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DEPARTMENT OF MECHANICAL ENGINEERING
(BE MECHANICAL ENGINEERING)

REGULATION – 2013

Course Outcomes

Course Name: Transforms and Partial Differential Equations (MA6351)

C201.1	Formulate and solve partial differential equations.
C201.2	Evaluate Fourier series of periodic functions.
C201.3	Apply the method of separation of variables to find the solution of heat and wave equation.
C201.4	Illustrate the Fourier transform techniques.
C201.5	Examine Z transform techniques and solve difference equations.

Course Name: Strength of Materials (CE6306)

C202.1	Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes.
C202.2	Understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment.
C202.3	Apply basic equation of simple torsion in designing of shafts, helical spring & leaf spring
C202.4	Calculate the slope and deflection in beams using different methods.
C202.5	Analyse and design thin and thick shells for the applied internal and external pressures.

Course Name: Engineering Thermodynamics (ME6301)

C203.1	Understand and apply the concepts of equilibrium, conservation of mass and energy, principles of energy interactions to simple thermal systems.
C203.2	Understand and apply the second law and entropy principles to study simple systems like heat engines, heat pumps and refrigerators etc.
C203.3	Study the phase equilibrium diagrams of various pure substances and analyse vapor power cycles.
C203.4	Build thermodynamic relations between various thermodynamic properties to ideal and real gases.
C203.5	Study different psychrometric processes and apply the concepts of psychometry to solve related problems.

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Course Name: Fluid Mechanics & Fluid machinery (CE6451)

C204.1	Apply mathematical knowledge to predict the properties and characteristics of a fluid.
C204.2	Analyse and calculate major and minor losses associated with pipe flow in piping networks.
C204.3	Understand the practical usefulness of dimensional analysis and apply in framing equations for hydraulic systems.
C204.4	Understand the construction, working principle, performance and design analysis of pumps.
C204.5	Understand the construction, working principle, performance and design analysis of turbines.

Course Name: Manufacturing Technology- I (ME6302)

C205.1	Understand the metal casting processes associated defects, merits and demerits.
C205.2	Understand arc,gas,solid state, resistance welding processes
C205.3	Analyse the process and principles of various metal forming methods
C205.4	Understand the various sheet metal and special forming processes
C205.5	Understand various methods of manufacturing plastic components.

Course Name: Electrical Drives and Control (EE6353)

C206.1	Classify types of electric drives systems based on nature of loads, control objectives, performance and reliability.
C206.2	Analyse different motor characteristics.
C206.3	Gain knowledge about DC and AC starters.
C206.4	Apply different speed control methods on DC motors
C205.5	Apply different speed control methods on AC motors

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Course Name: Manufacturing Technology Laboratory-I (ME6311)

C207.1	Understand the basic taper turning and external thread cutting
C207.2	Understand the principles of internal and eccentric turning.
C207.3	Understand the principles of knurling operation, and square head shaping.
C207.4	Understand the basic concepts hexagonal head shaping
C207.5	Understand the basic concepts of CNC programming.

Course Name: Fluid Mechanics and Machinery Laboratory (CE6461)

C208.1	Experiment with flow measurement devices like venturimeter and orifice meter.
C208.2	Percentage error in Rotometer with the actual flow rate.
C208.3	Estimate the friction and measure the frictional losses in fluid flow.
C208.4	Ability to do performance test on different hydraulic machinery such as pump.
C208.5	Ability to do performance test on different hydraulic machinery such as turbines.

Course Name: Electrical Engineering Laboratory (EE6365)

C209.1	Student will be able to Understand the characteristics of DC Machines and AC Machines.
C209.2	Student will be able to Understand the different speed control methods of DC and AC machines.
C209.3	Student will be able to analyse the Synchronous motor

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Course Name: Statistics & Numerical Methods (MA6452)

C210.1	Compute basic statistical analysis by identifying the tests, computing mean values, standard deviations and confidence intervals.
C210.2	Adapt Design of Experiment using Annova to test the hypothesis.
C210.3	To solve algebraic and Transcendental equations and to find dominant Eigen value of a matrix.
C210.4	Estimate the unknown intermediate values through interpolation and calculate the derivatives, the length and area of irregular objects using numerical differentiation and integration.
C210.5	Assess the initial value problems by single and multistep methods numerically.

