



## SHREE VENKATESHWARA HI-TECH ENGINEERING COLLEGE

(AUTONOMOUS)

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

Accredited by NAAC with 'A' Grade | NBA (CIVIL, CSE, EEE, MECH)

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### COURSE OUTCOME STATEMENTS FOR 2021 REGULATIONS, ANNA UNIVERSITY, CHENNAI DEPARTMENT OF MECHANICAL ENGINEERING

At the end of the course, students will able to:

YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
I/I	HS3151	Professional English - I	CO1: <b>Listen</b> and comprehend complex academic texts	K2
			CO2: <b>Read</b> and <b>Infer</b> the denotative and connotative meanings of technical texts	K2 & K4
			CO3: <b>Write</b> definitions, descriptions, narrations and essays on various topics	K3
			CO4: <b>Speak</b> fluently and accurately in formal and informal communicative contexts	K3
			CO5: <b>Express</b> their opinions effectively in both oral and written medium of communication	K3

At the end of the course, students will able to:

YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
I/I	MA3151	Matrices and Calculus	CO1: <b>Use</b> the matrix algebra methods for solving practical problems	K2
			CO2: <b>Apply</b> differential calculus tools in solving various application problems	K3
			CO3: <b>Use</b> differential calculus ideas on several variable functions	K2
			CO4: <b>Apply</b> different methods of integration in solving practical problems	K3
			CO5: <b>Apply</b> multiple integral ideas in solving areas, volumes and other practical problems	K3

At the end of the course, students will able to:

YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
I/I	PH3151	Engineering Physics	CO1: <b>Understand</b> the importance of mechanics	K2
			CO2: <b>Express</b> their knowledge in electromagnetic waves	K2
			CO3: <b>Demonstrate</b> a strong foundational knowledge in oscillations, optics and lasers	K3
			CO4: <b>Understand</b> the importance of quantum physics	K2
			CO5: <b>Comprehend</b> and <b>Apply</b> quantum mechanical principles towards the formation of energy bands	K3

At the end of the course, students will able to:

YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
I/I	CY3151	Engineering Chemistry	CO1: <b>Infer</b> the quality of water from quality parameter data and propose suitable treatment methodologies to treat water	K1, K2, K3
			CO2: <b>Identify</b> and <b>Apply</b> basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications	K1, K2, K3
			CO3: <b>Apply</b> the knowledge of phase rule and composites for material selection requirements	K1, K3
			CO4: <b>Recommend</b> suitable fuels for engineering processes and applications	K2, K3
			CO5: <b>Recognize</b> different forms of energy resources and apply them for suitable applications in energy sectors	K2, K3

At the end of the course, students will able to:

YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
I/I	GE3151	Problem Solving and Python Programming	CO1: <b>Develop</b> algorithmic solutions to simple computational problems	K2
			CO2: <b>Develop</b> and execute simple Python programs	K3
			CO3: <b>Write</b> simple Python programs using conditionals and looping for solving problems and decompose a Python program into functions	K3
			CO4: <b>Represent</b> compound data using Python lists, tuples, dictionaries etc	K3
			CO5: <b>Read</b> and <b>write</b> data from/to files in Python Programs	K3

At the end of the course, students will able to:

YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
I/I	GE3171	Problem Solving and Python Programming Laboratory	CO1: <b>Develop</b> algorithmic solutions to simple computational problems	K2
			CO2: <b>Develop</b> and execute simple Python programs	K3
			CO3: <b>Write</b> simple Python programs using conditionals and looping for solving problems and deploy functions to decompose a Python program	K3
			CO4: <b>Process</b> compound data using Python data structures	K3
			CO5: <b>Utilize</b> Python packages in developing software applications	K3

At the end of the course, students will able to:

YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
I/I	BS3171	Physics and Chemistry Laboratory	CO1: <b>Understand</b> the functioning of various physics laboratory equipment	K2
			CO2: <b>Use</b> graphical models to analyze laboratory data	K4
			CO3: <b>Solve</b> problems individually and collaboratively	K3
			CO4: <b>Analyse</b> the quality of water samples with respect to their acidity, alkalinity, hardness and DO	K4
			CO5: <b>Quantitatively Analyse</b> the impurities in solution by electro analytical techniques	K4

At the end of the course, students will able to:

YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
I/II	HS3251	Professional English - II	CO1: <b>Compare</b> and <b>Contrast</b> products and ideas in technical texts	K2
			CO2: <b>Identify</b> cause and effects in events, industrial processes through technical texts	K2
			CO3: <b>Analyse</b> problems in order to arrive at feasible solutions and communicate them orally and in the written format	K4
			CO4: <b>Report</b> events and the processes of technical and industrial nature	K3
			CO5: <b>Present</b> their opinions in a planned and logical manner, and draft effective resumes in context of job search	K3

At the end of the course, students will able to:

YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
I/II	MA3251	Statistics and Numerical Methods	CO1: <b>Apply</b> the concept of testing of hypothesis for small and large samples in real life problems	K2
			CO2: <b>Apply</b> the basic concepts of classifications of design of experiments in the field of agriculture	K3
			CO3: <b>Appreciate</b> the numerical techniques of interpolation in various intervals and <b>Apply</b> the numerical techniques of differentiation and integration for engineering problems	K2
			CO4: <b>Understand</b> the knowledge of various techniques and methods for solving first and second order ordinary differential equations	K2
			CO5: <b>Solve</b> the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications	K3

At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
I/II	PH3251	Materials Science	CO1: <b>Know</b> basics of crystallography and its importance for varied materials properties	K1
			CO2: <b>Gain</b> knowledge on the electrical and magnetic properties of materials and their applications	K3
			CO3: <b>Understand</b> clearly of semiconductor physics and functioning of semiconductor devices	K2
			CO4: <b>Understand</b> the optical properties of materials and working principles of various optical devices	K2
			CO5: <b>Appreciate</b> the importance of functional nanoelectronic devices	K4
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
I/II	BE3251	Basic Electrical and Electronics Engineering	CO1: <b>Compute</b> the electric circuit parameters for simple problems	K3
			CO2: <b>Explain</b> the working principle and applications of electrical machines	K2
			CO3: <b>Analyze</b> the characteristics of analog electronic devices	K4
			CO4: <b>Explain</b> the basic concepts of digital electronics	K2
			CO5: <b>Explain</b> the operating principles of measuring instruments	K1,K2
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
I/II	GE3251	Engineering Graphics	CO1: <b>Construct</b> the conic curves, involutes and cycloid.	K3
			CO2: <b>Solve</b> practical problems involving projection of lines.	K3
			CO3: <b>Draw</b> the orthographic, isometric projections of simple solids.	K3
			CO4: <b>Draw</b> the development of simple solids.	K3
			CO5: <b>Visualize</b> and <b>Project</b> the Isometric of simple, truncated solids and Perspective projections of Simple solids	K3
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
I/II	GE3271	Engineering Practices Laboratory	CO1: <b>Draw</b> pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; <b>Make</b> joints in wood materials used in common household wood work.	K3
			CO2: <b>Wire</b> various electrical joints in common household electrical wire work.	K2
			CO3: <b>Weld</b> various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts	K3
			CO4: <b>Assemble</b> simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.	K3
			CO5: <b>Solder</b> and <b>Test</b> simple electronic circuits; <b>Assemble</b> and test simple electronic components on PCB.	K4
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
I/II	BE3271	Basic Electrical and Electronics Engineering Laboratory	CO1: <b>Use</b> experimental methods to verify the Ohm's and Kirchhoff's Laws	K1,K2
			CO2: <b>Analyze</b> experimentally the load characteristics of electrical machines	K4
			CO3: <b>Analyze</b> the characteristics of basic electronic devices	K2
			CO4: <b>Gain</b> the knowledge in the applications of GATES in electronics	K2
			CO5: <b>Use</b> DSO to measure the various parameters	K4

