ARUNAI ENGINEERING COLLEGE, THIRUVANNAMALAI

Department of Mechanical Engineering

Course Outcomes

Semester / Year, Branch: 01 – 08, I – IV, B.E. Mechanical Engineering

Regulations: 2017

I Year (Odd Semester)

C101: HS8151 Communicative English, Year of study 2017 - 2018

C101.1	Communicate clearly both in the written form and orally using appropriate vocabulary and comprehend written texts to make inferences.
C202.2	Speak persuasively in different social contexts and write biographical details and technical documents cohesively, coherently and flawlessly using appropriate words.
C103.3	Speak, read and write effectively for a variety of professional and social settings.
C104.4	Read descriptive, narrative, expository and interpretive texts and write using creative, critical, analytical and evaluative methods.
C105.5	Listen, comprehend and respond to different spoken and written discourses/excerpts in different accents and write different genres of texts adopting various writing strategies.

C102: MA8151Engineering Mathematics – I, Year of study 2017 - 2018

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, also evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts, in addition to determine convergence/divergence of improper integrals and evaluate convergent improper integrals.
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	Apply various techniques in solving differential equations

C103: PH8151 Engineering Physics, Year of study 2017 - 2018

C103.1	Analyze the elastic nature of materials and be able to choose the materials depending upon the modulus of elasticity for different applications.
C103.2	Illustrate the advantages of optical communication using LASER.
C103.3	Explain the conducting properties of solids, liquids, good thermal conductors and bad thermal conductors.
C103.4	Apply the knowledge of quantum mechanics and classical mechanics in addressing the problems related to science and technology.
C103.5	Describe the crystal structures, crystal defects and various crystal growth techniques.

C104: CY8151 Engineering Chemistry, Year of study 2017 - 2018

C104.1	Describe the importance of water technology in the purification of water and its domestic and industrial applications.

C104.2	Illustrate the concepts of adsorption in surface chemistry and catalysis and its applications.
C104.3	Review the use of phase rule in identifying its applications in metallurgy and manufacture of alloys.
C104.4	Compare the different types of industrial techniques of petroleum processing and the determination of calorific values and combustion parameters.
C104.5	Explain the fundamentals of different alternative sources of energy, the generation processes and batteries.

C105: GE8151 Problem Solving and Python Programming, Year of study 2017 - 2018

C105.1	Develop algorithmic solutions to simple computational problems.
C105.2	Read, write and execute simple python programs.
C105.3	Apply control, looping structures and functions to solve problems.
C105.4	Represent compound data using python lists, tuples, and dictionaries.
C105.5	Read and Write data from/to files in python programs.

C106: GE8152 Engineering Graphics, Year of study 2017 - 2018

C106.1	Perform free hand sketching of multiple views of objects and construct various plane curves
C106.2	Draw the orthographic projection of lines and plane surfaces
C106.3	Draw the projection of a simple solids and truncated solids
C106.4	Draw the sectional view and develop the lateral surface of simple and truncated solids
C106.5	Draw the isometric and perspective projections of simple and truncated solids

C107 (L): GE8161 Problem Solving and Python Programming Laboratory, Year of study 2017 - 2018

C107(L).1	Write, test, and debug simple Python programs.
C107(L).2	Implement Python programs with conditionals and loops.
C107(L).3	Develop Python programs step-wise by defining functions and calling them.
C107(L).4	Demonstrate the use Python lists, tuples, and dictionaries for representing compound data.
C107(L).5	Illustrate the concepts of read and write data from/to files in Python.

C108 (L): BS8161 Physics and Chemistry Laboratory, Year of study 2017 - 2018

C108(L).1	Students will be able to demonstrate the principle and theory behind young's modulus, torsion pendulum, laser, thermal conductivity and air-wedge experiments
C108(L).2	Perform the quantitative chemical analysis of chloride, dissolved oxygen, hardness, alkalinity and copper ions by titration methods.
C108(L).3	Demonstrate basic concepts in the determination of acids, sodium, potassium and iron by the instrumental methods of analysis.

