstrate the working of different systems and processes of S.I. engines
MEC501.2	Demonstrate the working of different systems and processes of C.I. engines
MEC501.3	Illustrate the working of lubrication, cooling and supercharging systems.
MEC501.4	Analyse engine performance
MEC501.5	Illustrate emission norms and emission control
MEC501.6	Comprehend the different technological advances in engines and alternate fuels
MEC502	**Mechanical Measurements and Control**
MEC502.1	Classify various types of static characteristics and types of errors occurring in the system.
MEC502.2	Classify and select proper measuring instrument for linear and angular displacement
MEC502.3	Classify and select proper measuring instrument for pressure and temperature measurement
MEC502.4	Design mathematical model of system/process for standard input responses
MEC502.5	Analyse error and differentiate various types of control systems and time domain specifications
MEC502.6	Analyse the problems associated with stability
MEC503	**Heat Transfer**
MEC503.1	Identify the three modes of heat transfer (conduction, convection and radiation)
MEC503.2	Illustrate basic modes of heat transfer
MEC503.3	Develop mathematical model for each mode of heat transfer
MEC503.4	Develop mathematical model for transient heat transfer
MEC503.5	Demonstrate and explain mechanism of boiling and condensation
MEC503.6	Analyse different heat exchangers and quantify their performance
MEC504	**Dynamics of Machinery**
MEC504.1	Demonstrate working Principles of different types of governors and Gyroscopic effects on the mechanical systems
MEC504.2	Illustrate basic of static and dynamic forces
MEC504.3	Determine natural frequency of element/system
MEC504.4	Determine vibration response of mechanical elements / systems
MEC504.5	Design vibration isolation system for a specific application
MEC504.6	Demonstrate basic concepts of balancing of forces and couples
MEDLO5011	**Press Tool Design**
MEDLO5011	Demonstrate various press working operations for mass production of sheet metal parts
MEDLO5011	Identify press tool requirements to build concepts pertaining to design of press tools
MEDLO5011	Prepare working drawings and setup for economic production of sheet metal components
MEDLO5011	Select suitable materials for different elements of press tools
MEDLO5011	Illustrate the principles and blank development in bent & drawn components
MEDLO5011	Elaborate failure mechanisms of pressed components, safety aspects and automation in press working
MEL501	**Internal Combustion Engines**
MEL501.1	Dismantle engine assembly
MEL501.2	Overhaul and Assemble engine components
MEL501.3	Perform load test/speed test on engine setup

MEL501.4	Calculate performance of multi cylinder engine
MEL501.5	Analyse engine performance and draw heat balance sheet
MEL501.6	Perform exhaust gas analysis
MEL502	**Mechanical Measurements and Control**
MEL502.1	Calibrate displacement sensors
MEL502.2	Calibrate pressure and vacuum gauges
MEL502.3	Measure torque using strain gauges
MEL502.4	Identify system/process characteristics for standard input responses
MEL502.5	Identify various types of control systems and time domain specifications
MEL502.6	Analyse the problems associated with stability
MEL503	**Heat Transfer**
MEL503.1	Estimate thermal conductivity of metals/non metals/liquids
MEL503.2	Compute heat transfer coefficient in natural as well forced convection
MEL503.3	Measure emissivity of grey body
MEL503.4	Quantify fin effectiveness/efficiency
MEL503.5	Analyse heat exchanger performance
MEL503.6	Demonstrate energy balance for heat exchanger
MEL504	**Dynamics of Machinery**
MEL504.1	Plot and analyse governor characteristics
MEL504.2	Analyse gyroscopic effect on laboratory model
MEL504.3	Estimate natural frequency of mechanical systems
MEL504.4	Analyse vibration response of mechanical systems
MEL504.5	Determine damping coefficient of a system
MEL504.6	Balance rotating mass
MEL505	**Manufacturing Sciences Lab**
MEL505.1	Estimate machining time for simple and taper turning operations on lathe
MEL505.2	Estimate machining time for threading/knurling operations on lathe
MEL505.3	Estimate machining time for various machining operations on shaper
MEL505.4	Perform NC, CNC and DNC machining operations
MEL505.5	Write CNC program for different operations
MEL505.6	Identify machining parameters for various Non Traditional machining operations
MEL506	**Business Communication and Ethics**
MEL506.1	Design a technical document using precise language, suitable vocabulary and apt style.
MEL506.2	Develop the life skills/ interpersonal skills to progress professionally by building stronger relationships.
MEL506.3	Demonstrate awareness of contemporary issues knowledge of professional and ethical responsibilities.
MEL506.4	Apply the traits of a suitable candidate for a job/higher education, upon being trained in the techniques of holding a group discussion, facing interviews and writing resume/SOP.
MEL506.5	Deliver formal presentations effectively implementing the verbal and non-verbal skills

