



MEENAKSHI SUNDARARAJAN ENGINEERING COLLEGE

363, Arcot Road, Kodambakkam, Chennai – 24
Approved by AICTE & Affiliated to Anna University
email Id: principal@msec.edu.in

Website : www.msec.edu.in

**DEPARTMENT OF MECHANICAL ENGINEERING
(BE MECHANICAL ENGINEERING)**

**REGULATION – 2017
Course Outcomes**

Course Name : Transforms and Partial Differential Equations (MA8353)

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 : Engineering Thermodynamics (ME8391)

C202.1	Understand and apply the concepts of equilibrium, conservation of mass and energy, principles of energy interactions to simple thermal systems.
C202.2	Apply the second law and entropy principles to study simple systems like heat engines, heat pumps and refrigerators etc.
C202.3	Study the phase equilibrium diagrams of various pure substances and analyse vapor power cycles
C202.4	Build thermodynamic relations between various thermodynamic properties to ideal and real gases.
C202.5	Study different psychrometric processes and apply the concepts of psychrometry to solve related problems.

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Course Name : Fluid Mechanics and Machinery(CE8394)

C203.1	Apply mathematical knowledge to predict the properties and characteristics of a fluid.
C203.2	Analyse and calculate major and minor losses associated with pipe flow in piping networks.
C203.3	Understand the practical usefulness of dimensional analysis and apply in framing equations for hydraulic systems.
C203.4	Understand the construction, working principle, performance and design analysis of pumps.
C203.5	Understand the construction, working principle, performance and design analysis of turbines.


Course Name : Manufacturing Technology – I (ME8351)

C204.1	To understand the metal casting processes associated defects, merits and demerits.
C204.2	To impart the knowledge of Different metal joining process.
C204.3	To know the knowledge the various Hot and cold working.
C204.4	To discuss the various sheet metal making processes.
C204.5	To understand the knowledge of various methods of manufacturing plastic components.

Course Name : Electrical Drives and Control (EE8353)

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


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Course : Manufacturing Technology Laboratory

C206.1	Understand the metal casting processes associated defects, merits and demerits.
C206.2	Understand arc,gas,solid state, resistance welding processes
C206.3	Analyse the process and principles of various metal forming methods
C206.4	Understand the various sheet metal and special forming processes
C206.5	Understand various methods of manufacturing plastic components.

Course : Computer Aided Machine Drawing

C207.1	Follow Indian Standards on drawing practices, symbols, geometric dimensioning and tolerances
C207.2	Visualize and Re-create part drawings, sectional views and assembly drawings of machine components as per standards using CAD software and also by manual drawing
C207.3	Visualize and Re-create assembly drawings of machine components as per standards by manual drawing.

Course : Electrical Engineering Laboratory

C208.1	Student will be able to Understand the characteristics of DC Machines and AC Machines.
C208.2	Student will be able to Understand the different speed control methods of DC and AC machines.
C208.3	Student will be able to analyse the Synchronous motor


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Course : Interpersonal Skills laboratory / Reading & Speaking (HS8381)

C209.1	Ability to listen and respond appropriately.
C209.2	Ability to participate in group discussions.
C209.3	Ability to make effective presentations.
C209.4	Ability to listen/view and comprehend different spoken discourses/excerpts different accents and to speak clearly in simple language.
C209.5	Ability to participate confidently and appropriately in formal and informal conversations.

Course : Statistics and Numerical Methods (MA8452)

C210.1	Compute basic statistical analysis by identifying the tests, computing mean values, standard deviations and confidence intervals.
C210.2	Adapt Design of Experiments using Annova to test the hypothesis.
C210.3	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 : Kinematics of Machinery (ME8492)

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


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Course : Manufacturing Technology – II(ME8451)

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

Course : Engineering Metallurgy (ME8491)

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 materials for various mechanical properties.

Course : Strength of Materials for Mechanical Engineers(CE8395)

C214.1	Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes.
C214.2	Understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment.
C214.3	Apply basic equation of simple torsion in designing of shafts and helical spring
C214.4	Calculate the slope and deflection in beams using different methods
C214.5	Analyze and design thin and thick shells for the applied internal and external pressures.