I Year (Even Semester)

C109: HS8251 Technical English, Year of study 2017 - 2018

C109.1	Read technical texts and write area specific texts effortlessly.
C109.2	Listen and comprehend lectures and talks in their areas of specialization and write effectively for a variety of professional and social settings.
C109.3	Speak and write appropriately and effectively in varied formal and informal contexts.
C109.4	Write effectively and persuasively and produce different types of writing such as letters, minutes, reports and winning job applications.
C109.5	Communicate clearly using technical vocabulary in their professional correspondences.

C110: MA8251 Engineering Mathematics-II, Year of study 2017 - 2018

C110.1	Eigenvalues 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, Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification.
C110.3	Solve problems on analytic functions and conformal mapping.
C110.4	Evaluate complex integrals
C110.5	Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

C111: PH8251 Material Science, Year of study 2017 - 2018

C111.1	Explain the various phase diagrams and their applications.
C111.2	Describe the iron-iron carbide phase diagram, various microstructures and alloys.
C111.3	Apply the knowledge on mechanical properties of materials and their measurement.
C111.4	Explain the properties of magnetic, dielectric and superconducting materials
C111.5	Apply the knowledge on the basics of ceramics, composites and nanomaterials.

C112: BE8253 Basic Electrical, Electronics and Instrumentation Engineering, Year of study 2017 - 2018

C112.1	Explain the operation of three phase electrical circuits and power system.
C112.2	Determine the regulation and efficiency of transformers.
C112.3	Describe the characteristics of DC Generator and Motor.
C112.4	Analyze the performance of AC and DC machines.
C112.5	Apply the concepts of measurements and instruments for real time applications.

C113: GE8291 Environmental Science and Engineering, Year of study 2017 - 2018

C113.1	Summarize the importance of public awareness on environment and nature of biodiversity.
C113.2	Describe the various causes, effect and control measures of environmental pollution.

C113.3	Discuss the human development that leads to environmental disasters, the value of natural resources and their conservation.
C113.4	Explain the value of public participation in environmental protection, Environmental Management and Legislation Acts and sustainable development.
C113.5	Review the problems related to population and their remedial measures.

C114: GE8292 Engineering Mechanics, Year of study 2017 - 2018

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 (L): GE8261 Engineering Practices Laboratory, Year of study 2017 - 2018

C115(L).1	Construct carpentry components and pipe connections including plumbing works.
C115(L).2	Use welding equipment's to join the structures.
C115(L).3	Carry out the basic machining operations.
C115(L).4	Make the models using sheet metal works.
C115(L).5	Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundry and fittings
C115(L).6	Fabricate Electrical and Electronics circuits.
C115(L).7	Design the simple electrical circuits based on the applications.
C115(L).8	Solder the electrical and electronic devices and components in the PCB.
C115(L).9	Explain the functioning of electrical and electronic circuits.

C116 (L): Basic Electrical, Electronics and Instrumentation Engineering Laboratory, Year of Study 2017 - 2018

C116(L).1	Draw the performance characteristics of various DC generators, D.C. Motors and understand the applications of it to power system.
C116(L).2	Determine the performance of various A.C. Induction motors and understand the applications of it to power system.
C116(L).3	Calculate the efficiency and determine the performance of the single phase transformer.
C116(L).4	Understand the characteristics of LVDT, RTD and Thermistor.
C116(L).5	Apply the circuit laws and theorems to simple electrical circuits.
C116(L).6	Design and Analyze the simple circuits with diode and transistor.

II Year (odd Semester)

C201: Transforms and Partial Differential Equations, Year of study 2018 - 2019

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, Year of study 2018 - 2019

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 psychrometric processes

C203: CE8394 Fluid Mechanics and Machinery, Year of study 2018 - 2019

C203.1	Apply mathematical knowledge to predict the properties and characteristics of a fluid
C203.2	Analyze and calculate major and minor losses associated with pipe flow in piping networks
C203.3	Mathematically predict the nature of physical quantities
C203.4	Critically analyze the performance of pumps
C203.5	Critically analyze the performance of turbines

C204: ME8351 Manufacturing Technology-I, Year of study 2018 - 2019

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: Electrical Drives and Controls, Year of study 2018 - 2019

C205.1	Illustrate heating and cooling curves with factors influencing the choice of electrical drives.
C205.2	Explain different types of electrical machines and their performances.
C205.3	Employ various starting methods in electrical motors.
C205.4	Apply various methods adopted in conventional and solid state speed control of DC drives.
C205.5	Use various methods adopted in conventional and solid state speed control of AC drives.