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Course Number	**Course Outcomes**		
	Third Year 2019 Even Sem		
MEC601	**Metrology and Quality Engineering**		
MEC601.1	Demonstrate inspection methods and different gauges		
MEC601.2	Illustrate working principle of measuring instruments and calibration methodology		
MEC601.3	Illustrate basic concepts and statistical methods in quality control		
MEC601.4	Demonstrate characteristics of screw threads, gear profile, and tool profile		
MEC601.5	Illustrate the different sampling techniques in quality control		
MEC601.6	Illustrate different nondestructive techniques used for quality evaluation		
MEC602	**Machine Design - I**		
MEC602.1	Demonstrate understanding of various design considerations		
MEC602.2	Illustrate basic principles of machine design		
MEC602.3	Design machine elements for static as well as dynamic loading		
MEC602.4	Design machine elements on the basis of strength/ rigidity concepts		
MEC602.5	Use design data books in designing various components		
MEC602.6	Acquire skill in preparing production drawings pertaining to various designs		
MEC603	**Finite Element Analysis**		
MEC603.1	Solve differential equations using weighted residual methods		
MEC603.2	Develop the finite element equations to model engineering problems governed by second order differential equations		
MEC603.3	Apply the basic finite element formulation techniques to solve engineering problems by using one dimensional elements		
MEC603.4	Apply the basic finite element formulation techniques to solve engineering problems by using two dimensional elements		
MEC603.5	Apply the basic finite element formulation techniques to find natural frequency of single degree of vibration system		
MEC603.6	Use commercial FEA software, to solve problems related to mechanical engineering		
MEC604	**Refrigeration and Air Conditioning**		
MEC604.1	Demonstrate fundamental principles of refrigeration and air conditioning		
MEC604.2	Identify and locate various important components of the refrigeration and air conditioning system		
MEC604.3	Illustrate various refrigeration and air conditioning processes using psychometric chart		
MEC604.4	Design Air Conditioning system using cooling load calculations.		
MEC604.5	Estimate air conditioning system parameters		
MEC604.6	Demonstrate understanding of duct design concepts		
MEDLO6021	**Mechatronics**		
MEDLO6021	Identify the suitable sensor and actuator for a mechatronics system		
MEDLO6021	Select suitable logic controls		
MEDLO6021	Analyse continuous control logics for standard input conditions		
MEDLO6021	Develop ladder logic programming		
MEDLO6021	Design hydraulic/pneumatic circuits		
MEDLO6021	Design a mechatronic system		
MEL601	**Metrology and Quality Engineering**		
MEL601.1	Measure linear and angular dimensions		

MEL601.2	Measure surface roughness
MEL601.3	Measure various parameters of gear tooth profile
MEL601.4	Use optical profile projector for measurement
MEL601.5	Use various instruments for measurement of screw threads
MEL601.6	Measure flatness by Autocollimator / Interferometry method
MEL602	**Machine Design - I**
MEL602.1	Design shaft under various conditions
MEL602.2	Design Knuckle Joint / cotter joint
MEL602.3	Design Screw Jack/C-clamp along with frame
MEL602.4	Design Flexible flange couplings/ Leaf spring
MEL602.5	Convert design dimensions into working/manufacturing drawing
MEL602.6	Use design data book/standard codes to standardise the designed dimensions
MEL603	**Finite Element Analysis**
MEL603.1	Select appropriate element for given problem
MEL603.2	Select suitable meshing and perform convergence test
MEL603.3	Select appropriate solver for given problem
MEL603.4	Interpret the result
MEL603.5	Apply basic aspects of FEA to solve engineering problems
MEL603.6	Validate FEA solution
MEL604	**Refrigeration and Air Conditioning**
MEL604.1	Demonstrate fundamental principles of refrigeration and air conditioning
MEL604.2	Identify and locate various important components of the refrigeration and air conditioning system
MEL604.3	Represent various refrigeration and air conditioning processes using psychometric chart
MEL604.4	Operate and maintain refrigeration system
MEL604.5	Operate and maintain air conditioning system
MEL604.6	Simulate VCRS
MEL605	**Mechatronics**
MEL605.1	Demonstrate implementation of interfacing sensors and actuators using microcontrollers
MEL605.2	2. Demonstrate of interfacing various utilities with microcontrollers
MEL605.3	3. Demonstrate discrete control system using PLC microcontroller
MEL605.4	4. Design and develop a control system for specific use
MEL605.5	5. Implement program to PLC system and demonstrate its application
MEL605.6	6. Develop pneumatic circuits for a specific system

