



# **M.I.E.T. ENGINEERING COLLEGE**

(AUTONOMOUS)

(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)

**Accredited by NBA (CIVIL, CSE, ECE, EEE & MECH)**

**Accredited with 'A+' grade by NAAC**

(An ISO 9001:2015 Certified Institution)

(Recognized by UGC under section 2(f) & 12(B) of UGC Act, 1956)

TRICHY - PUDUKKOTTAI MAIN ROAD, TRICHY - 620 007



## **DEPARTMENT OF MECHANICAL ENGINEERING**

**Regulation – 2021**

**UG Course Outcome**

<b>S. No</b>	<b>COURSE OUTCOME</b>
<b>YEAR/SEMESTER-II/III</b>	
At the end of the course, the student will able to	
<b>C201/ CE3391-FLUID MECHANICS AND MACHINERY</b>	
C201.1	Understand the fundamentals of fluid properties.
C201.2	Understand the flow characteristics of various fluids.
C201.3	Solve the problems related to flow through pipes and boundary layer.
C201.4	Perform the dimensional analysis and model studies for various cases.
C201.5	Solve the problems of various turbines and its performances.
C201.6	Solve the problems of various pumps.
<b>C202/ ME3351-ENGINEERING MECHANICS</b>	
C202.1	Apply the equilibrium equation for the statics of the particle.
C202.2	Apply the equilibrium equation for the rigid body.
C202.3	Determine the centroidal properties of surfaces and solids.
C202.4	Determine the Moment of Inertia for surfaces and solids.
C202.5	Solve the problems related to friction.
C202.6	Analyze the dynamic problems for particles and bodies.
<b>C203/ ME3391-ENGINEERING THERMODYNAMICS</b>	
C203.1	Apply basic Zeroth and first law thermodynamics systems.
C203.2	Apply the second law and entropy for various thermal systems.
C203.3	Analyze the concept of available and unavailable energies for different thermodynamic systems.
C203.4	Understand the application of the second law.
C203.5	Apply the thermodynamic relations for real gases, ideal gases and gas mixtures.
C203.6	Apply the Gas mixture and thermodynamic relationship for thermal systems.
<b>C204/ ME3392-ENGINEERING MATERIALS AND METALLURGY</b>	
C204.1	Understand alloys and phase diagrams, Iron-Iron carbon diagram.
C204.2	Understand isothermal transformation and heat treatment processes.
C204.3	Understand the alloying elements influence on both ferrous and non-ferrous metals.
C204.4	Understand the properties and applications of non-metallic materials.

C204.5	Understand the testing proceeding for measuring mechanical properties.
C204.6	Review the properties and applications of composites.
<b>C205/ ME3393-MANUFACTURING PROCESSES</b>	
C205.1	Understand the metal casting processes by elucidating their operational principles.
C205.2	Understand the operational principles associated with various metal joining processes as part of the learning process.
C205.3	Understand the fundamental operational principles of bulk deformation of metals.
C205.4	Understand the working principles and mechanisms of the sheet metal forming process.
C205.5	Understand the manufacturing processes for plastic component manufacturing.
C205.6	Select a suitable manufacturing method as per the requirements of the component.
<b>C206/MA3351-TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS</b>	
C206.1	Analyse Partial Differential Equations in various methods.
C206.2	Solving Fourier Series for different types of functions.
C206.3	Computing the solutions of the heat equation and wave equation subject to boundary conditions.
C206.4	Deduce the Gaussian function and Convolution theorem form using Fourier Transforms.
C206.5	Formation of finite difference method in Z-transforms.
<b>C207/ ME3382-MANUFACTURING TECHNOLOGY LABORATORY</b>	
C207.1	Joint two Metals using Gas Metal Arc Welding.
C207.2	Produce mould cavity for different shapes of components.
C207.3	Perform lathe and drilling operation for various components.
C207.4	Produce different components using Milling and Gear hopping Machines.
C207.5	Perform the cylindrical and surface grinding process.
C207.6	Measure the cutting forces of lathe and milling using dynamometer.
<b>C208/ ME3381-COMPUTER AIDED MACHINE DRAWING</b>	
C208.1	Understand the drawing standards and Fits & Tolerance.
C208.2	Understand the software toolbars and commands.
C208.3	Produce detailed drawing of different types of Bearings.
C208.4	Produce detailed drawing of different types of Valves.
C208.5	Produce detailed drawing of different types of Couplings.