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Course : Thermal Engineering – I (ME8493)

C215.1	Apply thermodynamic concepts to different air standard cycles, steam power cycles and analyse related problems
C215.2	Explain working principle of various types of air compressors and solve problems
C215.3	Explain the functioning and features of IC engines, its components and combustion in CI and SI engines
C215.4	Calculate performance parameters of IC engines and explain IC engine auxiliaries
C215.5	Describe and analyse open and closed cycle gas turbine plants and their improvement methods

Course : Manufacturing Technology Lab – II(ME8462)

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 : Strength of Materials and Fluid Mechanics and Machinery Lab (CE8381)

C217.1	Perform Tension, Torsion, Hardness, Compression, and Deflection test on rods, plates, springs and beams
C217.2	Perform heat treatment operations, measure hardness and study the influence of heat treatment on mechanical properties
C217.3	Perform strain measurement using Rosette strain gauge
C217.4	Experiment with flow measurement devices such as venturimeter, orifice meter and rotometer for actual flow rate and friction losses
C217.5	Carry out performance test on different hydraulic machineries such as pumps and turbines


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Course : Advanced Reading and Writing (HS8461)

C218.1	Function effectively as an individual in multi-disciplinary settings.
C218.2	Able to comprehend and write effective reports.
C218.3	Write different types of essays by understanding the elements and structure of a good essay.
C218.4	Write winning job application and project report, statement of purpose and apply these in their career.
C218.5	Read and evaluate texts critically and display critical thinking in various professional contexts.

Course : Thermal Engineering – II (ME8595)

C301.1	Apply thermodynamic concepts to steam nozzles and analyse related problems
C301.2	Explain the functioning and features of different types of boilers ,its auxiliaries and calculate performance parameters
C301.3	Explain flow in steam turbines and draw the velocity diagrams of single and multi-stage turbines
C301.4	Understand the concepts of cogeneration, working features of heat pumps and heat exchangers
C301.5	Apply the basic concepts of thermodynamics to different types of refrigeration and air conditioning systems and analyse related problems

Course : Design of Machine Elements(ME8593)

C302.1	Explain the concepts of principal stresses, theories of failure, stress concentration and fatigue loading
C302.2	Make proper assumptions with respect to material, factor of safety and able to design shafts under fluctuating, combined loads and under critical speed. Design shafts, keys and couplings
C302.3	Analyse the temporary and permanent joints and design joints based on applications.
C302.4	Design different energy storing element (helical springs, compression and tension springs, flywheels) and engine components- (connecting rods and crank shafts)
C302.5	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 : Metrology and Measurements (ME8501)

C303.1	To understand basics of metrology and their effect on precision, accuracy, errors.
C303.2	To learn about linear and angular measuring instruments, principles and applications
C303.3	To understand about advances in metrology like laser interferometers, CMM
C303.4	To learn about form measurement like straightness, flatness, roundness, thread and surface finish
C303.5	To learn about measurements of power, flow and temperature

Course : Dynamics of Machines(ME8594)

C304.1	Analyze forces-motion relationship in standard mechanism and to design a flywheel based on energy fluctuation
C304.2	Analyze balancing problems in rotating and reciprocating machinery and to determine the unbalance forces and couples in a system.
C304.3	Understand the fundamentals of different type of vibratory motion and solve problems related to SDOF free damped and un-damped vibration systems.
C304.4	Analyze the forced vibration of damped SDOF systems and understand the significance of force transmissibility and vibration isolation.
C304.5	Understand the principles in mechanisms used for speed control and stability control and solve problem related to their applications

Course : Open Elective : Environment and Agriculture(OAI551)

C305A.1	To gain knowledge on the issues of with respect to land use and land scape changes. Students able to gain the knowledge about water quality, globalization and agro eco system.
C305A.2	To understand the environmental impacts with respect to erosion and deposition problems in irrigation and mechanized agriculture etc.
C.305A.3	To gain knowledge on the basic concepts of Climate Change, Water scarcity and water shortage.
C305A.4	To understand the ecosystem, ecological diversity, farming principles and forest fragmentation.
C305A.5	To understand the alternate culture systems, Mega farms and vertical farms , Agricultural environment policies and its impacts


