# MEENAKSHI COLLEGE OF ENGINEERING

No-12, Vembuli Amman Koil Street, West K.K Nagar
Chennai - 600 078

DEPARTMENT OF MECHANICAL ENGINERRING
REGULATION-2021
COURSE OUTCOMES SEMESTER-1

Course Name: **HS3152-PROFESSIONAL ENGLISH I**

| CO1 | Utilize suitable language in professional settings. |
|-----|-----------------------------------------------------|
| CO2 | Develop a strong understanding of essential grammatical structures and effectively utilize them in diverse contexts. |
| CO3 | Interact with technical texts to uncover both their apparent and hidden significances, comprehensively exploring not just their technical complexities but also their nuanced interpretations. |
| CO4 | Examine and interpret data presented in tables, charts, and other visual formats. |
| CO5 | Compose definitions, descriptions, narratives, and essays covering a wide range of topics. |

Course Name: **MA3151-MATRICES AND CALCULUS**

| CO1 | Apply matrix algebra techniques to address real-world problems. |
|-----|-----------------------------------------------------------------|
| CO2 | Apply methods from differential calculus to address a variety of practical problems. . |
| CO3 | Able to employ principles from differential calculus in addressing functions involving multiple variables. |
| CO4 | Utilize a variety of integration techniques to effectively tackle real-world problems. |
| CO5 | Apply concepts of multiple integrals to solve problems involving areas, volumes, and various practical situations. |

Course Name: **PH3151-ENGINEERING PHYSICS**

| CO1 | Understand the importance of mechanics. |
|-----|----------------------------------------|
| CO2 | Express their knowledge in electromagnetic waves. |
| CO3 | Demonstrate a strong foundational knowledge in oscillations, optics and lasers. |
| CO4 | Understand the importance of quantum physics. |
| CO5 | Comprehend and apply quantum mechanical principles towards the formation of energy bands. |

Course Name: **CY3151-ENGINEERING CHEMISTRY**

| CO1 | Interpret the water quality parameters and water treatment techniques. |
|-----|----------------------------------------|
| CO2 | Demonstrate the basic principles and preparatory methods of nano materials. |
| CO3 | Illustrate the basic concepts and applications of phase rule and composites. |
| CO4 | Facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics. |
| CO5 | Familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices. |

Course Name: **GE3151-PROBLEM SOLVING AND PYTHON PROGRAMMING**

| CO1 | Develop algorithmic solutions to simple computational problems |
| --- | --- |
| CO2 | Develop and execute simple Python programs |
| CO3 | Write simple Python programs using conditionals and loops for solving problems |
| CO4 | Decompose a Python program into functions |
| CO5 | Represent compound data using Python lists, tuples, dictionaries etc |
| CO6 | Read and write data from/to files in Python programs |

Course Name: **GE3152-HERITAGE OF TAMILS**

| CO1 | Discuss the Tamil language and literature |
| --- | --- |
| CO2 | Explain about the modern-art sculpture. |
| CO3 | Illustrate the folk and martial arts. |
| CO4 | Describe the Thinai concepts of Tamil. |
| CO5 | Summarize the contribution of Tamil in Indian culture |
| CO6 | Define the role of siddha medicine. |

Course Name: **GE3171-PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY**

| CO1 | Develop algorithmic solutions to simple computational problems | |
|-----|---------------------------------------------------------------|--|
| CO2 | Develop and execute simple Python programs | |
| CO3 | Implement programs in Python using conditionals and loops for solving problems | |
| CO4 | Deploy functions to decompose a Python program. | |
| CO5 | Process compound data using Python data structures | |
| CO6 | Utilize Python packages in developing software applications | |