C206 (L): ME8361 Manufacturing Technology Laboratory – I, Year of study 2018 - 2019

C206.1	Demonstrate the safety precautions exercised in the mechanical workshop.
C206.2	Make the work piece 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 (L): ME8381 Computer Aided Machine Drawing, Year of study 2018 - 2019

C207(L).1	Follow the drawing standards, Fits and Tolerances
C207(L).2	Re-create part drawings, sectional views and assembly drawings as per standards
C207(L).3	Describe Indian Standards on drawing practices and standard components
C207(L).4	Sketch drawings of machine components
C207(L).5	Construct drawings both manually and using standard CAD packages

C208 (L): EE8361 Electrical Engineering Laboratory, Year of study 2018 - 2019

C208(L).1	Determine the load characteristics of DC motors and Generators.
C208(L).2	Draw the equivalent circuit of transformer.
C208(L).3	Predetermine the voltage regulation of an alternator.
C208(L).4	Sketch the characteristics of three phase synchronous and induction motors.
C208(L).5	Differentiate various types of D.C. and A.C. motor starters.

C209 (L): HS8381 Interpersonal Skills / Listening & Speaking, Year of study 2018 - 2019

C209(L).1	Speak effectively on various academic topics and respond to questions.
C209(L).2	Converse effectively with the use of conversation starters and discourse markers.
C209(L).3	Listen and respond to various academic dialogues and discussions.
C209(L).4	Participate confidently and appropriately in informal and formal conversations and group discussions.
C209(L).5	Use a range of presentation tools like PPT, Videos, and Charts etc. to make an engaging presentation.

II Year (Even Semester)

C210: MA8452 Statistics and Numerical Methods, Year of study 2018 - 2019

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 designing engineering problems.
C210.3	Appreciate the numerical techniques for solving algebraic, transcendental and system of linear equations.
C210.4	Make use the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
C210.5	Apply the knowledge of various techniques and methods for solving first order ordinary differential equations with initial and boundary conditions in engineering problems.

C211: ME8492 Kinematics of Machinery, Year of study 2018 - 2019

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

C212: ME8451 Manufacturing Technology-II, Year of study 2018 - 2019

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, Year of study 2018 - 2019

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, Year of study 2018 - 2019

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, Year of study 2018 - 2019

C215.1	Apply thermodynamic concepts of 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 I.C. engines, components and auxiliaries.
C215.4	Calculate performance parameters of I.C. Engines.
C215.5	Explain the flow in Gas turbines and solve problems.

C216 (L): ME8462 Manufacturing Technology Laboratory – II, Year of study 2018 - 2019

C216(L).1	Design different parts of mechanical equipment's
C216(L).2	Apply skills in various designing and manufacturing industries
C216(L).3	Create 2D and 3D models using modeling software's
C216(L).4	Make appropriate selection of CAD functionality to use as tools in the design process
C216(L).5	Communicate effectively the geometry and intent of design features
C216(L).6	Develop CNC programs to manufacture industrial components

C217 (L): CE8381 Strength of Materials and Fluid Mechanics and Machinery Laboratory, Year of study 2018 - 2019

C217(L).1	Perform different destructive testing and Compare Characteristics of material
C217(L).2	Utilize appropriate materials in design considering engineering properties, sustainability, cost and weight
C217(L).3	Perform engineering work in accordance with ethical and economic constraints related to the design of structures and machine parts
C217(L).4	Analyze and design structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behavior of materials
C217(L).5	Measure the discharge of fluid flow in a pipe by using different flow measurement devices
C217(L).6	Calculate the energy losses of friction in a pipe flow for various flow conditions
C217(L).7	Perform the characteristics of positive displacement and dynamic pumps
C217(L).8	Determine the efficiency of impulse and reaction turbine in various load conditions
C217(L).9	Compare the performance characteristics of pumps and turbines