Course Name: Kinematics of Machinery (ME6401)

C211.1	Understand various concepts of mechanism and develops mechanism to provide specific motion
C211.2	Analyse the velocity and acceleration of planar mechanisms using graphical method
C211.3	Construct the cam profile for specific follower motion
C211.4	Estimate the size of appropriate gears and gear trains for particular application
C211.5	Apply the concepts of friction to solve problems in machine elements

Course Name: Manufacturing Technology -II (ME6402)

C212.1	Introduce the theory of metal cutting and finding out cutting force in turning process
C212.2	Understand the lathe machine and its parts and various operations involved
C212.3	Familiarize with the shaper, milling and gear cutting calculations.
C212.4	Analyses various abrasive processes and operations broaching machines
C212.5	Understand the various turning and machining calculations

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Course Name: Engineering Materials and Metallurgy (ME6403)

C213.1	Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification.
C213.2	Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.
C213.3	Clarify the effect of alloying elements on ferrous and non-ferrous metals.
C213.4	Summarize the properties and applications of non-metallic materials.
C213.5	Explain the testing of mechanical properties.

Course Name: Environment Science and Engineering (GE6351))

C214.1	The knowledge gained on flora and fauna in our environment helps to know about social environment
C214.2	The students will gain knowledge on the offensive effects of pollution in day to day life
C214.3	The students will aquire knowledge on the natural resources available and their conservation
C214.4	The students will have adequate knowledge on the concepts of adverse effects of social issues like acid rain and global warming
C214.5	The students will get knowledge about the problems faced by society due to population explosion

Course Name: Thermal Engineering (ME6404)

C215.1	Apply thermodynamic concepts to different air standard cycles and analyse related problems
C215.2	Explain the functioning and features of IC engines, components and auxiliaries
C215.3	Apply thermodynamic concepts to steam nozzles, steam turbines and draw velocity diagrams of single and multi-stage turbines
C215.4	Explain working principle of various types of air compressors and solve problems
C215.5	Understand the basic concepts of different types of refrigeration and air conditioning systems and analyse related problems

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Course Name: Manufacturing Technology Laboratory-II (ME6411)

C216.1	Understand the basic milling operations.
C216.2	Understand the principle of various gear cutting operations.
C216.3	Understand the principles of various grinding operations.
C216.4	Understand the basic concepts cutting forces
C216.5	Understand the basic concepts of CNC programming.

Course Name: Thermal Engineering Laboratory-I (ME6412)

C217.1	Draw valve timing of four stroke engines and port timing of two stroke engines
C217.2	Determine flash and fire points of fuels
C217.3	Conduct experiments on single cylinder diesel engines with electrical ,mechanical and hydraulic loading and to study the performance characteristics and draw heat balance sheet
C217.4	Conduct experiments on multi cylinder petrol engines with hydraulic loading and to study the performance characteristics
C217.5	Conduct experiments on steam boiler and steam turbine and to study the performance characteristics

Course Name: Strength Of Materials Laboratory (CE6315)

C218.1	Perform Tension, Torsion, Hardness, Compression, and Deformation test on Solid materials.
C218.2	Examine the strain measurement using Rosette strain gauge.
C218.3	Study the effect of hardening- Improvement in hardness and impact resistance of steels.
C218.4	Study the effect of Tempering- Improvement in Mechanical properties & Comparison.
C218.5	Perform microscopic examination of Hardened samples and Hardened & tempered samples

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Course Name: Computer Aided Design (ME6501)

C301.1	Demonstrate the various stages of design and manufacturing of any product
C301.2	Use modelling features of curves, surfaces and solids in designing simple components
C301.3	Build up the algorithms in making simple curves and for visualization schemes such as viewing, shading and colouring
C301.4	Carry out assembly modelling and execute assembly analysis by understanding concepts such as mating, interferences, tolerance, geometric and mass properties.
C301.5	Use Standards for computer graphics, exchanging data and images and communication between the CAD systems

Course Name: Heat and Mass Transfer (ME6502)

C302.1	Apply heat conduction equations to different surface configuration under steady state and transient conditions and solve conduction based problems
C302.2	Apply free and forced convection heat transfer correlations to internal and external flow through/over various surface configuration and solve problems.
C302.3	Explain the phenomena of boiling and condensation, apply LMTD and NTU methods of thermal analysis to different types of heat exchanger configurations and solve problems,
C302.4	Explain basic laws for radiation and apply these principles to radiative heat transfer between different types of surfaces to solve problems.
C302.5	Apply diffusive and convective mass transfer equation and correlation to solve problems for different application.