Course Name: **BS3171-PHYSICS CHEMISTRY LABORATORY**

| CO1 | Understand the functioning of various physics laboratory equipment. |
|------|---------------------------------------------------------------------|
| CO2 | Use graphical models to analyze laboratory data. |
| CO3 | Use mathematical models as a medium for quantitative reasoning and describing physical reality. |
| CO4 | Access, process and analyze scientific information. |
| CO5 | Solve problems individually and collaboratively. |
| CO6 | Analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO. |
| CO7 | Determine the amount of metal ions through volumetric and spectroscopic techniques |
| CO8 | Analyse and determine the composition of alloys |
| CO9 | Learn simple method of synthesis of nanoparticles |
| CO10 | Quantitatively analyse the impurities in solution by electroanalytical techniques |

Course Name: **GE3271-ENGLISH LABORATORY I**

| CO1 | Engage in active listening to effectively absorb and comprehend a broad spectrum of academic information, ranging from general concepts to more complex topics. |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO2 | Listen attentively and understand various perspectives presented in a discussion. |
| CO3 | Communicate fluently and accurately in both formal and informal contexts. |
| CO4 | Describe products and processes clearly and accurately, elucidating their uses and purposes effectively. |
| CO5 | Express opinions adeptly in both formal and informal discussions. |

Course Name: **HS3252-PROFESSIONAL ENGLISH – II**

| CO1 | Analyze and differentiate between products and ideas in technical texts, highlighting their similarities and differences. |
|-----|---------------------------------------------------------------------------------------------------------------------------|
| CO2 | Identify and document cause-and-effect relationships within events and industrial processes by analyzing technical texts. |
| CO3 | Examine issues thoroughly to develop practical solutions and convey them effectively through written communication. |
| CO4 | Express their ideas and opinions in an organized and coherent manner. |
| CO5 | Compose compelling resumes tailored to the specifics of job searches. |

Course Name: **MA3251-STATISTICS AND NUMERICAL METHODS**

| 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 | Identify the different interval interpolation techniques and apply the differentiation and integration numerical methods to engineering problems. |
| CO4 | Develop an understanding of a range of techniques and methods utilized in 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. |

Course Name**: PH3251-MATERIALS SCIENCE**

| CO1 | Know basics of crystallography and its importance for varied materials properties |
|-----|-----|
| CO2 | Gain knowledge on the electrical and magnetic properties of materials and their applications |
| CO3 | Understand clearly of semiconductor physics and functioning of semiconductor devices |
| CO4 | Understand the optical properties of materials and working principles of various optical |
| CO5 | Appreciate the importance of functional nano electronic devices |

Course Name: **BE3251-BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

| CO1 | Compute the electric circuit parameters for simple problems |
|-----|-------------------------------------------------------------|
| CO2 | Explain the working principle and applications of electrical machines |
| CO3 | Analyze the characteristics of analog electronic devices |
| CO4 | Explain the basic concepts of digital electronics |
| CO5 | Explain the operating principles of measuring instruments |

Course Name: **GE3251-ENGINEERING GRAPHICS**

| CO1 | Use BIS conventions and specifications for engineering drawing. |
|-----|-----------------------------------------------------------------|
| CO2 | Construct the conic curves, involutes and cycloid. |
| CO3 | Solve practical problems involving projection of lines. |
| CO4 | Draw the orthographic, isometric and perspective projections of simple solids. |
| CO5 | Draw the development of simple solids. |

Course Name: **GE3252-TAMILS AND TECHNOLOGY**

| CO1 | Explain about the weaving and pottery technology in Tamilnadu |
| --- | --- |
| CO2 | Describe about the design and construction technology in Tamilnadu. |
| CO3 | Discuss about the manufacturing technology in Tamilnadu. |
| CO4 | Illustrate the agriculture and irrigation technology in Tamilnadu. |
| CO5 | Define the growth of science in Tamil |
| CO6 | Learn the contribution of the Tamils to Indian culture. |

Course Name: **GE3271-ENGINEERING PRACTICES LABORATORY**

| CO1 | Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work. |
| --- | --- |
| CO2 | Wire various electrical joints in common household electrical wire work. |
| CO3 | Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipment's; Make a tray out of metal sheet using sheet metal work |
| CO4 | Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB. |