C218 (L): HS8461 Advanced Reading and Writing, Year of study 2018 - 2019

C218(L).1	Read and evaluate different types of texts critically and predict content.
C218(L).2	Write different types of essays using appropriate discourse markers.
C218(L).3	Display critical thinking in various professional contexts.
C218(L).4	Write winning job applications.
C218(L).5	Prepare technical documents like project proposals and statement of purpose

III Year (Odd Semester)

C301: ME8595 Thermal Engineering II, Year of study 2019 - 2020

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, Year of study 2019 - 2020

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.
C303.4	Apply the concepts of design to energy absorbing members, connecting rod and crank shaft.
C305.5	Apply the concepts of design to bearings.

C303: ME8504 - Metrology and Measurements, Year of study 2019 - 2020

C302.1	Describe the concepts of measurements to apply in various metrological Instruments.
C302.2	Outline the principles of linear and angular measurement tools used for industrial applications.
C302.3	Explain the procedure for conducting computer aided inspection.
C303.4	Demonstrate the techniques of form measurement used for industrial components.
C305.5	Discuss various measuring techniques of mechanical properties in industrial Applications.

C304: ME8594 - Dynamics of Machines, Year of study 2019 - 2020

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: OCE551 Air Pollution and Control, Year of study 2019 - 2020

C305.1	Understand the nature and characteristics of air pollutants with its impact on human, vegetation, animals and properties.

C305.2	Recognize the meteorological effects of air pollution
C305.3	Explain the design stacks and particulate air pollution control devices to meet Applicable standards.
C305.4	Select equipment's to control gaseous contaminants.
C305.5	Summarize the sources, types and control measures of indoor air pollutants and noise pollution.

C306: OIT551 Database Management Systems, Year of study 2019 - 2020

C306.1	Interpret relational data model, evolve conceptual model of a given problem, its mapping to relational model.
C306.2	Query the relational database and write simple and complex queries
C306.3	Develop and write programs with database connectivity.
C306.4	Analyze and design a database system and perform normalization.
C306.5	Identify the concepts of database security and information retrieval systems.

C307: OML551 Introduction to Nano Technology, Year of study 2019 - 2020

C307.1	Describe the basic science behind the properties of materials at the nanometre scale.
C307.2	Elucidate the concepts of different classes of nanomaterials.
C307.3	Recognize the synthetic routes in identifying its applications in device fabrication.
C307.4	Learn the principles behind the fabrication and characterization techniques for studying nanomaterials.
C307.5	Develop their knowledge and ideas of the applications of nanotechnology.

C308: OAN551 Sensors and Transducers, Year of study 2019 - 2020

C308.1	Expertise in various calibration techniques and signal types for sensors
C308.2	Apply the various sensors in the Automotive and Mechatronics applications
C308.3	Explain force, magnetic and heading sensor in Aerospace and Home appliances.
C308.4	Describe the basic principles of various smart sensors.
C308.5	Implement the DAQ systems with different sensors for real time applications.

C309: ME8511 Kinematics and Dynamics Laboratory, Year of study 2019 - 2020

C309.1	Explain gear parameters and working of lab equipment's.
C309.2	Analyze the kinematics of mechanisms, gyroscopic effect and two-dimensional (planar) rigid-body motion.
C309.3	Determine mass moment of inertia of mechanical element, governor effort and range sensitivity and compare for different governors.
C309.4	Determine the natural frequency and damping coefficient, torsional frequency and critical speeds of shafts.
C309.5	Analyze balancing mass of rotating and reciprocating masses and transmissibility ration.

C310: ME8512 Thermal Engineering Laboratory, Year of study 2019 - 2020

C310(L).1	Conduct tests on heat conduction apparatus and evaluate thermal conductivity of materials.
C310(L).2	Conduct tests on natural and forced convective heat transfer apparatus and evaluate heat transfer coefficient.
C310(L).3	Conduct tests on radiative heat transfer apparatus and evaluate Stefan Boltzmann constant and emissivity.
C310(L).4	Conduct tests to evaluate the performance of parallel/counter flow heat exchanger apparatus and reciprocating air compressor.
C310(L).5	Conduct tests to evaluate the performance of refrigeration and air conditioning test rigs.

