Department of Mechanical Engineering

Course out Come (I Year – I & II Semester)

C101	HS8151	Communicative English
	Outcomes	
C101.1	Read articles of a general kind in magazines and newspapers.	
C101.2	Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.	
C101.3	Comprehend conversations and short talks delivered in English	
C101.4	Write short essays of a general kind and personal letters and emails in English.	

C102	MA8151	Engineering Mathematics – I
	Outcomes	
C102.1	Use both the limit definition and rules of differentiation to differentiate functions.	
C102.2	Apply differentiation to solve maxima and minima problems.	
C102.3	Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.	
C102.4	Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.	
C102.5	Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.	
C102.6	Determine convergence/divergence of improper integrals and evaluate convergent improper integrals.	
C102.7	Apply various techniques in solving differential equations.	

C103	PH8151	Engineering Physics
	Outcomes	
C103.1	The students will gain knowledge on the basics of properties of matter and its applications,	
C103.2	The students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics,	
C103.3	The students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers,	
C103.4	The students will get knowledge on advanced physics concepts of quantum theory and its applications in tunneling microscopes.	
C103.5	The students will understand the basics of crystals, their structures and different crystal growth techniques.	

C104	CY8151	Engineering Chemistry
Outcomes		
C104.1	The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.	

C105	GE8151	Problem Solving and Python Programming
Outcomes		
C105.1	Develop algorithmic solutions to simple computational problems	
C105.2	Read, write, execute by hand simple Python programs.	
C105.3	Structure simple Python programs for solving problems.	
C105.4	Decompose a Python program into functions.	
C105.5	Represent compound data using Python lists, tuples, and dictionaries.	
C105.6	Read and write data from/to files in Python Programs.	

C106	GE8152	Engineering Graphics
Outcomes		
C106.1	Familiarize with the fundamentals and standards of Engineering graphics	
C106.2	Perform freehand sketching of basic geometrical constructions and multiple views of objects.	
C106.3	Project orthographic projections of lines and plane surfaces.	
C106.4	Draw projections and solids and development of surfaces.	
C106.5	Visualize and to project isometric and perspective sections of simple solids.	

C107	GE8161	Problem Solving and Python Programming Laboratory
Outcomes		
C107.1	Write, test, and debug simple Python programs.	
C107.2	Implement Python programs with conditionals and loops.	
C107.3	Develop Python programs step-wise by defining functions and calling them.	
C107.4	Use Python lists, tuples, dictionaries for representing compound data.	
C107.5	Read and write data from/to files in Python.	

C108	BS8161	Physics and Chemistry Laboratory
Outcomes		
C108.1	Apply principles of elasticity, optics and thermal properties for engineering applications.	
C108.2	The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.	

C109	HS8251	Technical English
Outcomes		
C109.1	Read technical texts and write area- specific texts effortlessly.	
C109.2	Listen and comprehend lectures and talks in their area of specialisation successfully.	
C109.3	Speak appropriately and effectively in varied formal and informal contexts.	
C109.4	Write reports and winning job applications.	

C110	MA8251	Engineering Mathematics – II
Outcomes		
C110.1	Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.	
C110.2	Gradient, divergence and curl of a vector point function and related identities.	
C110.3	Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification.	
C110.4	Analytic functions, conformal mapping and complex integration.	
C110.5	Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.	

C111	PH8251	Materials Science
Outcomes		
C111.1	The students will have knowledge on the various phase diagrams and their applications	
C111.2	The students will acquire knowledge on Fe-Fe3C phase diagram, various microstructures and alloys	
C111.3	The students will get knowledge on mechanical properties of materials and their measurement	
C111.4	The students will gain knowledge on magnetic, dielectric and superconducting properties of materials	
C111.5	The students will understand the basics of ceramics, composites and nanomaterial's.	

C112	BE8253	Basic Electrical, Electronics and Instrumentation Engineering
Outcomes		
C112.1	Understand electric circuits and working principles of electrical machines	
C112.2	Understand the concepts of various electronic devices	
C112.3	Choose appropriate instruments for electrical measurement for a specific application	

C113	GE8291	Environmental Science and Engineering
Outcomes		
C113.1	Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.	