Course Name: Design of Machine Elements (ME6503)

C303.1	Explain the concepts of principal stresses, theories of failure, stress concentration and fatigue loading
C303.2	Make proper assumptions with respect to material, factor of safety and able to design shafts under fluctuating and combined loads.
C303.3	Analyse the temporary and permanent joints and design joints based on applications.
C303.4	Design different energy storing element (helical springs, compression and tension springs, flywheels) and engine components- (connecting rods and crank shafts)
C303.5	Ability to compute equivalent radial loads for rolling contact bearing and sliding contact bearing and select appropriate bearing from the standard catalogue

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Course Name: Metrology and Measurements (ME6504)

C304.1	Understand basics of metrology and their effect on precision, accuracy, errors.
C304.2	Learn about linear and angular measuring instruments, principles and applications
C304.3	Understand about advances in metrology like laser interferometers, CMM
C304.4	Learn about form measurement like straightness, flatness, roundness, thread and surface finish
C304.5	Learn about measurements of power, flow and temperature

Course Name: Dynamics of Machines (ME6505)

C305.1	Analyse forces-motion relationship in standard mechanism and to design a flywheel based on energy fluctuation
C305.2	Analyse balancing problems in rotating and reciprocating machinery and to determine the unbalance forces and couples in a system
C305.3	Understand the fundamentals of different type of vibratory motion and solve problems related to SDOF free damped and un-damped vibration systems
C305.4	Analyse the forced vibration of damped SDOF systems and understand the significance of force transmissibility and vibration isolation
C305.5	Understand the principles in mechanisms used for speed control and stability control and solve problem related to their applications

Course Name: Professional Ethics in Engineering (GE6075)

C306.1	Gain Awareness On Human Values For Professional Excellence And Stress Management
C306.2	Gain Knowledge On Engineering Ethics, Moral Issues & Uses Of Ethical Theories
C306.3	Understand The Role Of Engineers As Responsible Experimenters Along With Courses Of Ethics In Engineering Field .
C306.4	Gain Awareness Of Responsibilities Of An Engineer For Safety And Risc Along With Risc Benefit Analysis
C306.5	Acquire Knowledge On Global Issues And Able To Apply Ethical Principles To Resolve Situations That Arise In Their Professional Lives

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Course Name: Dynamics Laboratory (ME6511)

C307.1	Explain gear parameters, kinematics of mechanisms and determine mass moment of inertia of mechanical element
C307.2	Demonstrate basic concepts of balancing of forces and couples in rotating and reciprocating mechanical system
C307.3	Determine vibration response of mechanical elements
C307.4	Demonstrate working Principles of different types of governor & Gyroscopic effect on the mechanical system

Course Name: Thermal Engineering lab-II (ME6512)

C308.1	Conduct tests on heat conduction apparatus and evaluate thermal conductivity of materials.
C308.2	Conduct tests on natural and forced convective heat transfer apparatus and evaluate heat transfer coefficient.
C308.3	Conduct tests on radiative heat transfer apparatus and evaluate Stefan Boltzmann constant and emissivity.
C308.4	Conduct tests to evaluate the performance of parallel/counter flow heat exchanger apparatus and reciprocating air compressor.
C308.5	Conduct tests to evaluate the performance of refrigeration and air-conditioning test rigs.

Course Name: Metrology & Measurements Laboratory (ME6513)

C309.1	Gain knowledge about length and thickness measuring equipments
C309.2	Gain knowledge about angle measuring equipments
C309.3	Get familiar with flatness and straightness equipments.
C309.4	Gain knowledge about screw threads and gear tooth parameters
C309.5	Gain knowledge on force, torque and temperature measuring equipments

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Course Name: Design of Transmission Systems (ME6601)

C310.1	Design a power transmission system through belt, rope, and chain drive to meet desired needs in engineering applications.
C310.2	Understand Gear Terminology and Design spur and helical gear drive by considering strength and life.
C310.3	Understand the tooth terminology and apply the standard procedure for design of Bevel, Worm and Crossed Helical gears drives.
C310.4	Design of Gear box using standard step ratio, shows its speeds in stages through ray diagram and kinematic arrangement.
C310.5	Analyse and Design the Clutches, Brakes and Cam according to the requirements.

Course Name: Principles of Management (MG6851)

C311.1	An understanding of the managerial functions like planning, organizing, staffing, leading & Controlling.
C311.2	The basic knowledge on international aspect of management.
C311.3	The basic knowledge on management and its evolution.
C311.4	A knowledge on budgetary control and their strategies.
C311.5	A understanding of the motivational theories existing in the management.

Course Name: Automobile Engineering (ME 6602)

C312.1	Recognize the various parts of the automobile with their functions and materials.
C312.2	Discuss the engine auxiliary systems and engine emission control.
C312.3	distinguish the working of different types of transmission systems
C312.4	Explain the steering, brakes and suspension systems.
C312.5	Predict possible alternate source of energy for IC engines.

