MARTHANDAM COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

Course Outcomes – 2020-2021 Odd Semester

Sl. No.	Semester	Theory/ Practical	Course Code / Course Name
1)	3	Theory	MA8353 Transforms and Partial Differential Equations
2)	3	Theory	ME8391Engineering Thermodynamics
3)	3	Theory	CE8394 Fluid Mechanics and Machinery
4)	3	Theory	ME8351Manufacturing Technology - I
5)	3	Theory	EE8353Electrical Drives and Controls
6)	3	Practical	ME8361 Manufacturing Technology Laboratory - I
7)	3	Practical	ME8381Computer Aided Machine Drawing
8)	3	Practical	EE8361 Electrical Engineering Laboratory
9)	3	Practical	HS8381 Interpersonal Skills / Listening & Speaking
10)	5	Theory	ME8595 Thermal Engineering- II
11)	5	Theory	ME8593 Design of Machine Elements
12)	5	Theory	ME8501 Metrology and Measurements
13)	5	Theory	ME8594 Dynamics of Machines
14)	5	Theory	ORO 551 Renewable Energy Systems
15)	5	Practical	ME8511 Kinematics and Dynamics Laboratory
16)	5	Practical	ME8512 Thermal Engineering Laboratory
17)	5	Practical	ME8513 Metrology and Measurements Laboratory
18)	7	Theory	ME 8792 Power Plant Engineering
19)	7	Theory	ME 8793 Process Planning and Cost Estimation
20)	7	Theory	ME 8791 Mechatronics
21)	7	Theory	OML 751Testing of Materials
22)	7	Theory	ME 8073 Unconventional Machining Processes
23)	7	Theory	ME 8099 Robotics
24)	7	Practical	ME8711 Simulation and Analysis Laboratory
25)	7	Practical	ME8781 Mechatronics Laboratory
26)	7	Practical	ME8712 Technical Seminar

Course Outcomes 2020-2021 EVEN Semester

Sl. No.	Semester	Theory/ Practical	Course Code / Course Name
1)	4	Theory	MA8452 Statistics and Numerical Methods
2)	4	Theory	ME8492 Kinematics of Machinery
3)	4	Theory	ME8451 Manufacturing Technology – II
4)	4	Theory	ME8491Engineering Metallurgy
5)	4	Theory	CE8395 Strength of Materials for Mechanical Engineers
6)	4	Theory	ME8493 Thermal Engineering- I
7)	4	Practical	ME8462 Manufacturing Technology Laboratory – II
8)	4	Practical	CE8381 Strength of Materials and Fluid Mechanics and Machinery Laboratory
9)	4	Practical	HS8461 Advanced Reading and Writing
10)	6	Theory	ME8651Design of Transmission Systems
11)	6	Theory	ME8691 Computer Aided Design and Manufacturing
	6	Theory	ME8693 Heat and Mass Transfer
12)	6	Theory	ME8692 Finite Element Analysis
13)	6	Theory	ME8694 Hydraulics and Pneumatics
14)	6	Theory	ME 8091 Automobile Engineering
15)	6	Practical	ME8681 CAD / CAM Laboratory
16)	6	Practical	ME8682 Design and Fabrication Project
17)	6	Practical	HS8581 Professional Communication
18)	8	Theory	MG8591 Principles of Management
19)	8	Theory	IE 8693 Production Planning and Control
20)	8	Practical	ME8811 Project Work

2020 -2021 ODD Semester

III Semester B.E. MECH

MA8353 Transforms and Partial Differential Equations
COs Course Outcome : The students, after the completion of the course, are expected to
CO1 Understand how to solve the given standard partial differential equations
CO2 Solve differential equations using Fourier series analysis which plays a vital role in engineering applications
CO3 Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
CO4 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.
CO5 Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

ME8391Engineering Thermodynamics
Course Outcome : Upon the completion of this course the students will be able to
CO1 Apply the first law of thermodynamics for simple open and closed systems under steady and unsteady conditions.
CO2 Apply second law of thermodynamics to open and closed systems and calculate entropy and availability.
CO3 Apply Rankine cycle to steam power plant and compare few cycle improvement methods
CO4 Derive simple thermodynamic relations of ideal and real gases
CO5 Calculate the properties of gas mixtures and moist air and its use in psychometric processes

CE8394 Fluid Mechanics and Machinery
COs Course Outcome : Upon completion of this course, the students will be able to
CO1 Apply mathematical knowledge to predict the properties and characteristics of a fluid.
CO2: Can analyse and calculate major and minor losses associated with pipe flow in piping networks.
CO3: Can mathematically predict the nature of physical quantities
CO4: Can critically analyse the performance of pumps
CO5: Can critically analyse the performance of turbines.