At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
II/III	MA3351	Transforms and Partial Differential Equations	CO1 : <b>Understand</b> how to solve the given standard partial differential equations	K2
			CO 2 : <b>Solve</b> differential equations using Fourier series analysis which plays a vital role in engineering applications	K2, K3
			CO3 : <b>Appreciate</b> the physical significance of Fourier series techniques in solving one- and two dimensional heat flow problems and one-dimensional wave equations	K2
			CO4 : <b>Understand</b> 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	K2
			CO5: <b>Use</b> the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems	K3
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
I/III	ME3351	Engineering Mechanics	CO1: <b>Illustrate</b> the vector and scalar representation of forces and moments	K2
			CO2: <b>Analyze</b> the rigid body in equilibrium	K3
			CO3: <b>Evaluate</b> the properties of distributed forces	K3
			CO4: <b>Determine</b> the friction and the effects by the laws of friction	K4
			CO5: <b>Calculate</b> dynamic forces exerted in rigid body	K3
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
II/III	ME3391	Engineering Thermodynamics	CO1: <b>Apply</b> the zeroth and first law of thermodynamics by formulating temperature scales and calculating the property changes in closed and open engineering systems.	K1
			CO2: <b>Apply</b> the second law of thermodynamics in analysing the performance of thermal devices through energy and entropy calculations	K2
			CO3: <b>Apply</b> the second law of thermodynamics in evaluating the various properties of steam through steam tables and Mollier chart	K3
			CO4: <b>Apply</b> the properties of pure substance in computing the macroscopic properties of ideal and real gases using gas laws and appropriate thermodynamic relations	K2
			CO5: <b>Apply</b> the properties of gas mixtures in calculating the properties of gas mixtures and applying various thermodynamic relations to calculate property changes	K3
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
II/III	CE3391	Fluid Mechanics and Machinery	CO1: <b>Understand</b> the properties and behaviour in static conditions. Also, to understand the conservation laws applicable to fluids and its application through fluid kinematics and dynamics	K1
			CO2: <b>Estimate</b> 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	K2
			CO3: <b>Formulate</b> the relationship among the parameters involved in the given fluid phenomenon and to predict the performances of prototype by model studies	K4
			CO4: <b>Explain</b> the working principles of various turbines and design the various types of turbines	K4
			CO5: <b>Explain</b> the working principles of centrifugal, reciprocating and rotary pumps and design the centrifugal and reciprocating pumps	K4
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
II/III	ME3392	Engineering Materials and Metallurgy	CO1: <b>Explain</b> alloys and phase diagram, Iron-Iron carbon diagram and steel classification	K2
			CO2: <b>Explain</b> isothermal transformation, continuous cooling diagrams and different heat treatment processes	K2
			CO3: <b>Clarify</b> the effect of alloying elements on ferrous and non-ferrous metals	K3
			CO4: <b>Summarize</b> the properties and applications of non-metallic materials	K4
			CO5: <b>Explain</b> the testing of mechanical properties	K2

At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
II/III	ME3393	Manufacturing Processes	CO1: <b>Explain</b> the principle of different metal casting processes	K2
			CO2: <b>Describe</b> the various metal joining processes	K2
			CO3: <b>Illustrate</b> the different bulk deformation processes	K2
			CO4: <b>Apply</b> the various sheet metal forming process	K2
			CO5: <b>Apply</b> suitable molding technique for manufacturing of plastics components	K2
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
II/III	ME3381	Computer Aided Machine Drawing	CO1: <b>Use</b> drawing standards & Fits and tolerances	K1
			CO2: <b>Prepare</b> detailing and assembled drawings manually with drawing standards	K3
			CO3: <b>Prepare</b> standard drawing layout for modelled assemblies with BoM	K3
			CO4: <b>Model</b> orthogonal views of machine components	K3
			CO5: <b>Prepare</b> standard drawing layout for modelled parts	K3
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
II/III	ME3382	Manufacturing Technology Laboratory	CO1: <b>Demonstrate</b> the safety precautions exercised in the mechanical workshop	K4
			CO2: <b>Join</b> two metals using GMAW	K3
			CO3: <b>Make</b> the work piece as per given shape and size using machining process such as rolling, drawing, turning, shaping, drilling and milling	K3
			CO4: <b>Make</b> the gears using gear making machines	K3
			CO5: <b>Analyze</b> the defects in the cast and machined components	K6
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
II/III	GE3361	Professional Development	CO1: <b>Demonstrate</b> proficiency in creating and formatting professional documents using MS Word.	K3
			CO2: <b>Apply</b> advanced formatting, referencing, and document security features in MS Word.	K3
			CO3: <b>Utilize</b> MS Excel for data manipulation, statistical analysis, and visualization.	K3
			CO4: <b>Develop</b> and analyze structured data using MS Excel functions, pivot tables, and macros.	K4
			CO5: <b>Create</b> and deliver engaging presentations using MS PowerPoint with animations, media, and transitions.	K3
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
II/IV	ME3491	Theory of Machines	CO1: <b>Discuss</b> the basics of mechanism.	K2
			CO2: <b>Solve</b> problems on gears and gear trains.	K3
			CO3: <b>Examine</b> friction in machine elements.	K4
			CO4: <b>Calculate</b> static and dynamic forces of mechanisms.	K3
			CO5: <b>Calculate</b> the balancing masses and their locations of reciprocating and rotating masses. <b>Computing</b> the frequency of free vibration, forced vibration and damping coefficient.	K3
At the end of the course, students will able to:				