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Course Name: Finite Element Analysis (ME 6603)

C313.1	Understand numerical methods and analytical methods involved in Finite Element method and to understand Ritz technique and weighted residual methods for deriving finite element governing equations.
C313.2	Understand the role and significance of shape functions in finite element formulations and use linear, quadratic, and cubic shape functions for interpolation in global, local, and natural coordinates for the formulation of One-dimensional elements used to solve Structural, thermal and Eigen value problems.
C313.3	Understand the formulation of Two-dimensional elements to solve scalar variable problems.
C313.4	Understand the formulation of Two-dimensional elements to solve vector variable problems.
C313.5	Understand shape function of Isoparametric one-two dimensional, higher order elements (serendipity). Its numerical integration and its application to plane stress problems

Course Name: Gas Dynamics and Jet Propulsion (ME6604)

C314.1	Apply the concept of compressible flow in variable area ducts.
C314.2	Apply the concept of compressible flow in constant area ducts.
C314.3	Examine the effect of compression and expansion waves in compressible flow.
C314.4	Use the concept of gas dynamics in Jet Propulsion.
C314.5	Apply the concept of gas dynamics in Space Propulsion.

Course Name: Unconventional Machining Processes (ME6004)

C315A.1	Understand unconventional machining process needs
C315A.2	Understand about mechanical energy based process
C315A.3	Understand about electrical energy based process
C315A.4	Understand about chemical and electro-chemical energy based process
C315A.5	Understand about thermal energy based process

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Course Name: Refrigeration and Air Conditioning (ME6002)

C315B.1	Explain the basic concepts of refrigeration
C315B.2	Explain the vapor compression refrigeration system and to solve problems
C315B.3	Discuss the various types of refrigeration systems.
C315B.4	Calculate the Psychromentric properties and its use in Psychrometric processes.
C315B.5	Explain the concepts of air conditioning and to solve problems.

Course Name: CAD/CAM Laboratory (ME6611)

C316.1	Develop 2D Part and 3D Part Models using CAD Software
C316.2	Develop 3D Assembly Models using CAD Software
C316.3	Understand the CNC Control in Modern Manufacturing System
C316.4	Prepare CNC Part Programming and Perform Manufacturing

Course Name: Design and Fabrication Project (ME6612)

C317.1	Identify methods and materials to carry out experiments/develop code.
C317.2	Reorganize the procedures with a concern for society, environment and ethics.
C317.3	Design the proposed model using any CAD system and make calculations
C317.4	Analyse and discuss the results to draw valid conclusions.
C317.5	Prepare a report as per recommended format and defend the work.

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Course Name: Communication and soft Skills Lab (GE6674)

C318.1	Take international examination such as IELTS and TOEFL.
C318.2	Make presentations and Participate in Group Discussions
C318.3	Successfully answer questions in interviews

Course Name: Power Plant Engineering (ME6701)

C401.1	Explain the layout, construction and working of the components inside a thermal power plant.
C401.2	Explain the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power plants.
C401.3	Explain the layout, construction and working of the components inside nuclear power plants.
C401.4	Explain the layout, construction and working of the components inside Renewable energy power plants.
C401.5	Explain the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.

Course Name: Mechatronics (ME6702)

C402.1	Discuss the interdisciplinary applications of Electronics, Electrical, Mechanical and computer Systems for the Control of Mechanical, Electronic Systems and sensor Technology.
C402.2	Discuss the architecture of Microprocessor and Microcontroller, Pin Diagram, Addressing Modes of Microprocessor and Microcontroller.
C402.3	Discuss Programmable Peripheral Interface, Architecture of 8255 PPI, and various device interfacing
C402.4	Explain the architecture, programming and application of programmable logic controllers to problems and challenges in the areas of Mechatronic engineering.
C402.5	Discuss various Actuators and Mechatronics system using the knowledge and skills acquired through the course and also from the given case studies

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Course Name: Computer Integrated Manufacturing Systems (ME6703)

C403.1	Understand the concepts of CIM
C403.2	Impart knowledge about production planning and control & computerized process planning in CIM
C403.3	Understand the group technology and cellular manufacturing
C403.4	Impart knowledge about flexible manufacturing system in CIM and understand the Automated guided vehicle system
C403.5	Know about industrial robots and its programming

Course Name: Total Quality Management (GE6757)

C404.1	Select and apply appropriate techniques in identifying customer needs, as well as the quality impact that will be used as inputs in TQM methodologies
C404.2	Have a strategy to create and maintain a quality culture that will move the organization towards world-class status
C404.3	Understand the TQM concept and techniques for managing, controlling and improving quality at the workplace.
C404.4	Knowing business excellence models and be able to assess organizations performance through data collection and analysis
C404.5	Have a strategy to implement total quality practices at the workplace and effect savings on the input cost of an organization.