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Course : Kinematics and Dynamics Laboratory(ME8511)

C306.1	Explain gear parameters, kinematics of mechanisms and determine mass moment of inertia of mechanical element.
C306.2	Demonstrate basic concepts of balancing of forces and couples in rotating and reciprocating mechanical system.
C306.3	Determine vibration response of mechanical elements.
C306.4	Demonstrate working Principles of different types of Governor and Gyroscopic effect on the mechanical system

Course : Thermal Engineering Laboratory (ME8512)

C307.1	Able to draw valve timing of four stroke engines and port timing of two stroke engines and to determine flash and fire power points of fuels
C307.2	Ability to conduct experiments on single cylinder diesel and multi cylinder petrol engines with electrical ,mechanical and hydraulic loading and to study the performance characteristics and draw heat balance
C307.3	Ability to conduct experiments on steam boiler and steam turbine and to study the performance characteristics
C307.4	Conduct tests on heat conduction apparatus and evaluate thermal conductivity of materials and natural and forced convection apparatus to evaluate heat transfer coefficient
C307.5	Conduct tests on radiative heat transfer apparatus and evaluate Stefan Boltzmann constant and emissivity. Conduct tests to evaluate the performance of parallel / counterflow heat exchanger apparatus
C307.6	Conduct tests of on Air compressors, Heat exchangers, Refrigeration and Air-conditioning test rigs to study and evaluate their performance.

Course : Metrology and Measurements Laboratory (ME8513)

C308.1	Gain knowledge about length and thickness measuring equipments
C308.2	Gain knowledge about angle measuring equipments
C308.3	Get familiar with flatness and straightness equipments.
C308.4	Gain knowledge about screw threads and gear tooth parameters
C308.5	Gain knowledge on force, torque and temperature measuring equipments

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Course : Design of Transmission Systems (ME8651)

C309.1	Design a power transmission system through belt, rope, and chain drive to meet desired needs in engineering applications.
C309.2	Understand Gear Terminology and Design spur and helical gear drive by considering strength and life.
C309.3	Understand the tooth terminology and apply the standard procedure for design of Bevel, Worm and Crossed Helical gears drives.
C309.4	Design of Gear box using standard step ratio, shows its speeds in stages through ray diagram and kinematic arrangement.
C309.5	Analyze and Design the Clutches, Brakes and Cam according to the requirement.

Course : Computer Aided Design and Manufacturing (ME8691)

C310.1	Demonstrate the various stages of design and manufacturing of any product
C310.2	Use modeling features of curves, surfaces and solids in designing simple components
C310.3	Build up the algorithms in making simple curves and for visualization schemes such as viewing, shading and coloring
C310.4	Carry out assembly modeling and execute assembly analysis by understanding concepts such as mating, interferences, tolerance, geometric and mass properties.
C310.5	Use Standards for computer graphics, exchanging data and images and communication between the CAD systems

Course : Heat and Mass Transfer (ME8693)

C311.1	Apply heat conduction equations to different surface configuration under steady state and transient conditions and solve conduction based problems
C311.2	Apply free and forced convection heat transfer correlations to internal and external flow through/over various surface configurations and solve problems.
C311.3	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,
C311.4	Explain basic laws for radiation and apply these principles to radiative heat transfer between different types of surfaces to solve problems.
C311.5	Apply diffusive and convective mass transfer equation and correlation to solve problems for different application.