C113.2	Public awareness of environmental is at infant stage.
C113.3	Ignorance and incomplete knowledge has lead to misconceptions
C113.4	Development and improvement in std. of living has lead to serious environmental disasters

C114	**GE8292**	**Engineering Mechanics**
Outcomes		
C114.1	Illustrate the vectorial and scalar representation of forces and moments	
C114.2	Analyse the rigid body in equilibrium	
C114.3	Evaluate the properties of surfaces and solids	
C114.4	Calculate dynamic forces exerted in rigid body	
C114.5	Determine the friction and the effects by the laws of friction	

C115	**GE8261**	**Engineering Practices Laboratory**
Outcomes		
C115.1	Fabricate carpentry components and pipe connections including plumbing works.	
C115.2	Use welding equipments to join the structures.	
C115.3	Carry out the basic machining operations	
C115.4	Make the models using sheet metal works	
C115.5	Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings	
C115.6	Carry out basic home electrical works and appliances	
C115.7	Measure the electrical quantities	
C115.8	Elaborate on the components, gates, soldering practices.	

C116	**BE8261**	**Basic Electrical, Electronics and Instrumentation Engineering Laboratory**
Outcomes		
C116.1	Ability to determine the speed characteristic of different electrical machines	
C116.2	Ability to design simple circuits involving diodes and transistors	
C116.3	Ability to use operational amplifiers	

Course out Come (II Year – III & IV Semester)

C201	MA8353	Transforms and Partial Differential Equations
Outcomes		
C201.1	Understand how to solve the given standard partial differential equations.	
C201.2	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.	
C201.3	Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.	
C201.4	Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.	
C201.5	Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.	

C202	ME8391	Engineering Thermodynamics
Outcomes		
C202.1	Apply the first law of thermodynamics for simple open and closed systems under steady and unsteady conditions.	
C202.2	Apply second law of thermodynamics to open and closed systems and calculate entropy and availability.	
C202.3	Apply Rankine cycle to steam power plant and compare few cycle improvement methods	
C202.4	Derive simple thermodynamic relations of ideal and real gases	
C202.5	Calculate the properties of gas mixtures and moist air and its use in psychometric processes	

C203	CE8394	Fluid Mechanics and Machinery
Outcomes		
C203.1	Apply mathematical knowledge to predict the properties and characteristics of a fluid.	
C203.2	Can analyse and calculate major and minor losses associated with pipe flow in piping networks.	
C203.3	Can mathematically predict the nature of physical quantities	
C203.4	Can critically analyse the performance of pumps	
C203.5	Can critically analyse the performance of turbines.	

C204	ME8351	Manufacturing Technology - I
Outcomes		
C204.1	Explain different metal casting processes, associated defects, merits and demerits	
C204.2	Compare different metal joining processes.	
C204.3	Summarize various hot working and cold working methods of metals.	
C204.4	Explain various sheet metal making processes.	
C204.5	Distinguish various methods of manufacturing plastic components.	

C205	EE8353	Electrical Drives and Controls
Outcomes		
C205.1	Upon Completion of this subject, the students can able to explain different types of electrical machines and their performance	

C206	ME8361	Manufacturing Technology Laboratory - I
Outcomes		
C206.1	Demonstrate the safety precautions exercised in the mechanical workshop.	
C206.2	Make the workpiece as per given shape and size using Lathe.	
C206.3	Join two metals using arc welding.	
C206.4	Use sheet metal fabrication tools and make simple tray and funnel.	
C206.5	Use different moulding tools, patterns and prepare sand moulds.	