ME8351Manufacturing Technology - I
Course Outcome :
CO1- Explain different metal casting processes, associated defects, merits and demerits
CO2- Compare different metal joining processes.
CO3 -Summarize various hot working and cold working methods of metals.
CO4- Explain various sheet metal making processes.
CO5- Distinguish various methods of manufacturing plastic components

EE8353 Electrical Drives and Controls
COs Course Outcome : Upon Completion of this subject, the students can able to explain different types of electrical machines and their performance

Laboratory

ME8361 MANUFACTURING TECHNOLOGY LABORATORY – I
COs Course Outcome : Upon the completion of this course the students will be able to
CO1 Demonstrate the safety precautions exercised in the mechanical workshop.
CO2 Make the workpiece as per given shape and size using Lathe.
CO3 Join two metals using arc welding.
CO4 Use sheet metal fabrication tools and make simple tray and funnel.
CO5 Use different moulding tools, patterns and prepare sand moulds

ME8381 COMPUTER AIDED MACHINE DRAWING
Course Outcome :Upon the completion of this course the students will be able to
CO1 Follow the drawing standards, Fits and Tolerances
CO2 Re-create part drawings, sectional views and assembly drawings as per standards

EE8361 ELECTRICAL ENGINEERING LABORATORY
Course Outcome : Ability to perform speed characteristic of different electrical machine•

HS8381 INTERPERSONAL SKILLS/LISTENING & SPEAKING
Course Outcome : At the end of the course Learners will be able to
CO 1 Listen and respond appropriately
CO 2 Participate in group discussions
CO 3 Make effective presentations
CO 4 Participate confidently and appropriately in conversations both formal and informal

V Semester B.E. MECH

ME8595 THERMAL ENGINEERING – II
COs Course Outcome : Upon the completion of this course the students will be able to
CO1 Solve problems in Steam Nozzle
CO2 Explain the functioning and features of different types of Boilers and auxiliaries and calculate performance parameters.
CO3 Explain the flow in steam turbines, draw velocity diagrams for steam turbines and solve problems.
CO4 Summarize the concept of Cogeneration, Working features of Heat pumps and Heat exchangers
CO5 Solve problems using refrigerant table / charts and psychrometric charts

ME8593 DESIGN OF MACHINE ELEMENTS
COs Course Outcome : Upon the completion of this course the students will be able to
CO1 Explain the influence of steady and variable stresses in machine component design.
CO2 Apply the concepts of design to shafts, keys and couplings.
CO3 Apply the concepts of design to temporary and permanent joints.
CO4 Apply the concepts of design to energy absorbing members, connecting rod and crank shaft.
CO5 Apply the concepts of design to bearings.

ME8501 METROLOGY AND MEASUREMENTS
COs Course Outcome : Upon the completion of this course the students will be able to
CO1 Describe the concepts of measurements to apply in various metrological instruments
CO2 Outline the principles of linear and angular measurement tools used for industrial applications
CO3 Explain the procedure for conducting computer aided inspection.
CO4 Demonstrate the techniques of form measurement used for industrial components
CO5 Discuss various measuring techniques of mechanical properties in industrial Applications.

ME8594 DYNAMICS OF MACHINES
Course Outcome : Upon the completion of this course the students will be able to
CO1 Calculate static and dynamic forces of mechanisms.
CO2 Calculate the balancing masses and their locations of reciprocating and rotating masses.
CO3 Compute the frequency of free vibration.
CO4 Compute the frequency of forced vibration and damping coefficient.
CO5 Calculate the speed and lift of the governor and estimate the gyroscopic effect on automobiles, ships and airplanes.