C208.6	Produce detailed drawing of different types of Engine parts.
<b>YEAR/SEMESTER-II/IV</b>	
<b>C209/ CE3491-STRENGTH OF MATERIALS</b>	
C209.1	Understand the basic concepts of stress and strain of solids
C209.2	Understand the basic concepts of deformation of solids.
C209.3	Apply transverse loading on beams and stresses in beam.
C209.4	Apply basic equation of torsion in designing of shafts and helical springs
C209.5	Determine the slope and deflection of beam by various methods.
C209.6	Analyze the cylindrical thin and thick shells under circumferential and radial loading.
<b>C210/ GE3451-ENVIRONMENTAL SCIENCES AND SUSTAINABILITY</b>	
C210.1	Understand the functions of environment, ecosystems & biodiversity and their conservation.
C210.2	Identify the causes and effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.
C210.3	Understandof renewable and non-renewable resources and contribute to sustainable measures to preserve them for future generations.
C210.4	Recognize the different goals of Renewable Sources of Energy.
C210.5	Demonstrate the sustainability and management system.
C210.6	Apply sustainability practices in green energy environment.
<b>C211/ME3451-THERMAL ENGINEERING</b>	
C211.1	Apply thermodynamic cycles for various engines.
C211.2	Resolve problems related to steam nozzles, including the calculation of critical pressure ratios.
C211.3	Apply various conditions for steam and gas turbines.
C211.4	Understand feature and combustion of IC Engines.
C211.5	Evaluate the performance of the IC Engines.
C211.6	Understand the concepts and performances of Auxiliary systems.
<b>C212/ ME3491-THEORY OF MACHINES</b>	
C112.1	Analyze the kinematic mechanisms and their inversions.
C112.2	Analyze the motion of spur gear and gear trains.
C112.3	Examine frictional characteristics in various types of machine elements.
C112.4	Analyze the static and dynamic forces on simple machine members.

C112.5	Estimate the damped and forced vibrations of a simple system.
C112.6	Explain the different mechanisms and dynamic forces acting
<b>C213/ ME3492-HYDRAULICS AND PNEUMATICS</b>	
C213.1	Understand the operational principles of fluid power systems and hydraulic pumps.
C213.2	Understand the workings of hydraulic actuators and control components.
C213.3	Understand the hydraulic circuits and systems.
C213.4	Understand the working of pneumatic circuits.
C213.5	Understand the working of electro-pneumatic circuits.
C213.6	Understand the troubleshooting and applications of hydraulic and pneumatic systems.
<b>C214/ME3493-MANUFACTURING TECHNOLOGY</b>	
C214.1	Understand the metal removal mechanism with considering various machining parameters.
C214.2	Understand the lathe and special lathe machines mechanisms and operations.
C214.3	Understand the reciprocating machine tools mechanisms and operations.
C214.4	Understand the various surface finishing processes.
C214.5	Understand the operational principles of CNC machine tools and operations.
C214.6	Write the CNC programming for various operations in CNC Lathe machine.
<b>C215/ CE3481-STRENGTH OF MATERIALS AND FLUID MACHINERY LABORATORY</b>	
C215.1	Determine the tensile, torsion and hardness properties of metals.
C215.2	Determine the stiffness properties of helical spring.
C215.3	Determine compressive properties of carriage spring.
C215.4	Determine of coefficient of discharge of a venturimeter and friction factor for flow through pipes.
C215.5	Determination of metacentric height and forces due to impact of jet on a fixed plate.
C215.6	Determine the performance characteristics of centrifugal pumps, reciprocating pump and turbine.
<b>C216/ ME3461-THERMAL ENGINEERING LABORATORY</b>	
C216.1	Understand Valve Timing, Port Timing and Actual p-v diagrams of IC engines through experiments.
C216.2	Conduct Performance and heat balance Test on 4 – stroke Diesel Engine.
C216.3	Conduct Morse Test on Multi-Cylinder Petrol Engine and Retardation Test on a Diesel Engine.
C216.4	Determine of p-θ diagram, heat release characteristics of an IC engine and also Flash Point and Fire Point of various fuels lubricants.