C207	ME8381	Computer Aided Machine Drawing
Outcomes		
C207.1	Follow the drawing standards, Fits and Tolerances	
C207.2	Re-create part drawings, sectional views and assembly drawings as per standards	

C208	EE8361	Electrical Engineering Laboratory
Outcomes		
C208.1	Ability to perform speed characteristic of different electrical machine	

C209	HS8381	Interpersonal Skills / Listening & Speaking
Outcomes		
C209.1	Listen and respond appropriately.	
C209.2	Participate in group discussions	
C209.3	Make effective presentations	
C209.4	Participate confidently and appropriately in conversations both formal and informal	

C210	MA8452	Statistics and Numerical Methods
Outcomes		
C210.1	Apply the concept of testing of hypothesis for small and large samples in real life problems.	
C210.2	Apply the basic concepts of classifications of design of experiments in the field of agriculture.	
C210.3	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.	
C210.4	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.	
C210.5	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications	

C211	ME8492	Kinematics of Machinery
Outcomes		
C211.1	Discuss the basics of mechanism	
C211.2	Calculate velocity and acceleration in simple mechanisms	
C211.3	Develop CAM profiles	
C211.4	Solve problems on gears and gear trains	
C211.5	Examine friction in machine elements	

C212	ME8451	Manufacturing Technology – II
Outcomes		
C212.1	Explain the mechanism of material removal processes.	
C212.2	Describe the constructional and operational features of centre lathe and other special purpose lathes.	
C212.3	Describe the constructional and operational features of shaper, planner, milling, drilling, sawing and broaching machines.	
C212.4	Explain the types of grinding and other super finishing processes apart from gear manufacturing processes.	
C212.5	Summarize numerical control of machine tools and write a part program.	

C213	ME8491	Engineering Metallurgy
Outcomes		
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. .	

C214	CE8395	Strength of Materials for Mechanical Engineers
Outcomes		
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.	

C215	ME8493	Thermal Engineering- I
Outcomes		
C215.1	Apply thermodynamic concepts to different air standard cycles and solve problems.	
C215.2	Solve problems in single stage and multistage air compressors	
C215.3	Explain the functioning and features of IC engines, components and auxiliaries.	
C215.4	Calculate performance parameters of IC Engines.	
C215.5	Explain the flow in Gas turbines and solve problems.	

C216	ME8462	Manufacturing Technology Laboratory – II
Outcomes		
C216.1	Use different machine tools to manufacturing gears	
C216.2	Ability to use different machine tools to manufacturing gears.	
C216.3	Ability to use different machine tools for finishing operations	
C216.4	Ability to manufacture tools using cutter grinder	
C216.5	Develop CNC part programming	

C217	CE8381	Strength of Materials and Fluid Mechanics and Machinery Laboratory
Outcomes		
C217.1	Ability to perform Tension, Torsion, Hardness, Compression, and Deformation test on Solid materials.	
C217.2	Perform Tension, Torsion, Hardness, Compression, and Deformation test on Solid materials.	
C217.3	Use the measurement equipments for flow measurement.	
C217.4	Perform test on different fluid machinery.	

C218	HS8461	Advanced Reading and Writing
Outcomes		
C218.1	Write different types of essays.	
C218.2	Write winning job applications.	
C218.3	Read and evaluate texts critically.	
C218.4	Display critical thinking in various professional contexts.	

Course out Come (III Year – V & VI Semester)

C301	ME8595	Thermal Engineering- II
Outcomes		
C301.1	Solve problems in Steam Nozzle	
C301.2	Explain the functioning and features of different types of Boilers and auxiliaries and calculate performance parameters.	
C301.3	Explain the flow in steam turbines, draw velocity diagrams for steam turbines and solve problems.	
C301.4	Summarize the concept of Cogeneration, Working features of Heat pumps and Heat exchangers	
C301.5	Solve problems using refrigerant table / charts and psychrometric charts	

C302	ME8593	Design of Machine Elements
Outcomes		
C302.1	Explain the influence of steady and variable stresses in machine component design.	
C302.2	Apply the concepts of design to shafts, keys and couplings.	
C302.3	Apply the concepts of design to temporary and permanent joints.	
C302.4	Apply the concepts of design to energy absorbing members, connecting rod and crank shaft.	
C302.5	Apply the concepts of design to bearings.	