ORO 551 Renewable Energy Systems
Course Outcome : The students, after the completion of the course, are expected to
CO1-Understanding the physics of solar radiation.
CO2- Ability to classify the solar energy collectors and methodologies of storing solar energy.
CO3- Knowledge in applying solar energy in a useful way.
CO4- Knowledge in wind energy and biomass with its economic aspects.
CO5- Knowledge in capturing and applying other forms of energy sources like wind, biogas and geothermal energies

Laboratory

ME8511 KINEMATICS AND DYNAMICS LABORATORY
Course Outcome : Upon the completion of this course the students will be able to
CO1 Explain gear parameters, kinematics of mechanisms, gyroscopic effect and working of lab equipments.
CO2 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.

ME8512 THERMAL ENGINEERING LABORATORY
COs Course Outcome : Upon the completion of this course the students will be able to
CO1 conduct tests on heat conduction apparatus and evaluate thermal conductivity of materials.
CO2 conduct tests on natural and forced convective heat transfer apparatus and evaluate heat transfer coefficient.
CO3 conduct tests on radiative heat transfer apparatus and evaluate Stefan Boltzmann constant and emissivity.
CO4 conduct tests to evaluate the performance of parallel/counter flow heat exchanger apparatus and reciprocating air compressor.
CO5 conduct tests to evaluate the performance of refrigeration and airconditioning test rigs.

ME8513 METROLOGY AND MEASUREMENTS LABORATORY
Course Outcome : Upon the completion of this course the students will be able to
CO1 Measure the gear tooth dimensions, angle using sine bar, straightness and flatness, thread parameters, temperature using thermocouple, force, displacement, torque and vibration.
CO2 Calibrate the vernier, micrometer and slip gauges and setting up the comparator for the inspection

VII Semester B.E. MECH

ME8792 POWER PLANT ENGINEERING
COs Course Outcome : Upon the completion of this course the students will be able to
CO1 Explain the layout, construction and working of the components inside a thermal power plant.
CO2 Explain the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power plants.
CO3 Explain the layout, construction and working of the components inside nuclear power plants.
CO4 Explain the layout, construction and working of the components inside Renewable energy power plants.
CO5 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.

ME8793 PROCESS PLANNING AND COST ESTIMATION
COs Course Outcome : Upon the completion of this course the students will be able to
CO1 select the process, equipment and tools for various industrial products.
CO2 prepare process planning activity chart.
CO3 explain the concept of cost estimation.
CO4 compute the job order cost for different type of shop floor.
CO5 calculate the machining time for various machining operations

ME8791 MECHATRONICS
Course Outcome : Upon the completion of this course the students will be able to
CO1 Discuss the interdisciplinary applications of Electronics, Electrical, Mechanical and Computer Systems for the Control of Mechanical, Electronic Systems and sensor technology.
CO2 Discuss the architecture of Microprocessor and Microcontroller, Pin Diagram, Addressing Modes of Microprocessor and Microcontroller.
CO3 Discuss Programmable Peripheral Interface, Architecture of 8255 PPI, and various device interfacing
CO4 Explain the architecture, programming and application of programmable logic controllers to problems and challenges in the areas of Mechatronic engineering.
CO5 Discuss various Actuators and Mechatronics system using the knowledge and skills acquired through the course and also from the given case studies.

OML751 Testing of Materials
Course Outcome : The students, after the completion of the course, are expected to
CO1 Understand different types of material testing methods.
CO2 Identify suitable Mechanical testing technique to inspect industrial component.
CO3 Ability to use the different technique of NDT and know its applications.
CO4 Ability to use material characterization technique
CO5 Ability to use thermal and chemical testing on materials.

ME8073 Unconventional Machining Processes
COs Course Outcome : The students, after the completion of the course, are having the
CO1. Explain the need for unconventional machining processes and its classification
CO2. Compare various thermal energy and electrical energy based unconventional machining processes.
CO3. Summarize various chemical and electro-chemical energy based unconventional machining processes.
CO4. Explain various nano abrasives based unconventional machining processes.
CO5. Distinguish various recent trends based unconventional machining processes.