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YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
II/IV	ME3451	Thermal Engineering	CO1: <b>Apply</b> thermodynamic concepts to different air standard cycles and solve problems.	K3
			CO2: <b>Solve</b> problems in steam nozzle and calculate critical pressure ratio.	K3
			CO3: <b>Explain</b> the flow in steam turbines, draw velocity diagrams, flow in Gas turbines and solve problems.	K2 & K3
			CO4: <b>Explain</b> the functioning and features of IC engine, components and auxiliaries.	K2
			CO5: <b>Calculate</b> the various performance parameters of IC engines	K3
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
II/IV	ME3492	Hydraulics and Pneumatics	CO1: <b>Apply</b> the working principles of fluid power systems and hydraulic pumps.	K3
			CO2: <b>Apply</b> the working principles of hydraulic actuators and control components.	K3
			CO3: <b>Apply</b> principles to construct hydraulic circuits and systems.	K3
			CO4: <b>Apply</b> the working principles of pneumatic circuits and power system and its components.	K3
			CO5: <b>Identify</b> various troubles shooting methods in fluid power systems.	K4
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
II/IV	ME3493	Manufacturing Technology	CO1: <b>Apply</b> the mechanism of metal removal process and to identify the factors involved in improving machinability.	K3
			CO2: <b>Describe</b> the constructional and operational features of centre lathe and other special purpose lathes.	K2
			CO3: <b>Describe</b> the constructional and operational features of reciprocating machine tools.	K2
			CO4: <b>Apply</b> the constructional features and working principles of CNC machine tools.	K3
			CO5: <b>Demonstrate</b> the Program CNC machine tools through planning, writing codes and setting up CNC machine tools to manufacture a given component.	K4
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
II/IV	CE3491	Strength of Materials	CO1: <b>Understand</b> the concepts of stress and strain in simple and compound bars, the important of principal stresses and principal planes.	K2
			CO2: <b>Understand</b> the load transferring mechanism in beams and stress distribution due shearing force and bending moment.	K2
			CO3: <b>Apply</b> basic equation of torsion in designing of shafts and helical springs	K3
			CO4: <b>Calculate</b> slope and deflection in beams using different methods.	K3
			CO5: <b>Analyze</b> thin and thick shells for applied pressures.	K4
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
II/IV	GE3451	Environmental Sciences and Sustainability	CO1: <b>Recognize</b> and <b>Understand</b> the functions of environment, ecosystems and biodiversity and their conservation.	K2
			CO2: <b>Identify</b> the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.	K3
			CO3: <b>Identify</b> and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.	K3
			CO4: <b>Recognize</b> the different goals of sustainable development and apply them for suitable technological advancement and societal development.	K3
			CO5: <b>Demonstrate</b> the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.	K4

At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
II/IV	CE3481	Strength of Materials and Fluid Machinery Laboratory	CO1: <b>Determine</b> the tensile, torsion and hardness properties of metals by testing.	K4
			CO2: <b>Determine</b> the stiffness properties of helical and carriage spring.	K4
			CO3: <b>Apply</b> the conservation laws to determine the coefficient of discharge of a venturimeter and finding the friction factor of given pipe.	K3
			CO4: <b>Apply</b> the fluid static and momentum principles to determine the metacentric height and forces due to impact of jet.	K3
			CO5: <b>Determine</b> the performance characteristics of turbine, rotodynamic pump and positive displacement pump.	K4
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
II/IV	ME3461	Thermal Engineering Laboratory	CO1: <b>Analyze</b> valve timing, port timing, and p-v diagrams of IC engines.	K3
			CO2: <b>Conduct</b> performance tests on IC engines and compressors.	K4
			CO3: <b>Perform</b> heat balance and Morse tests on IC engines.	K4
			CO4: <b>Determine</b> refrigeration system performance and COP.	K4
			CO5: <b>Conduct</b> performance and energy balance tests on steam generators and turbines.	K4
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
III/V	ME3591	Design of Machine Elements	CO1: <b>Explain</b> the design machine members subjected to static and variable loads.	K2
			CO2: <b>Apply</b> the concepts design to shafts, key and couplings.	K3
			CO3: <b>Apply</b> the concepts of design to bolted, Knuckle, Cotter, riveted and welded joints.	K3
			CO4: <b>Apply</b> the concept of design helical, leaf springs, flywheels, connecting rods and crank shafts.	K3
			CO5: <b>Apply</b> the concepts of design and select sliding and rolling contact bearings, seals and gaskets.	K3
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
III/V	ME3592	Metrology and Measurements	CO1: <b>Discuss</b> the concepts of measurements to apply in various metrological instruments.	K2
			CO2: <b>Apply</b> the principle and applications of linear and angular measuring instruments, assembly and transmission elements.	K3
			CO3: <b>Apply</b> the tolerance symbols and tolerance analysis for industrial applications.	K3
			CO4: <b>Apply</b> the principles and methods of form and surface metrology.	K3
			CO5: <b>Apply</b> the advances in measurements for quality control in manufacturing Industries.	K3
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
III/V	CME384	Power Plant Engineering	CO1: <b>Explain</b> the layout, construction and working of the components inside a thermal power plant.	K2
			CO2: <b>Explain</b> the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power plants.	K2
			CO3: <b>Explain</b> the layout, construction and working of the components inside nuclear power plants.	K2
			CO4: <b>Explain</b> the layout, construction and working of the components inside Renewable energy power plants	K2
			CO5: <b>Explain</b> the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.	K3