C303	ME8501	Metrology and Measurements
Outcomes		
C303.1	Describe the concepts of measurements to apply in various metrological instruments	
C303.2	Outline the principles of linear and angular measurement tools used for industrial applications	
C303.3	Explain the procedure for conducting computer aided inspection	
C303.4	Demonstrate the techniques of form measurement used for industrial components	
C303.5	Discuss various measuring techniques of mechanical properties in industrial applications	

C304	ME8594	Dynamics of Machines
Outcomes		
C304.1	Calculate static and dynamic forces of mechanisms.	
C304.2	Calculate the balancing masses and their locations of reciprocating and rotating masses.	
C304.3	Compute the frequency of free vibration.	
C304.4	Compute the frequency of forced vibration and damping coefficient.	
C304.5	Calculate the speed and lift of the governor and estimate the gyroscopic effect on automobiles, ships and airplanes	

C305	ORO551	Renewable Energy Sources (Open Elective I)
Outcomes		
C305.1	To Understand the physics of solar radiation	

C305.2	Ability to classify the solar energy collectors and methodologies of storing solar energy.
C305.3	To gain knowledge in applying solar energy in a useful way.
C305.4	To gain knowledge in wind energy and biomass with its economic aspects.
C305.5	To obtain knowledge in capturing and applying other forms of energy sources like wind, biogas and geothermal energies.

C306	**ME8511**	**Kinematics and Dynamics Laboratory**
Outcomes		
C306.1	Explain gear parameters, kinematics of mechanisms, gyroscopic effect and working of lab equipments.	
C306.2	Determine mass moment of inertia of mechanical element, governor effort and range sensitivity, natural frequency and damping coefficient, torsional frequency, critical speeds of shafts, balancing mass of rotating and reciprocating masses, and transmissibility ratio.	

C307	**ME8512**	**Thermal Engineering Laboratory**
Outcomes		
C307.1	Conduct tests on heat conduction apparatus and evaluate thermal conductivity of materials.	
C307.2	Conduct tests on natural and forced convective heat transfer apparatus and evaluate heat transfer coefficient.	
C307.3	Conduct tests on radiative heat transfer apparatus and evaluate Stefan Boltzmann constant and emissivity.	
C307.4	Conduct tests to evaluate the performance of parallel/counter flow heat exchanger apparatus and reciprocating air compressor.	
C307.5	Conduct tests to evaluate the performance of refrigeration and airconditioning test rigs.	

C308	**ME8513**	**Metrology and Measurements Laboratory**
Outcomes		
C308.1	Measure the gear tooth dimensions, angle using sine bar, straightness and flatness, thread parameters, temperature using thermocouple, force, displacement, torque and vibration.	
C308.2	Calibrate the vernier, micrometer and slip gauges and setting up the comparator for the inspection.	

C309	**ME8651**	**Design of Transmission Systems**
Outcomes		
C309.1	Apply the concepts of design to belts, chains and rope drives.	
C309.2	Apply the concepts of design to spur, helical gears.	
C309.3	Apply the concepts of design to worm and bevel gears.	
C309.4	Apply the concepts of design to gear boxes .	

C309.5	Apply the concepts of design to cams, brakes and clutches

C310	ME8691	Computer Aided Design and Manufacturing
Outcomes		
C310.1	Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics	
C310.2	Explain the fundamentals of parametric curves, surfaces and Solids	
C310.3	Summarize the different types of Standard systems used in CAD	
C310.4	Apply NC & CNC programming concepts to develop part programme for Lathe & Milling Machines	
C310.5	Summarize the different types of techniques used in Cellular Manufacturing and FMS	

C311	ME8693	Heat and Mass Transfer
Outcomes		
C311.1	Apply heat conduction equations to different surface configurations under steady state and transient conditions and solve problems	
C311.2	Apply free and forced convective heat transfer correlations to internal and external flows 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 equations and correlations to solve problems for different applications	

C312	ME8692	Finite Element Analysis
Outcomes		
C312.1	Summarize the basics of finite element formulation.	
C312.2	Apply finite element formulations to solve one dimensional Problems.	
C312.3	Apply finite element formulations to solve two dimensional scalar Problems.	
C312.4	Apply finite element method to solve two dimensional Vector problems.	
C312.5	Apply finite element method to solve problems on iso parametric element and dynamic Problems.	