ME8099 Robotics
Course Outcome : The students, after the completion of the course, are expected to
CO1 Explain the concepts of industrial robots, classification, specifications and coordinate systems. Also summarize the need and application of robots in different sectors. analysis of robots.
CO2 Illustrate the different types of robot drive systems as well as robot end effectors.
CO3 Apply the different sensors and image processing techniques in robotics to improve the ability of robots.
CO4 Develop robotic programs for different tasks and familiarize with the kinematics motions of robot.
CO5 Examine the implementation of robots in various industrial sectors and interpolate the economic

Laboratory

ME8711 SIMULATION AND ANALYSIS LABORATORY
Course Outcome : Upon the completion of this course the students will be able to
CO1 simulate the working principle of air conditioning system, hydraulic and pneumatic cylinder and cam follower mechanisms using MATLAB.
CO2 analyze the stresses and strains induced in plates, brackets and beams and heat transferproblems.
CO3 calculate the natural frequency and mode shape analysis of 2D components and beams

ME8781 MECHATRONICS LABORATORY
COs Course Outcome : Upon the completion of this course the students will be able to
CO1 Demonstrate the functioning of mechatronics system with various pneumatic, hydraulic and electrical systems.
CO2 Demonstrate the functioning of control systems with the help of PLC and microcontrollers.

ME8712 TECHNICALSEMINAR
To enrich the communication skills of the student and presentations of technical topics of interest, this course is introduced. In this course, a student has to present three Technical papers or recent advances in engineering/technology that will be evaluated by a Committee constituted by the Head of the Department.

2020-2021 EVEN Semester

IV Semester – B.E. MECH

MA8452 Statistics and Numerical Methods
Course Outcome : Upon successful completion of the course, students will be able to:
CO1 Apply the concept of testing of hypothesis for small and large samples in real life problems.
CO2 Apply the basic concepts of classifications of design of experiments in the field of agriculture.
CO3 Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
CO4 Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
CO5 Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications

ME8492 KINEMATICS OF MACHINERY
Course Outcome : Upon the completion of this course the students will be able to
CO1 Discuss the basics of mechanism
CO2 Calculate velocity and acceleration in simple mechanisms
CO3 Develop CAM profiles
CO4 Solve problems on gears and gear trains
CO5 Examine friction in machine elements

ME8451 MANUFACTURING TECHNOLOGY – II
COs Course Outcome : Upon the completion of this course the students will be able to
CO1 Explain the mechanism of material removal processes.
CO2 Describe the constructional and operational features of centre lathe and other special purpose lathes.
CO3 Describe the constructional and operational features of shaper, planner, milling, drilling,sawing and broaching machines.
CO4 Explain the types of grinding and other super finishing processes apart from gear manufacturing processes.
CO5 Summarize numerical control of machine tools and write a part program.

ME8491 ENGINEERING METALLURGY
COs Course Outcome : Upon the completion of this course the students will be able to
CO1 Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification.
CO2 Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.
CO3 Clarify the effect of alloying elements on ferrous and non-ferrous metals
CO4 Summarize the properties and applications of non metallic materials.
CO5 Explain the testing of mechanical properties. .

CE8395 STRENGTH OF MATERIALS FOR MECHANICAL ENGINEERS
Course Outcome : Students will be able to
CO1 Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes.
CO2 Understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment.
CO3 Apply basic equation of simple torsion in designing of shafts and helical spring
CO4 Calculate the slope and deflection in beams using different methods.
CO5 Analyze and design thin and thick shells for the applied internal and external pressures.

ME8493 THERMAL ENGINEERING - I
COs Course Outcome : Upon the completion of this course the students will be able to
CO1 Apply thermodynamic concepts to different air standard cycles and solve problems.
CO2 Solve problems in single stage and multistage air compressors
CO3 Explain the functioning and features of IC engines, components and auxiliaries.
CO4 Calculate performance parameters of IC Engines.
CO5 Explain the flow in Gas turbines and solve problems.