C216.5	Conduct performance test on a two stage Reciprocating Air compressor and Determine COP of a Refrigeration system.
C216.6	Evaluate Performance and Energy Balance on a Steam Generator.
<b>YEAR/SEMESTER-III/V</b>	
<b>C301/CME336-HYBRID AND ELECTRIC VEHICLE TECHNOLOGY</b>	
C301.1	Understand the configuration of hybrid drive requirements for a vehicle.
C301.2	Apply appropriate hybrid and electric drive trains in a vehicle.
C301.3	Create and install suitable AC and DC drives for electric vehicles.
C301.4	Apply a suitable energy storage system for a hybrid / electric vehicle.
C301.5	Understand concern energy management strategies to ensure better economy and efficiency.
C301.6	Create the Basic components of Electric vehicles and DC to AC voltage control.
<b>C302/CME386-GAS DYNAMICS AND JET PROPULSION</b>	
C302.1	Understand basic concepts and isentropic flows of fluids.
C302.2	Understand the compressible flow through ducts.
C302.3	Analyze the variation of flow parameters across the normal and oblique shocks.
C302.4	Analyze the performance of various jet propulsion systems.
C302.5	Understand space propulsion system and its performance.
C302.6	Apply Rocket performance calculations.
<b>C303/ME3591-DESIGN OF MACHINE ELEMENTS</b>	
C303.1	Understand the basic design parameters of various machine elements.
C303.2	Analyze the various stresses induced at different loading conditions.
C303.3	Apply the basic design procedure to design the shafts, bearings and couplings.
C303.4	Design the temporary and permanent joints.
C303.5	Design the various energy storing elements and engine components.
C303.6	Design the various machine members as per standard design catalogs.
<b>C304/ME3592-METROLOGY AND MEASUREMENTS</b>	
C304.1	Understand the principles of measurement applicable to diverse metrological instruments.
C304.2	Implement the principles and functionalities of linear and angular measuring instruments, as well as assembly and transmission elements.
C304.3	Utilize tolerance symbols and conduct tolerance analysis for industrial applications.
C304.4	Incorporate the principles and methodologies of form and surface metrology.
C304.5	Integrate advancements in measurements to enhance quality control in manufacturing industries.

C304.6	Explore the principles of laser applications in advanced metrology.
<b>C305/MR3491-SENSORS AND INSTRUMENTATION</b>	
C305.1	Understand various calibration techniques and signal types of sensors.
C305.2	Understand motion, proximity and ranging sensors.
C305.3	Understand force, magnetic and heading sensors.
C305.4	Understand optical and pressure sensors.
C305.5	Understand the temperature sensors.
C305.6	Apply signal conditioning and DAQ systems.
<b>C306/ ME3581-METROLOGY AND DYNAMICS LAB</b>	
C306.1	Calibrate measuring instruments.
C306.2	Measure linear and angular dimension of various components.
C306.3	Measure surface roughness and form tolerance of various components.
C306.4	Determine mass moment of inertia of mechanical elements.
C306.5	Analyze the vibration of machines.
C306.6	Analyze the sensitivity of centrifugal governors.
<b>YEAR/SEMESTER-III/VI</b>	
<b>C307/CME333-RENEWABLE POWERED OFF HIGHWAY VEHICLES AND EMISSION CONTROL TECHNOLOGY</b>	
C307.1	Assessing the accessibility, appropriateness, and contributions of off-road vehicle categories in mitigating environmental carbon footprint.
C307.2	Acquire information on diverse methods of green energy production and their influence on fulfilling the energy requirements of off-road vehicle applications.
C307.3	Summarize the functionality of fuel cells, explore different types of fuel cells, and design considerations for their application in off-road vehicles.
C307.4	Understanding of different in-cylinder low-temperature combustion technologies and their crucial role in managing emissions produced by the engine.
C307.5	Summarize the functioning of different currently available after treatment systems for managing engine-out emissions.
C307.6	Elaborate various methods used for conversion and storage the fuel power in to a battery charge.