C311: ME8512 Metrology and Measurements Laboratory, Year of study 2019 - 2020

C311(L).1	Measure the gear tooth dimensions, angle using sine bar, straightness and flatness, thread parameters, temperature using thermocouple, force, displacement, torque and vibration.
C311(L).2	Calibrate the vernier, micrometer and slip gauges and setting up the comparator for the inspection.
C311(L).3	Measure the components precisely using non-contact (optical) measurement system.
C311(L).4	Demonstrate the functions of Coordinate measuring machine and surface roughness tester for measuring complex profiles.
C311(L).5	Explain the machine tool metrology equipments with its measuring technique like straightness using auto collimator, precision level using spindle tests.

III Year (Even Semester)

C312: ME8601 - Design of Transmission Systems, Year of study 2019 - 2020

C312.1	Apply the concepts of design to belts, chains and rope drives.
C312.2	Apply the concepts of design to spur, helical gears.
C312.3	Apply the concepts of design to worm and bevel gears
C312.4	Apply the concepts of design to gear boxes.
C312.5	Apply the concepts of design to cams, brakes and clutches.

C313: ME8691 - Computer Aided Design and Manufacturing, Year of study 2019 - 2020

C313.1	Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics
C313.2	Explain the fundamentals of parametric curves, surfaces and Solids
C313.3	Summarize the different types of Standard systems used in CAD
C313.4	Apply NC & CNC programming concepts to develop part program for Lathe & Milling Machines
C313.5	Summarize the different types of techniques used in Cellular Manufacturing and FMS

C314: ME8693 - Heat and Mass Transfer, Year of study 2019 - 2020

C314.1	The students will be able to develop the knowledge about steady and unsteady state heat conduction in one dimensional heat transfer.
C314.2	The students will be able to understand the mechanism of natural and forced convection for different fluid flow.
C314.3	The students will be able to learn the various regimes of phase change heat transfer and design parameters of heat exchanger.
C314.4	The students will be able to acquire the concept radiation heat transfer mode for different surfaces.
C314.5	The students will be able to understand the mechanism of diffusion and convective mass transfer in stagnant and flow condition.

C315: ME8692 - Finite Element Analysis, Year of study 2019 - 2020

C315.1	Summarize the basics of finite element formulation.
C315.2	Apply finite element formulations to solve one dimensional Problems.
C315.3	Apply finite element formulations to solve two dimensional scalar Problems
C315.4	Apply finite element method to solve two dimensional Vector problems.
C315.5	Apply finite element method to solve problems on iso parametric element and dynamic Problems.

C316: ME8694 - Hydraulics and Pneumatics, Year of study 2019 - 2020

C316.1	Explain the Fluid power and operation of different types of pumps.
C316.2	Summarize the features and functions of Hydraulic motors, actuators and Flow control valves
C316.3	Explain the different types of Hydraulic circuits and systems
C316.4	Explain the working of different pneumatic circuits and systems
C316.5	Summarize the various trouble shooting methods and applications of hydraulic

C317: ME8091 Automobile Engineering, Year of study 2019 - 2020

C317.1	Recognize the various parts of the automobile and their functions and materials.
C317.2	Discuss the engine auxiliary systems and engine emission control.
C317.3	Distinguish the working of different types of transmission systems.
C317.4	Explain the Steering, Brakes and Suspension Systems.
C317.5	Predict possible alternate sources of energy for IC Engines.

C318: PR8592 Welding Technology, Year of study 2019 - 2020

C318.1	Understand the construction and working principles of gas and arc welding process.
C318.2	Understand the construction and working principles of resistance welding process.
C318.3	Understand the construction and working principles of various solid state welding process.
C318.4	Understand the construction and working principles of various special welding processes.
C318.5	Understand the concepts on weld joint design, weldability and testing of weldments.