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Course : Finite Element Analysis (ME8692)

C312.1	To 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.
C312.2	To 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.
C312.3	To understand the formulation of Two-dimensional elements to solve scalar variable problems.
C312.4	To understand the formulation of Two-dimensional elements to solve vector variable problems.
C312.5	To understand shape function of Isoparametric one-two dimensional, higher order elements (serendipity). Its numerical integration and its application to plane stress problems

Course : Hydraulics and Pneumatics (ME8694)

C313.1	Explain fluid power principles and fundamentals
C313.2	Discuss the hydraulic systems and components
C313.3	Explain the hydraulic circuit
C313.4	Explain the pneumatic circuit
C313.5	Explain design hydraulic and pneumatic circuit

Course : Automobile Engineering (ME8091)

C314A.1	Recognize the various parts of the automobile with their functions and materials.
C314A.2	Discuss the engine auxiliary systems and engine emission control.
C314A.3	distinguish the working of different types of transmission systems
C314A.4	Explain the steering, brakes and suspension systems.
C314A.5	Predict possible alternate source of energy for IC engines.


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Course : Gas Dynamics and Jet Propulsion (ME8096)

C314B.1	Apply the concept of compressible flow in variable area ducts.
C314B.2	Apply the concept of compressible flow in constant area ducts.
C314B.3	Examine the effect of compression and expansion waves in compressible flow.
C314B.4	Use the concept of gas dynamics in Jet Propulsion.
C314B.5	Apply the concept of gas dynamics in Space Propulsion.

Course : CAD / CAM Laboratory (ME8681)

C315.1	To Develop 2D Part AND 3D Part Models using CAD Software
C315.2	To develop 3D Assembly Models using CAD Software
C315.3	To Understand the CNC Control in Modern Manufacturing System
C315.4	To Prepare CNC Part Programming and Perform Manufacturing

Course : Design and Fabrication Project (ME8682)

C316.1	Identify methods and materials to carry out experiments/develop code.
C316.2	Reorganize the procedures with a concern for society, environment and ethics.
C316.3	Design the CAD model and model calculations
C316.4	Explain and Carry out necessary fabrication works as per the design.
C316.5	Prepare a report as per recommended format and defend the work.


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Course : Professional Communication (HS8581)

C317.1	To enhance the students to make effective presentations.
C317.2	To help the students participate confidently in Group Discussions.
C317.3	To motivate and prepare the students to attend job interviews and be successful in their pursuit.
C317.4	To train and develop the adequate Soft Skills required for the workplace.
C317.5	Ability to interpret different genres of texts, infer implied meanings and evaluate it for ideas as well as for methods of presentation relevant in different situations.


Course : Power Plant Engineering (ME8792)

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 : Process Planning and Cost Estimation (ME8793)

C402.1	Explain Introduction to Process Planning
C402.2	Discuss the Process Planning Activities
C402.3	Explain the Introduction to Cost Estimation
C402.4	Explain the production Cost Estimation
C402.5	Explain the Machining Time Calculation and details

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Course : Mechatronics (ME8791)

C403.1	Discuss the interdisciplinary applications of Electronics, Electrical, Mechanical and Computer Systems for the Control of Mechanical, Electronic Systems and sensor technology.
C403.2	Discuss the architecture of Microprocessor and Microcontroller, Pin Diagram, Addressing Modes of Microprocessor and Microcontroller.
C403.3	Discuss Programmable Peripheral Interface, Architecture of 8255 PPI, and various device interfacing
C403.4	Explain the architecture, programming and application of programmable logic controllers to problems and challenges in the areas of Mechatronic engineering.
C403.5	Discuss various Actuators and Mechatronics system using the knowledge and skills acquired through the course and also from the given case studies


Course Name: Simulation & Analysis Laboratory (ME8711)

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

Course Name: Mechatronics Laboratory (ME8782)

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	Ability to understand the functioning of various types of transducers.
C408.4	Ability to understand the functioning of image processing technique.


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Course Name: Technical Seminar (ME8712)

C409.1	Determine a technical topic from the field of engineering and application
C409.2	Prepare presentation and report for the same topic
C409.3	Analyze a current topic of professional interest and present it before audience


Course Name: Principles of Management (ME8581)

C410.1	Understande the managerial functions like planning, organizing, staffing, leading & controlling
C410.2	The basic knowledge on international aspect of management
C410.3	The basic knowledge on management and its evolution
C410.4	A knowledge on budgetary control and their strategies
C410.5	A understanding of the motivational theories existing in the management

Course name : Production Planning and Control

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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Course Name : Project Work (ME8811)

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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