Laboratory

ME8462 MANUFACTURING TECHNOLOGY LABORATORY – II
COs Course Outcome : Upon the completion of this course the students will be able to
CO1 use different machine tools to manufacturing gears
CO2 Ability to use different machine tools to manufacturing gears.
CO3 Ability to use different machine tools for finishing operations
CO4 Ability to manufacture tools using cutter grinder
CO5 Develop CNC part programming

CE8381 STRENGTH OF MATERIALS AND FLUID MECHANICS AND MACHINERY LABORATORY
COs Course Outcome : Upon completion of this course, the students will be able to:
CO1 Ability to perform Tension, Torsion, Hardness, Compression, and Deformation test on Solid materials.
CO2 Perform Tension, Torsion, Hardness, Compression, and Deformation test on Solid materials.
CO3 Use the measurement equipments for flow measurement.
CO3 Perform test on different fluid machine

HS8461 ADVANCED READING AND WRITING
Course Outcome : At the end of the course Learners will be able to:
CO1 Write different types of essays.
CO2 Write winning job applications.
CO3 Read and evaluate texts critically
CO4 Display critical thinking in various professional contexts.

VI Semester B.E. MECH

ME8651 DESIGN OF TRANSMISSION SYSTEMS
COs Course Outcome : Upon the completion of this course the students will be able to
CO1 apply the concepts of design to belts, chains and rope drives.
CO2 apply the concepts of design to spur, helical gears.
CO3 apply the concepts of design to worm and bevel gears.
CO4 apply the concepts of design to gear boxes .
CO5 apply the concepts of design to cams, brakes and clutches.

ME8691 COMPUTER AIDED DESIGN AND MANUFACTURING
COs Course Outcome : Upon the completion of this course the students will be able to
CO1 Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics
CO2 Explain the fundamentals of parametric curves, surfaces and Solids
CO3 Summarize the different types of Standard systems used in CAD
CO4 Apply NC & CNC programming concepts to develop part programme for Lathe & Milling Machines
CO5 Summarize the different types of techniques used in Cellular Manufacturing and FMS

ME8693 HEAT AND MASS TRANSFER
Course Outcome : Upon the completion of this course the students will be able to
CO1 Apply heat conduction equations to different surface configurations under steady state and transient conditions and solve problems
CO2 Apply free and forced convective heat transfer correlations to internal and external flows through/over various surface configurations and solve problems
CO3 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
CO4 Explain basic laws for Radiation and apply these principles to radiative heat transfer between different types of surfaces to solve problems
CO5 Apply diffusive and convective mass transfer equations and correlations to solve problems for different applications

ME8692 FINITE ELEMENT ANALYSIS
Course Outcome :
CO1 Summarize the basics of finite element formulation.
CO2 Apply finite element formulations to solve one dimensional Problems.
CO3 Apply finite element formulations to solve two dimensional scalar Problems.
CO4 Apply finite element method to solve two dimensional Vector problems.
CO5 Apply finite element method to solve problems on iso parametric element and dynamic Problems.

ME8694 HYDRAULICS AND PNEUMATICS
Course Outcome : Upon the completion of this course the students will be able to
CO1 Explain the Fluid power and operation of different types of pumps.
CO2 Summarize the features and functions of Hydraulic motors, actuators and Flow control valves
CO3 Explain the different types of Hydraulic circuits and systems
CO4 Explain the working of different pneumatic circuits and systems
CO5 Summarize the various trouble shooting methods and applications of hydraulic and pneumatic systems.

Laboratory

ME8681 CAD / CAM LABORATORY
COs Course Outcome :
CO1 Draw 3D and Assembly drawing using CAD software
CO2 Demonstrate manual part programming with G and M codes using CAM

ME8682 DESIGN AND FABRICATION PROJECT
COs Course Outcome : Upon the completion of this course the students will be able to
CO1 design and Fabricate the machine element or the mechanical product.
CO2 demonstrate the working model of the machine element or the mechanical product.

HS8581 PROFESSIONAL COMMUNICATION
Course Outcome : At the end of the course Learners will be able to:
CO1 Make effective presentations
CO2 Participate confidently in Group Discussions.
CO3 Attend job interviews and be successful in them.
CO4 Develop adequate Soft Skills required for the workplace

VIII Semester B.E. MECH

MG8591 PRINCIPLES OF MANAGEMENT
Course Outcome : 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

IE 8693 Production Planning and Control
Course Outcome : At the end of the course students will have the
CO1 Upon completion of this course, the students can able to prepare production planning and control activities such as work study, product planning, production scheduling, Inventory Control.
CO2 They can plan manufacturing requirements manufacturing requirement Planning (MRP II) and Enterprise Resource Planning (ERP)

Laboratory

ME8811 PROJECT WORK
COs Course Outcome : 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.