At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
III/V	CME387	Non-Traditional Machining Processes	CO1: <b>List</b> different types of non-traditional machining processes and describe mechanical energy-based non-traditional machining processes.	K2
			CO2: <b>Illustrate</b> chemical and electro chemical energy based processes.	K3
			CO3: <b>Describe</b> thermo-electric energy-based processes.	K2
			CO4: <b>Interpret</b> nano finishing processes.	K4
			CO5: <b>Analyze</b> hybrid non-traditional machining processes and differentiate non- traditional machining processes.	K4
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
III/V	CME396	Process Planning and Cost Estimation	CO1: <b>Discuss</b> select the process, equipment and tools for various industrial products.	K3
			CO2: <b>Explain</b> the prepare process planning activity chart.	K2
			CO3: <b>Explain</b> the concept of cost estimation.	K2
			CO4: <b>Compute</b> the job order cost for different type of shop floor.	K3
			CO5: <b>Calculate</b> the machining time for various machining operations.	K3
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
III/V	MX3084	Disaster Risk Reduction and Management	CO1: <b>Impart</b> knowledge on the concepts of Disaster, Vulnerability and Disaster Risk reduction (DRR)	K2
			CO2: <b>Enhance</b> understanding on Hazards, Vulnerability and Disaster Risk Assessment prevention and risk reduction	K2
			CO3: <b>Develop</b> disaster response skills by adopting relevant tools and technology	K3
			CO4: <b>Enhance</b> awareness of institutional processes for Disaster response in the country	K2
			CO5: <b>Develop</b> rudimentary ability to respond to their surroundings with potential Disaster response in areas where they live, with due sensitivity	K3
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
III/V	ME3581	Metrology and Dynamics Laboratory	CO1: <b>Understand</b> and apply the principles of linear and angular measurements using various instruments.	K2
			CO2: <b>Perform</b> precision measurement of gears, threads, and surface characteristics.	K4
			CO3: <b>Operate</b> Coordinate Measuring Machines (CMM) and non-contact measurement systems for quality inspection.	K4
			CO4: <b>Analyze</b> the dynamic behavior of mechanical systems, including vibrations, governors, and gyroscopes.	K4
			CO5: <b>Analyze</b> mass moment of inertia, critical speed of shafts, and gear mechanisms in practical applications.	K4
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
III/VI	ME3691	Heat and Mass Transfer	CO1: <b>Apply</b> heat conduction equations to different surface configurations under steady state and transient conditions and solve problems..	K3
			CO2: <b>Apply</b> free and forced convective heat transfer correlations to internal and external flows through/over various surface configurations and solve problems.	K3
			CO3: <b>Explain</b> the phenomena of boiling and condensation, apply LMTD and NTU methods of thermal analysis to different types of heat exchanger configurations and solve problems.	K2 & K3
			CO4: <b>Explain</b> basic laws for Radiation and apply these principles to radiative heat transfer between different types of surfaces to solve problems.	K2 & K3
			CO5: <b>Apply</b> diffusive and convective mass transfer equations and correlations to solve problems for different applications.	K3