Course Name: **BE3271-BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY**

| CO1 | Use experimental methods to verify the Ohm's and Kirchhoff's Laws. |
|-----|---------------------------------------------------------------------|
| CO2 | Analyze experimentally the load characteristics of electrical machines |
| CO3 | Analyze the characteristics of basic electronic devices |
| CO4 | Use DSO to measure the various parameters |

Course Name: **GE3272-COMMUNICATION LABORATORY / FOREIGN LANGUAGE**

| CO1 | Communicate effectively in group discussions conducted in formal or semi-formal settings. |
|-----|--------------------------------------------------------------------------------------------|
| CO2 | Participate actively in discussions; thoroughly examine concepts and issues from multiple angles, and articulate conclusions to identify appropriate solutions. |
| CO3 | Create emails, letters, and job applications that are refined and have a strong impact. |
| CO4 | Compose critical reports that effectively communicate data and information with clarity and precision. |
| CO5 | Deliver accurate and pertinent instructions and recommendations to ensure tasks are executed safely and effectively. |

Course Name: **MA3351-TRANSFORMSANDPARTIALDIFFERENTIALEQUATIONS**

| CO1 | Explain 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 | AppreciatethephysicalsignificanceofFourierseriestechniquesinsolvingone-and two-dimensional heat flow problems and one-dimensional wave equations. |
| CO4 | Explain the mathematical principles on transforms and partial differential equationswouldprovidethemtheabilitytoformulateandsolvesomeofthephysical problems of engineering |
| CO5 | Usetheeffectivemathematicaltoolsforthesolutionsofpartialdifferentialequations by using Z transform techniques for discrete time systems |

## Course Name: ME3351- ME3351-ENGINEERINGMECHANICS

| CO1 | Illustrate the vector and scalar representation of forces and moments |
| CO2 | Analyse the rigid body in equilibrium |
| CO3 | Decide the properties of distributed forces |
| CO4 | Determine the friction and the effects by the laws of friction |
| CO5 | Calculate dynamic forces exerted in rigid body |

Course Name: ME3391- ENGINEERINGTHERMODYNAMICS

| CO1 | Apply the zeroth and first law of thermodynamics by formulating temperature scales and calculating the property changes in closed and open engineering systems. |
| --- | --- |
| CO2 | Apply the second law of thermodynamics in analysing the performance of thermal devices through energy and entropy calculations |
| CO3 | Apply the second law of thermodynamics in evaluating the various properties of steam through steam tables and Moliere chart |
| CO4 | Apply the properties of pure substance in computing the macroscopic properties of ideal and real gases using gas laws and appropriate thermodynamic relations. |
| CO5 | Apply the properties of gas mixtures in calculating the properties of gas mixtures and applying various thermodynamic relations to calculate property changes. |

Course Name: CE3391- FLUIDMECHANICSANDMACHINERY

| CO1 | Explain the properties and behavior in static conditions. Also, to understand the conservation laws applicable to fluids and its application through fluid kinematics and dynamics |
| --- | --- |
| CO2 | Estimate losses in pipelines for both laminar and turbulent conditions and analysis of pipes connected in series and parallel. Also, to understand the concept of boundary layer and its thickness on the flat solid surface. |
| CO3 | Formulate the relationship among the parameters involved in the given fluid phenomenon and to predict the performances of prototype by model studies |
| CO4 | Explain the working principles of various turbines and design the various types of turbines. |
| CO5 | Explain the working principles of centrifugal, reciprocating and rotary pumps and design the centrifugal and reciprocating pumps |

Course Name: ME3392- ENGINEERING MATERIALS AND METALLURGY

| CO1 | Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification. |
|-----|-----|
| CO2 | Explain iso thermal 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 |

Course Name: ME3393- MANUFACTURINGPROCESSES

| CO1 | Explain the principle of different metal casting processes. |
|-----|-----|
| CO2 | Describe the various metal joining processes. |
| CO3 | Illustrate the different bulk deformation processes. |
| CO4 | Apply the various sheet metal forming process. |
| CO5 | Apply suitable molding technique for manufacturing of plastics components. |