C319: GE8075 Intellectual Property Rights, Year of study 2019 - 2020

C319.1	The student will be able to describe the concepts of various intellectual property rights
C319.2	The student will be able to elaborate the practical aspects of registration in India and abroad
C319.3	The student will be able to explain the implications of agreements and legislations
C319.4	The student will be able to illustrate the methods used for digital content protection
C319.5	The student will be able to discuss the legal aspects governing IPR infringement

C320: ME8681 CAD CAM Lab, Year of study 2019 - 2020

C320.1	Design different parts of mechanical equipment's.
C320.2	Apply skills in various designing and manufacturing industries
C320.3	Create 2D and 3D models using modeling software's.

C320.4	Make appropriate selection of CAD functionality to use as tools in the design process.
C320.5	Communicate effectively the geometry and intent of design features.

C321: ME8682 Design and Fabrication Project, Year of study 2019 - 2020

C321.1	Design the machine element or the mechanical product.
C321.2	Develop a 3D model of the designed product.
C321.3	Fabricate the machine element or the mechanical product.
C321.4	Demonstrate the working model of the machine element or the mechanical product.
C321.5	Prepare the necessary documents and reports for the final fabricated product

C322: HS8581 Professional Communication, Year of study 2019 - 2020

C 322.1	Cultivate intercultural communication skills, to guide students in making appropriate and responsible decisions, to develop leadership traits and soft skills and to create a desire to fulfill individual goals and team goals.
C 322.2	Help the learners acquire listening and speaking skills through lab based activities, and enable them to introduce themselves and make effective presentations.
C 322.3	Guide learners to evaluate their thinking skills, acquire listening and speaking skills and enable them to involve in group participation.
C 322.4	Teach various formats of interview, answering techniques, body language and paralinguistic skills.
C 322.5	Clarify and prioritize learners' objectives and goals, to contribute and work as a team by creating more leadership opportunities.

IV Year (Odd Semester)

C401: ME8792 Power Plant Engineering, Year of study 2020 - 2021

C 401.1	Explain the layout, construction and working of the components inside a thermal power plant.
C 401.2	Explain the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power plants.
C 401.3	Explain the layout, construction and working of the components inside nuclear power plants.
C 401.4	Explain the layout, construction and working of the components inside Renewable energy power plants.
C 401.5	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, Year of study 2020 - 2021

C 402.1	Select the process, equipment and tools for various industrial products.
C 402.2	Prepare process planning activity chart.
C 402.3	Explain the concept of cost estimation.
C 402.4	Compute the job order cost for different type of shop floor.
C 402.5	Calculate the machining time for various machining operations.

C403: ME8791 Mechatronics, Year of study 2020 - 2021

C 403.1	Discuss the interdisciplinary applications of Electronics, Electrical, Mechanical and Computer Systems for the Control of Mechanical, Electronic Systems and sensor technology.
C 403.2	Discuss the architecture of Microprocessor and Microcontroller, Pin Diagram, Addressing Modes of Microprocessor and Microcontroller.
C 403.3	Discuss Programmable Peripheral Interface, Architecture of 8255 PPI, and various device interfacing
C 403.4	Explain the architecture, programming and application of programmable logic controllers to problems and challenges in the areas of Mechatronic engineering.
C 403.5	Discuss various Actuators and Mechatronics system using the knowledge and skills acquired through the course and also from the given case studies

C404: OML752 Electronic Materials, Year of study 2020 - 2021

C 404.1	Explain the classifications of materials based on bonding.
C 404.2	Describe various applications of conducting materials.
C 404.3	Analyze the characteristics of semiconducting and magnetic materials.
C 404.4	Apply the concepts of dielectric and insulating materials in various applications.

C 404.5	Explain the uses of nano and opto electronic materials.

C405: OCE751 Environmental and Social Impact Assessment, Year of study 2020 - 2021

C 405.1	Understand the necessity to study the impacts of development on environment.
C 405.2	Carry out scoping and screening of developmental projects for environmental and social assessments and explain different methodologies for environmental impact prediction and assessment
C 405.3	Plan environmental impact assessments, environmental management plans and evaluate environmental impact assessment reports.
C 405.4	Carry out economic valuation of environmental impacts.
C 405.5	Conduct case studies on different types of projects pertaining EIA.