**C308/CME364-ENERGY STORAGE DEVICES**

C308.1	Understand a suitable energy storage device.
C308.2	Understand the workings of various energy storage devices and their importance.
C308.3	Understand the basic characteristics of batteries for mobile and hybrid systems.
C308.4	Apply the storage of renewable energies and management systems.
C308.5	Understand the need for other energy devices and their scope for applications.
C308.6	Understand the basic characteristics of Fuel cell and biogas storage applications.

**C309/CME38 - NON-TRADITIONAL MACHINING PROCESSES**

C309.1	Understand the difference between traditional and non-traditional machining processes.
C309.2	Understand the mechanical energy based processes.
C309.3	Understand the chemical and electro chemical energy based processes.
C309.4	Understand the thermo-electric energy based processes.
C309.5	Understand the nano finishing processes.
C309.6	Understand the hybrid non-traditional machining processes.

**C310/CME389-DESIGN OF TRANSMISSION SYSTEM**

C310.1	Apply design of flexible elements of drives like belt, rope and chain.
C310.2	Apply the design concept to spur gears and parallel axis helical gears.
C310.3	Apply the design concept to bevel, worm and cross helical gears.
C310.4	Apply the design concept to gear boxes.
C310.5	Apply the design concept to cams.
C310.6	Apply the design concept to clutches and brakes.

**C311/ME3691-HEAT AND MASS TRANSFER**

C311.1	Comprehend the conduction heat transfer equations for diverse geometries.
C311.2	Comprehend the convection heat transfer equations for diverse geometries.
C311.3	Analyze the various phase change heat transfer problems.
C311.4	Analyze the various heat exchangers' problems.
C311.5	Solve the thermal radiation problems.
C311.6	Compute mass transfers in binary mixtures and related energy exchanges.



**C312/ME3681-CAD/CAM LABORATORY**

C312.1	Understand various commands of 3D geometric object using modeling software.
C312.2	Apply 3D assembly model for different machine elements using modeling software.
C312.3	Apply manual part program for CNC machining center of linear and circular cuts.
C312.4	Apply manual part program for CNC machining center of Canned Cycle Operations.
C312.5	Apply manual part program for CNC turning center turning, thread cutting and drilling operations.
C312.6	Apply Computer Aided Part-Programming for machining and turning center.

**C313/ME3682-HEAT TRANSFER LABORATORY**

C313.1	Determine the thermal conductivity of pipe insulation, composite wall, insulating powder, oils, and water.
C313.2	Determine heat transfer coefficient of air and pin-fin under natural convection and forced convection.
C313.3	Measure heat flux under pool boiling and flow boiling in various regimes.
C313.4	Measure heat transfer coefficient in film-wise and drop-wise condensation and also friction factor, heat transfer coefficient of cold/hot fluid and effectiveness of a tube-in-tube heat exchanger.
C313.5	Measure Stefan – Boltzmann constant and emissivity of a grey surface.
C313.6	Calibrate of thermocouples / RTDs at standard reference temperatures.