Course Name: ME3381- COMPUTER AIDED MACHINE DRAWING

| CO1 | Generate standard drawing layout for modeled assemblies with BoM. |
|-----|-------------------------------------------------------------------|
| CO2 | Model orthogonal views of machine components. |
| CO3 | Create standard drawing layout for modeled parts |

Course Name: ME3382- MANUFACTURINGTECHNOLOGYLABORATORY

| CO1 | Demonstrate the safety precautions exercised in the mechanical workshop and join two metals using GMAW. |
|-----|--------------------------------------------------------------------------------------------------------|
| CO2 | The students able to make the work piece as per given shape and size using machining process such as rolling, drawing, turning, shaping, drilling and milling. |
| CO3 | The students become make the gears using gear making machines and analyze the defects in the cast and machined components |

Course Name: ME3382- PROFESSIONAL DEVELOPEMENT

| CO1 | Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements |
|-----|---------|
| CO2 | Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding |
| CO3 | Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects |

Course Name: ME3491- THEORY OF MACHINES

| CO1 | Discuss the basics of mechanism. |
|-----|---------|
| CO2 | Solve problems on gears and gear trains. |
| CO3 | Examine friction in machine elements. |
| CO4 | Calculate static and dynamic forces of mechanisms. |
| CO5 | Calculate the balancing masses and their locations of reciprocating and rotating masses.Computingthefrequencyoffreevibration,forcedvibrationanddamping coefficient |

Course Name: ME3451- THERMAL ENGINEERING

| CO1 | Apply thermo dynamic concepts to different air standard cycles and solve problems. |
|-----|-----------------------------------------------------------------------------------|
| CO2 | Solve problems in steam nozzle and calculate critical pressure ratio. |
| CO3 | Explain the flow in steam turbines, draw velocity diagrams, flow in Gas turbines and solve problems. |
| CO4 | Explain the functioning and features of IC engine, components and auxiliaries. |
| CO5 | Calculate the various performance parameters of IC engines |

Course Name: ME3492- HYDRAULICS AND PNEUMATICS

| CO1 | Apply the working principles of fluid power systems and hydraulic pumps. |
|-----|-------------------------------------------------------------------------|
| CO2 | Apply the working principles of hydraulic actuators and control components. |
| CO3 | Design and develop hydraulic circuits and systems. |
| CO4 | Applytheworkingprinciplesofpneumaticcircuitsandpowersystemandits components. |
| CO5 | Identify various troubles shooting methods in fluid power systems |

Course Name: ME3493- MANUFACTURING TECHNOLOGY

| CO1 | Apply the mechanism of metal removal process and to identify the factors involved in improving machinability. |
|------|-----|
| CO2 | Describe the constructional and operational features of centre lathe and other special purpose lathes. |
| CO3 | Describe the constructional and operational features of reciprocating machine tools. |
| CO4 | Apply the constructional features and working principles of CNC machine tools. |
| CO5 | Demonstrate the Program CNC machine tools through planning, writing codes and setting up CNC machine tools to manufacture a given component. |

Course Name: CE3491- STRENGTHOF MATERIALS

| CO1 | Explain the concepts of stress and strain in simple and compound bars, the important of principal stresses and principal planes. |
|------|-----|
| CO2 | Explain the load transferring mechanism in beams and stress distribution due shearing force and bending moment. |
| CO3 | Apply basic equation of torsion in designing of shafts and helical springs |
| CO4 | Calculates lope and m deflection in beams using different methods. |
| CO5 | Analyze thin and thick shells for applied  pressures. |

Course Name: GE3451- ENVIRONMENTAL SCIENCES AND SUSTAINABILITY

| CO1 | Evaluate the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation. |
|------|------|
| CO2 | Illustrate the causes, effects and control or prevention measures of environmental pollution and natural disasters. |
| CO3 | Assess and understanding of global and Indian scenario of renewable and nonrenewable resources causes of their degradation and measures to preserve them. |
| CO4 | Familiarize the concept of sustainable development goals and appreciate the interdependence of economic and social aspects of sustainability, recognize and analyze climate changes, concept of carbon credit and the challenges of environmental management. |
| CO5 | Inculcate and embrace sustainability practices and develop a broader understanding on green materials, energy cycles and analyze the role of sustainable urbanization. |