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Course Number	Course Outcomes
	Final Year 2018 ODD Sem
MEC701	**Machine Design - II**
MEC701.1	Select appropriate gears for power transmission on the basis of given load and speed.
MEC701.2	Design gears based on the given conditions.
MEC701.3	Select bearings for a given applications from the manufacturers catalogue.
MEC701.4	Select and/or design belts for given applications.
MEC701.5	Design cam and follower and clutches
MEC702	**CAD/CAM/CAE**
MEC702.1	Identify proper computer graphics techniques for geometric modelling.
MEC702.2	Transform, manipulate objects and store and manage data.
MEC702.3	Prepare part programming applicable to CNC machines.
MEC702.4	Use rapid prototyping and tooling concepts in any real life applications.
MEC702.5	Identify the tools for Analysis of a complex engineering component
MEC703	**Mechanical Utility Systems**
MEC707.1	Describe operating principles of compressors and pumps
MEC707.2	Evaluate performance of reciprocating/rotary compressors
MEC707.3	Illustrate and analyze characteristic curves of pumps
MEC707.4	Interpret possibilities of energy conservation in pumping and compressed air systems
MEC704	**Production Planning and Control**
MEC704.1	Illustrate production planning functions and manage manufacturing functions in a better way.
MEC704.2	Develop competency in scheduling and sequencing in manufacturing operations and effect affordable manufacturing lead time.
MEC704.3	Manage and control inventory with cost effectiveness
MEC704.4	Get conversant with various documents procedural aspects and preparation of orders for various manufacturing methods.
MEE7013	**Energy Management**
MEE7013.1	Summarize and explain need for energy management, economics and auditing
MEE7013.2	Describe importance of and analyze efficiency in thermal and electrical utilities
MEE7013.3	Assess need of waste heat recovery and cogeneration
MEE7019	**Operation Research**
MEE7019.1	Illustrate the need to optimally utilize the resources in various types of industries.
MEE7019.2	Apply and analyze mathematical optimization functions to various applications.
MEE7019.3	2. Demonstrate cost effective strategies in various applications in industry
MEP701	**Project**
MEP701.1	Do literature survey/industrial visit and identify the problem
MEP701.2	Apply basic engineering fundamental in the domain of practical applications
MEP701.3	Cultivate the habit of working in a team
MEP701.4	Attempt a problem solution in a right approach
MEP701.5	Correlate the theoretical and experimental/simulations results and draw the proper inferences
MEP701.6	Prepare report as per the standard guidelines

Department of Mechanical Engineering	
Course Number	**Course Outcomes** **Final Year 2019 Even Sem**
MEC801	**Design of Mechanical Systems**
MEC801.1	Design material handling systems such as hoisting mechanism of EOT Crane, belt conveyors.
MEC801.2	Design engine components such as cylinder, piston, connecting rod and crankshaft from system design point of view.
MEC801.3	Design pumps for the given applications.
MEC801.4	Prepare layout of machine tool gear box and select number of teeth on each gear.
MEC802	**Industrial Engineering and Management**
MEC802.1	Illustrate the need for optimization of resources and its significance in manufacturing industries, in order to enhance overall productivity.
MEC802.2	Develop capability in integrating knowledge of design along with other aspects of value addition in the conceptualization and manufacturing stage of various products.
MEC802.3	Demonstrate the concept of value analysis and its relevance
MEC802.4	Manage and implement different concepts involved in methods study and understanding of work content in different situations.
MEC802.5	Describe different aspects of work system design and facilities design pertinent to manufacturing industries
MEC802.6	Identify various cost accounting and financial management practices widely applied in industries
MEC803	**Refrigeration and Air Conditioning**
MEC808.1	Discuss fundamental refrigeration and air conditioning principles
MEC808.2	Identify and locate various important components of the refrigeration and air conditioning system
MEC808.3	Illustrate various refrigeration and air conditioning processes using psychometric char
MEC808.4	Design and analyze complete air conditioning system
MEE8022	**Renewable Energy Sources**
MEE8022.1	Demonstrate need of different renewable energy sources and their importance
MEE8022.2	Calculate and analyse utilization of solar and wind energy
MEE8022.3	Illustrate design of biogas plant
MEE8022.4	Estimate alternate energy sources India
MEE8026	**Automobile Engineering**
MEE8026.1	Demonstrate & explain various systems in an automobile
MEE8026.2	Describe importance and features of different systems like axle, differential, brakes, steering, suspension, wheel and balancing etc.
MEE8026.3	Explain principle of operation, construction and applications of various sensors used in modern automobile
MEP802	**Project**
MEP802.1	Do literature survey/industrial visit and identify the problem
MEP802.2	Apply basic engineering fundamental in the domain of practical applications
MEP802.3	Cultivate the habit of working in a team
MEP802.4	Attempt a problem solution in a right approach
MEP802.5	Correlate the theoretical and experimental/simulations results and draw the proper inferences

| MEP802.6 | Prepare report as per the standard guidelines |