Course Name: Process Planning & Cost Estimation (ME6005)

C405A.1	Explain Introduction to Process Planning
C405A.2	Discuss the Process Planning Activities
C405A.3	Explain the Introduction to Cost Estimation
C405A.4	Explain the production Cost Estimation
C405A.5	Explain the Machining Time Calculation and details

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Course Name: Maintenance Engineering (ME6012)

C406A.1	Execute the principles of maintenance planning for better performance
C406A.2	Apply various preventive maintenance methods to avoid failures
C406A.3	Carry out On- load and Off -load testing through condition monitoring
C406A.4	Develop various methodologies to repair basic machine elements
C406A.5	Illustrate the repair methods for material handling equipments

Course Name: Hydraulics & Pneumatics (ME6021)

C406B.1	Explain fluid power principles and fundamentals
C406B.2	Discuss the hydraulic systems and components
C406B.3	Explain the hydraulic circuit
C406B.4	Explain the pneumatic circuit
C406B.5	Explain design hydraulic and pneumatic circuit

Course Name: Simulation & Analysis Laboratory (ME6711)

C407.1	Model and simulate simple mechanisms using MATLAB & ADAMS
C407.2	Model and analyse trusses,cables,beams with different support conditions
C407.3	Model and analyse plates and simple shells with different loading conditions
C407.4	Model and analyse axisymmetric components and cylindrical shells for thermal stresses
C407.5	Model and analyse beams for finding out natural frequencies

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Course Name: Mechatronics Laboratory (ME6712)

C408.1	Demonstrate the functioning of mechatronics system with various pneumatic, hydraulic and electrical systems.
C408.2	Demonstrate the functioning of control systems with the help of PLC and microcontrollers
C408.3	Understand the functioning of various types of transducers.
C408.4	Understand the functioning of image processing technique.

Course Name: Comprehension (ME6713)

C409.1	Understand and comprehend any given problem related to mechanical engineering field.
C409.2	Review, prepare and present technological development
C409.3	Analyse the modern trends in the field of mechanical engineering

Course Name: Engineering Economics (MG6863)

C410.1	Prepare accounting records and summarize and interpret the accounting data for managerial decisions.
C410.2	Understand the concept of value of engineering and apply it to practical problems
C410.3	Prepare the cash flow charts and make reports
C410.4	Carry out replacement and maintenance analysis and determine economic life of assets
C410.5	Adopt various depreciation techniques and determine economic life of assets

Course Name : Production Planning and Control (IE6605)

C411.1	Explain various production control methods which can be applied to specific situations and state their relationship to the product/process involved.
C411.2	Make forecasts in the manufacturing and service sectors using selected quantitative and qualitative techniques.
C411.3	Apply the principles and techniques for planning and control of the production and service systems to optimize/make best use of resources.
C411.4	Understand the importance and function of inventory and to be able to apply selected techniques for its control and management under dependent and independent demand circumstances
C411.5	Demonstrate and explain the use of Manufacturing Requirements Planning (MRP2), Just - In - Time (JIT) techniques in terms of operation and their importance in Lean World Class Manufacturing.

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DEPARTMENT OF MECHANICAL ENGINEERING
(BE MECHANICAL ENGINEERING)

Course Name: Advanced I.C Engines (ME6016)

C412.1	Explain fuel injection systems in SI engine, types of combustion chamber and combustion process
C412.2	Explain different types of fuel injection system and combustion chambers of CI engine
C412.3	Explain the mechanism of pollution formation and the evolution of emission norms
C412.4	Describe the properties of various alternative fuels, engine modification required and emission characteristic of alternative fuels
C412.5	Discuss various ignition methods used in I.C engine and electronic engine management system

Course Name: Project Work (ME6811)

C413.1	Identify a topic in advanced areas of Mechanical Engineering and Identify methods and materials to carry out experiments/develop code
C413.2	Review literature to identify gaps and define objectives & scope of the work and Reorganize the procedures with a concern for society, environment and ethics
C413.3	Generate and implement innovative ideas for social benefit Analyze and discuss the results to draw valid conclusions
C413.4	Develop prototypes/models, experimental set-up and software systems necessary to meet the objectives and Prepare a report as per recommended format and defend the work
C413.5	Explore the possibility of publishing papers in peer reviewed journals/conference proceedings

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