Course Name: CE3481- STRENGTH OF MATERIALS AND FLUID MACHINERY LABORATORY

| CO1 | Determine the tensile, torsion and hardness properties of metals by testing |
|------|------|
| CO2 | Determine the stiffness properties of helical and carriage spring |
| CO3 | Apply the conservation laws to determine the coefficient of discharge of a venturimeter and finding the friction factor of given pipe |
| CO4 | Apply the fluid static and momentum principles to determine the metacentric height and forces due to impact of jet |
| CO5 | Determine the performance characteristics of turbine, rotor dynamic pump and positive displacement pump. |

Course Name: ME3461- THERMAL ENGINEERING LABORATORY

| CO1 | Conduct tests to evaluate performance characteristics of IC engines |
| CO2 | Conduct tests to evaluate  the performance of refrigeration cycle |
| CO3 | Conduct tests to evaluate Performance and Energy Balance on a Steam Generator. |

Course Name: ME3591- DESIGN OF MACHINE ELEMENTS

| CO1 | Explain the design machine members subjected to static and variable loads. |
| CO2 | Apply the concepts design to shafts, key and couplings. |
| CO3 | Apply the concepts of design to bolted, Knuckle, Cotter, riveted and welded joints. |
| CO4 | Apply the concept of design helical, leaf springs, fly wheels, connecting rods and crank shafts. |
| CO5 | Apply the concepts of design and select sliding and rolling contact bearings, seals and gaskets |

## Course Name: ME3592- METROLOGY AND MEASUREMENTS

| CO1 | Discuss the concepts of measurements to apply in various metrological instruments. |
|-----|------------------------------------------------------------------------------------|
| CO2 | Apply the principle and applications of linear and angular measuring instruments, assembly and transmission elements. |
| CO3 | Apply the tolerance symbols and tolerance analysis for industrial applications. |
| CO4 | Apply the principles and methods of form and surface metrology. |
| CO5 | Apply the advances in measurements for quality control in manufacturing Industries. |

## Course Name: CME384- POWER PLANT ENGINEERING

| 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 | Explainthelayout,constructionandworkingofthecomponentsinsideRenewable energy power plants |
| CO5 | Explaintheapplicationsofpowerplantswhileextendtheirknowledgetopowerplant economics and environmental hazards and estimate the costs of electrical energy Production. |

## Course Name: Non-Traditional Machining Processes

| CO1 | Formulate different types of non-traditional machining processes and evaluate mechanical energy based non-traditional machining processes. |
|-----|---|
| CO2 | Illustrate chemical and electro chemical energy-based processes. |
| CO3 | Evaluate thermo-electric energy-based processes. |
| CO4 | Inter prêt nano finishing processes. |
| CO5 | Analyze hybrid non-traditional machining processes and differentiate non-traditional machining  processes. |

## Course Name: CME396- Process Planning and Cost Estimation

| CO1 | Discuss select the process, equipment and tools for various industrial products. |
|-----|---|
| CO2 | Explain the 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. |

Course Name: MX3084 – DISASTER RISK REDUCTION AND MANAGEMENT

| CO1 | Impart knowledge on the concepts of Disaster, Vulnerability and Disaster Risk reduction (DRR) |
|-----|-----------------------------------------------------------------------------------------------|
| CO2 | Enhance understanding on Hazards, Vulnerability and Disaster Risk Assessment prevention and risk reduction |
| CO3 | Develop disaster responses kills by adopting relevant tools and technology |
| CO4 | Enhance awareness of institutional processes for Disaster response in the country |
| CO5 | Develop rudimentary ability to respond to their surroundings with potential Disaster response in areas where they live, with due sensitivity |