C313	ME8694	Hydraulics and Pneumatics
Outcomes		
C313.1	Explain the Fluid power and operation of different types of pumps.	
C313.2	Summarize the features and functions of Hydraulic motors, actuators and Flow control valves	
C313.3	Explain the different types of Hydraulic circuits and systems	

C313.4	Explain the working of different pneumatic circuits and systems
C313.5	Summarize the various trouble shooting methods and applications of hydraulic and pneumatic systems.

C314	ME8091	Automobile Engineering (Professional Elective - I)
Outcomes		
C314.1	Recognize the various parts of the automobile and their functions and materials.	
C314.2	Discuss the engine auxiliary systems and engine emission control.	
C314.3	Distinguish the working of different types of transmission systems.	
C314.4	Explain the Steering, Brakes and Suspension Systems.	
C314.5	Predict possible alternate sources of energy for IC Engines.	

C315	ME8681	CAD / CAM Laboratory
Outcomes		
C315.1	Draw 3D and Assembly drawing using CAD software	
C315.2	Demonstrate manual part programming with G and M codes using CAM	

C316	ME8682	Design and Fabrication Project
Outcomes		
C316.1	Design and Fabricate the machine element or the mechanical product.	
C316.2	Demonstrate the working model of the machine element or the mechanical product.	

C317	HS8581	Professional Communication
Outcomes		
C317.1	Make effective presentations	
C317.2	Participate confidently in Group Discussions.	
C317.3	Attend job interviews and be successful in them.	
C317.4	Develop adequate Soft Skills required for the workplace	

Course out Come (IV Year – VII & VIII Semester)

C401	ME8792	Power Plant Engineering
Outcomes		
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.	

C402	ME8793	Process Planning and Cost Estimation
Outcomes		
C402.1	Select the process, equipment and tools for various industrial products.	
C402.2	Prepare process planning activity chart.	
C402.3	Explain the concept of cost estimation.	
C402.4	Compute the job order cost for different type of shop floor.	
C402.5	Calculate the machining time for various machining operations.	

C403	ME8791	Mechatronics
Outcomes		
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	

C404	OIE751	Robotics (Open Elective – II)
Outcomes		
C404.1	Upon completion of this course, the students can able to apply the basic engineering knowledge for the design of robotics	

C405	GE8077	Total Quality Management (Professional Elective – II)
Outcomes		
C405.1	The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.	

C406	ME8097	Non Destructive Testing and Evaluation (Professional Elective – III)
Outcomes		
C406.1	Explain the fundamental concepts of NDT	
C406.2	Discuss the different methods of NDE	
C406.3	Explain the concept of Thermography and Eddy current testing	
C406.4	Explain the concept of Ultrasonic Testing and Acoustic Emission	
C406.5	Explain the concept of Radiography	

C407	ME8711	Simulation and Analysis Laboratory
Outcomes		
C407.1	Simulate the working principle of air conditioning system, hydraulic and pneumatic cylinder and cam follower mechanisms using MATLAB.	
C407.2	Analyze the stresses and strains induced in plates, brackets and beams and heat transfer problems.	
C407.3	Calculate the natural frequency and mode shape analysis of 2D components and beams.	

C408	ME8781	Mechatronics Laboratory
Outcomes		
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.	

C409	ME8712	Technical Seminar
Outcomes		
C409.1	Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management	

C410	MG8591	Principles of Management
Outcomes		
C410.1	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.	

C411	ME8094	Computer Integrated Manufacturing Systems (Professional Elective– IV)
Outcomes		
C411.1	Explain the basic concepts of CAD, CAM and computer integrated manufacturing systems	
C411.2	Summarize the production planning and control and computerized process planning	
C411.3	Differentiate the different coding systems used in group technology	
C411.4	Explain the concepts of flexible manufacturing system (FMS) and automated guided vehicle (AGV) system	
C411.5	Classification of robots used in industrial applications	

C412	ME8811	Project Work
Outcomes		
C412.1	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.	