C406: OEN751 Green Building Design, Year of study 2020 - 2021

C 406.1	The students will be able to understand the Environmental Implications of buildings.
C 406.2	The students will be able to enumerate the embodied energy of building materials and alternate sustainable concepts.
C 406.3	The students will be able to illustrate the concepts of thermal comfort in buildings and heat transfer characteristics of building materials and technologies.
C 406.4	The students will be able to identify the concepts of utility of Solar Energy in buildings.
C 406.5	The students will be able to explain about the Green Composites and Water Utilization in buildings.

C407: OMT751 MEMS and NEMS, Year of study 2020 - 2021

C 407.1	Find solution to Micro/Nano electromechanical systems including their applications and advantages.
C 407.2	Recognize the materials in micro fabrication and describe the fabrication processes including surface micromachining, bulk micromachining and LIGA.
C 407.3	Analyze the key performance aspects of electromechanical transducers including sensors.
C 407.4	Explain the Various electromechanical actuators.
C 407.5	Describe the techniques of quantum mechanics and Nano systems.

C408: ME8071 Refrigeration and Air Conditioning, Year of study 2020 - 2021

C 408.1	Explain the basic concepts of Refrigeration.
C 408.2	Explain the Vapour compression Refrigeration systems and to solve problems.
C 408.3	Discuss the various types of Refrigeration systems.
C 408.4	Calculate the Psychrometric properties and its use in psychrometric processes.

C 408.5	Explain the concepts of Air conditioning and to solve problems.

C409: ME8072 Renewable Sources of Energy, Year of study 2020 - 2021

C 409.1	Discuss the importance and economics of renewable energy
C 409.2	Describe the method of power generation from Solar energy
C 409.3	Explain the method of power generation from Wind energy
C 409.4	Elaborate the method of power generation from Bio energy
C 409.5	Discuss the Tidal energy, Wave Energy, OTEC, Hydro energy, Geothermal Energy, Fuel Cells and Hybrid Systems.

C410: ME8073 Unconventional Machining Process, Year of study 2020 - 2021

C 410.1	Explain the need of unconventional machining processes and its classifications
C 410.2	Compare various thermal energy and electrical energy based unconventional machining processes.
C 410.3	Summarize various chemical and electro-chemical energy based unconventional machining processes.
C 410.4	Explain various Nano abrasives based unconventional machining processes
C 410.5	Distinguish various recent trends based unconventional machining processes.

C411: MF8071 Additive Manufacturing, Year of study 2020 - 2021

C 411.1	Learn about a working principle and construction of Additive Manufacturing technologies, their potential to support design and manufacturing,
C 411.2	Analyze and select suitable process, DFAM principle and materials used in Additive Manufacturing.
C 411.3	Explain about working principle, process and application of Photo polymerization And Powder Bed Fusion Processes.
C 411.4	Exploit working principle, process and application of Extrusion based and Sheet Lamination Processes.
C 411.5	Enumerate about various printing process and Laser Engineered Net Shaping printing processes

C412: ME8099 Robotics, Year of study 2020 - 2021

C 412.1	Explain the concepts of industrial robots, classification, specifications and coordinate systems. Also summarize the need and application of robots in different sectors.
C 412.2	Illustrate the different types of robot drive systems as well as robot end effectors.
C 412.3	Apply the different sensors and image processing techniques in robotics to improve the ability of robots.
C 412.4	Develop robotic programs for different tasks and familiarize with the kinematics motions of robot.
C 412.5	Examine the implementation of robots in various industrial sectors and interpolate the economic analysis of robots.

C413: ME8097 Non Destructive Testing and Evaluation, Year of study 2020 - 2021

C 413.1	The student will be able to explain the fundamental concepts of NDT.
C 413.2	The student will be able to discuss the different methods of NDE.
C 413.3	The student will be able to explain the concept of Thermography and Eddy current testing.
C 413.4	The student will be able to explain the concept of Ultrasonic Testing and Acoustic Emission.
C 413.5	The student will be able to explain the concept of Radiography.