Course Name: ME3511 -- SUMMER INTERNSHIP

| CO1 | Work in real time situations in industries through hands on job execution |
|-----|---------------------------------------------------------------------------|
| CO2 | Apply theoretical aspects to solve engineering problems in the industries |

Course Name: ME3581-METROLOGYANDDYNAMICSLABORATORY

| CO1 | The students able to measure the gear tooth dimensions, angle using sine bar, straightness |
|-----|--------------------------------------------------------------------------------------------|
| CO2 | Determine mass moment inertia of mechanical element, governor effort and range of sensitivity |
| CO3 | Determine the natural frequency and damping coefficient, critical speeds of shafts, |

Course Name: ME3691-HEAT AND MASS TRANSFER

| 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. |

## Course Name: CME355-MATERIAL HANDLING AND SOLID PROCESSING EQUIPMENT

| CO1 | Discuss the basic concepts of material handling equipment. |
|-----|-----------------------------------------------------------|
| CO2 | Explain the basic working principles of various industrial Vehicles. |
| CO3 | Develop the basic working principles of various conveyors. |
| CO4 | Explain the basic working principles of various Auxiliary Equipment and Hoisting Equipment. |
| CO5 | Explain the basic working principles of various Bulk Handling Equipment and Systems. |

## Course Name: CME364-ENERGY STORAGE DEVICES

| CO1 | Discuss the need and identify the suitable energy storage devices for applications. |
|-----|------------------------------------------------------------------------------------|
| CO2 | Explain the working of various energy storage devices and their importance. |
| CO3 | Explain the basic characteristics of batteries for mobile and hybrid systems. |
| CO4 | Discuss the storage of renewable energies and management systems. |
| CO5 | Explain the need for other energy devices and their scope for applications. |

Course Name: CME344 - PRODUCT LIFE CYCLE MANAGEMENT

| CO1 | Summarize the history, concepts and terminology of PLM |
| CO2 | Develop the functions and features of PLM/PDM |
| CO3 | Discuss different modules offered in commercial PLM/PDM tools. |
| CO4 | Interpret the implement PLM/PDM approaches for industrial applications. |
| CO5 | Integrate PLM/PDM with legacy databases, CA x& ERP systems |

Course Name: CME380 - AUTOMOBILE ENGINEERING

| CO1 | Identify the various parts of the automobile and their functions and materials. |
| CO2 | Discuss the engine auxiliary systems and engine emission control. |
| CO3 | Distinguish the working of different types of transmission systems. |
| CO4 | Explain the Steering , Brakes and Suspension Systems. |
| CO5 | Predict possible alternate sources of energy for IC Engines. |

Course Name: MX3089 – INDUSTRIAL SAFETY

| CO1 | Explain the basic concept of safety. |
|-----|--------------------------------------|
| CO2 | Obtain knowledge of Statutory Regulations and standards. |
| CO3 | Identify the safety Activities of the Working Place |
| CO4 | Analyze on the impact of Occupational Exposures and their Remedies |
| CO5 | Obtain knowledge of Risk Assessment Techniques |

Course Name: ME3681 - CAD/CAM LABORATORY

| CO1 | Design experience in handling 2D drafting and 3D modeling software systems |
|-----|--------------------------------------|
| CO2 | Design3-Dimensional geometric model of parts, sub-assemblies , assemblies and export it to drawing |
| CO3 | Demonstrate manual part programming and simulate the CNC program and Generate part programming using G and M code through CAM software. |
| CO4 | |
| CO5 | |

Course Name: ME3682 – HEAT TRANSFER LABORATORY

| CO1 | Experiment on Predict the thermal conductivity of solids and liquids |
| CO2 | Experiment on Estimate the heat transfer coefficient values of various fluids. |
| CO3 | Experiment on Test the performance of tubes in tube heat exchangers |

Course Name: ME3791-Mechatronics and IoT

| CO1 | Explain Select suitable sensors and actuators to develop Mechatronics systems |
| CO2 | Discuss Devise proper signal conditioning circuit for mechatronics systems , and also able to implement PLC as a controller for an automated system |
| CO3 | Explain the fundamentals of IoT and Embedded Systems |
| CO4 | Discuss Control I/O devices through Arduino and Raspberry Pi |
| CO5 | Design and develop an apt Mechatronics / IoT based system for the given real-time application. |

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| CO5 | Design and develop an apt Mechatronics / IoT based system for the given real-time application. |

Course Name: ME3792-COMPUTER INTEGRATED MANUFACTURING

| CO1 | Discuss the basics of computer aided engineering. |
|-----|---------------------------------------------------|
| CO2 | Choose appropriate automotive tools and material handling systems |
| CO3 | Discuss the overview of group technology , FMS and automation identification methods |
| CO4 | Design using computer aided process planning for manufacturing of various components |
| CO5 | Create a knowledge in computer process control techniques. |

## Course Name: GE3791-HUMANVALUESANDETHICS

| CO1 | Identify the importance of democratic, secular and scientific values in harmonious functioning of social life |
| --- | --- |
| CO2 | Practice democratic and scientific values in both their personal and professional life. |
| CO3 | Find rational solutions to social problems. |
| CO4 | Behave in an ethical manner in society |
| CO5 | Practice critical thinking and the pursuit of truth |

## Course Name: GE3792-INDUSTRIAL MANAGEMENT

| CO1 | Discuss basic concepts of management ; approaches to management ; contributors to management studies; various forms of business organization and trade unions function in professional organizations |
| --- | --- |
| CO2 | Discuss the planning ; organizing and staffing functions of management in professional organization. |
| CO3 | Applytheleading;controllinganddecisionmakingfunctionsofmanagementin professional organization |
| CO4 | Discuss the organizational theory in professional organization |
| CO5 | Apply principles of productivity and modern concepts in management in professional organization. |

# Course Name: OMG354-PRODUCTION AND OPERATIONS MANAGEMENT FOR ENTREPRENEURS

| CO1 | Explain the basics and functions of Production and Operation Management for business owners |
|-----|---------------------------------------------------------------------------------------------|
| CO2 | Learn about the Production & Operation Systems. |
| CO3 | Acquaint on the Production & Operations Planning Techniques followed by entrepreneurs in Industries. |
| CO4 | Known about the Production & Operations Management Processes in organisations |
| CO5 | To comprehend the techniques of controlling, Production and Operations in industries. |

## Course Name: OML351-INTRODUCTION TO NON-DESTRUCTIVE TESTING

| CO1 | Explain the importance of NDT in various engineering fields. |
|-----|---------------------------------------------------------------|
| CO2 | Discuss a basic knowledge of surface NDE techniques which enables to carry out various inspection in accordance with the established procedures |
| CO3 | Calibrate the instrument and inspect for in-service damage in the components by means of Eddy current testing as well as Thermography testing. |
| CO4 | Differentiate various techniques of UT and AET and select appropriate NDT methods for better evaluation. |
| CO5 | Interpret the results of Radiography testing and also have the ability to analyze the influence of various parameters on the testing. |

## Course Name: ME3781-MECHATRONICS AND IoT LABORATORY

| CO1 | Demonstrate the functioning of Mechatronics systems with various pneumatic, hydraulic and electrical systems |
| CO2 | Demonstrate the micro controller and PLC as controllers in automation systems by executing proper interfacing of I/O devices and programming |
| CO3 | Demonstrate the sensing and actuation of Mechatronics elements using IoT. |

## Course Name: ME3711-SUMMER INTERNSHIP

| CO1 | Discuss the organogram of the industry and appreciate the skill enhancement |
| CO2 | Write an effective mini-project or internship report |
| CO3 | Deliver an effective presentation |
| CO4 | Inculcate non-plagiarism and teamwork ethics |

Course Name: ME3811-PROJECTWORK

| CO1 | Takeupanychallengingpracticalproblemsandfindsolutionbyformulating proper methodology | |