C414: GE8071 Disaster Management, Year of study 2020 - 2021

C 414.1	Able to Differentiate the types of disasters, causes and their impact on environment and society
C 414.2	Able to assess vulnerability and provide DRR.
C 414.3	Able to adopt various methods of risk reduction measures as well as mitigation.
C 414.4	Able to assess the damage caused by Disaster
C 414.5	Ability to draw the hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management.

C415: ME8711 Simulation and Analysis Laboratory, Year of study 2020 - 2021

C 415.1	Demonstrate the engineering design problem that involves interaction between heat, stress and to generate the model using a proper element type, and then solve the problem.
C 415.2	Discretize, apply load and constrains for the given model.
C 415.3	Display the results such as Von Mises stress, displacement, temperature, pressure, and velocity etc. obtained from analysis.
C 415.4	Model, analyse and simulate experiments under real time environment and evaluate the performance.
C 415.5	Demonstrate the use of MATLAB software for multi-physic type of problems.

C416: ME8781 Mechatronics Laboratory, Year of study 2020 - 2021

C 416.1	Summaries how mechatronics integrates knowledge from different disciplines in order to realize engineering and consumer products that are useful in everyday life.
C 416.2	Design the mechatronics circuits for suitable applications
C 416.3	Demonstrate the functions of 8051 microcontroller and their interface.
C 416.4	Simulate the various pneumatic and hydraulic circuits for real time applications.
C 416.5	Select suitable actuators and sensors and integrate them for suitable applications.

C417: ME8712 Technical Seminar, Year of study 2020 - 2021

C 417.1	To identify promising new directions of various cutting edge technologies
C 417.2	To employ different skills in preparing detailed report describing the project and results
C 417.3	To review the research articles for understanding of a new field, in the absence of a textbook
C 417.4	To improve the technical communication by making an oral presentation before an evaluation committee
C 417.5	To cite the reference sources as per research ethics

IV Year (Even Semester)

C418: MG8591 Principles of Management, Year of study 2020 - 2021

C 418.1	The student will be able to discuss the evolution of management, functions and roles of managers.
C 418.2	The student will be able to explain the different types of planning process and tools used for planning.
C 418.3	The student will be able to elaborate different organization structures and functions of human resources manager.
C 418.4	The student will be able to illustrate the different theories of motivation and leadership.
C 418.5	The student will be able to describe the control techniques and the role of technology in management.

C419: IE8693 Production Planning and Control, Year of study 2020 - 2021

C 419.1	Enumerate the activities involved in the Production Planning and Control function
C 419.2	Explain the significance and applications of work study techniques
C 419.3	Describe the process planning activities with reference to production control
C 419.4	Discuss the concepts of production scheduling
C 419.5	Explain different types of costs in inventory system

C420: MG8091 Entrepreneurship Development, Year of study 2020 - 2021

C 420.1	The student will be able to illustrate the role of entrepreneurship in economic growth
C 420.2	The student will be able to discuss the importance of motivation and Entrepreneurship Development Programme in business
C 420.3	The student will be able to describe the elements required to formulate a business plan for a start-up
C 420.4	The student will be able to explain the concept of capital structure and identify the factors determining ipt
C 420.5	The student will be able to summarize various corrective measures to overcome the sickness in small business

C421: ME8094 Computer Integrated Manufacturing Systems, Year of study 2020 - 2021

C 421.1	Explain the basic concepts of CAD, CAM and computer integrated manufacturing systems.
C 421.2	Summarize the production planning and control and computerized process planning.
C 421.3	Differentiate the different coding systems used in group technology.
C 421.4	Explain the concepts of flexible manufacturing system (FMS) and automated guided vehicle (AGV) system.
C 421.5	Classification of robots used in industrial applications.

C422: GE8076 Professional Ethics in Engineering, Year of study 2020 - 2021

C 422.1	Apply ethics, morals and human values in society.
C 422.2	Explain about engineering ethics.
C 422.3	Describe the responsibilities of engineers as experimenters.
C 422.4	Analyze the safety, risks, risk benefit analysis and rights of an engineer.

C 422.5	Discuss the importance of the global issues, moral leadership and code of conduct

C423: ME8811 Project Work, Year of study 2020 - 2021

C 423.1	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.