At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
III/VI	CME340	CAD/CAM	CO1: <b>Discuss</b> the basics of the design and concepts.	K2
			CO2: <b>Develop</b> the two dimensional drafting and projection views.	K3
			CO3: <b>Discuss</b> the three dimensional modeling, parametric and Non-parametric modeling	K2
			CO4: <b>Discuss</b> the assembly modeling and top down, bottom up approaches.	K2
			CO5: <b>Develop</b> the computer aided machining and wirting part programming.	K3
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
III/VI	CME344	Product Life Cycle Management	CO1: <b>Summarize</b> the history, concepts and terminology of PLM	K2
			CO2: <b>Develop</b> the functions and features of PLM/PDM	K3
			CO3: <b>Discuss</b> different modules offered in commercial PLM/PDM tools.	K2
			CO4: <b>Interpret</b> the implement PLM/PDM approaches for industrial applications.	K4
			CO5: <b>Integrate</b> PLM/PDM with legacy data bases, CAx& ERP systems	K4
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
III/VI	CME380	Automobile Engineering	CO1: <b>Recognize</b> the various parts of the automobile and their functions and materials.	K1
			CO2: <b>Discuss</b> the engine auxiliary systems and engine emission control.	K2
			CO3: <b>Distinguish</b> the working of different types of transmission systems.	K4
			CO4: <b>Explain</b> the Steering, Brakes and Suspension Systems.	K2
			CO5: <b>Predict</b> possible alternate sources of energy for IC Engines.	K4
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
III/VI	CME390	Thermal Power Engineering	CO1: <b>Describe</b> the properties of fuels and explain the process of proximate and ultimate analysis.	K2
			CO2: <b>Analyze</b> different types of boilers and compute their performance parameters.	K4
			CO3: <b>Calculate</b> the performance parameters of an air compressor.	K3
			CO4: <b>Apply</b> the working principles of various refrigeration systems and perform cop calculations.	K3
			CO5: <b>Analyze</b> the psychrometric properties and how they are utilized in arriving at calculations to determine heating loads.	K4
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
III/VI	OCS351	Artificial Intelligence and Machine Learning Fundamentals	CO1: <b>Understand</b> the foundations of AI and the structure of Intelligent Agents	K2
			CO2: <b>Use</b> appropriate search algorithms for any AI problem	K3
			CO3: <b>Study</b> of learning methods	K4
			CO4: <b>Solving</b> problem using Supervised learning	K3
			CO5: <b>Solving</b> problem using Unsupervised learning	K3

At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
III/VI	MX3089	Industrial Safety	CO1: <b>Understand</b> the basic concept of safety	K2
			CO2: <b>Obtain</b> knowledge of Statutory Regulations and standards	K1
			CO3: <b>Know</b> about the safety Activities of the Working Place	K1
			CO4: <b>Analyze</b> on the impact of Occupational Exposures and their Remedies	K4
			CO5: <b>Obtain</b> knowledge of Risk Assessment Techniques	K1
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
III/VI	ME3681	CAD/CAM Laboratory	CO1: <b>Understand</b> the fundamentals of CAD software, 3D geometric modeling techniques, and drafting.	K2
			CO2: <b>Develop</b> 3D solid and surface models using various modeling techniques.	K3
			CO3: <b>Create</b> and <b>Assemble</b> machine components using CAD software.	K3
			CO4: <b>Develop</b> and analyze manual part programming for CNC machining and turning operations.	K4
			CO5: <b>Generate</b> tool paths, post-process data, and apply Computer-Aided Process Planning (CAPP).	K4
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
III/VI	ME3682	Heat Transfer Laboratory	CO1: <b>Understand</b> the principles of heat conduction, convection, and radiation through experimental methods.	K3
			CO2: <b>Determine</b> the thermal conductivity of various materials and analyze their insulation properties.	K4
			CO3: <b>Determine</b> heat transfer coefficients under different convection conditions and boiling/condensation phenomena.	K4
			CO4: <b>Analyze</b> heat exchanger performance by determining friction factors and effectiveness.	K4
			CO5: <b>Develop</b> skills in experimental calibration of temperature sensors and radiation measurements.	K3
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
IV/VII	ME3791	Mechatronics and IOT	CO1: <b>Explain</b> and Select suitable sensors and actuators to develop mechatronics systems	K2
			CO2: <b>Discuss</b> and devise proper signal conditioning circuit for mechatronics systems and also implement PLC as a controller for an automated system	K3
			CO3: <b>Elucidate</b> the fundamentals of IoT and Embedded Systems	K2
			CO4: <b>Discuss</b> and Control I/O devices through Arduino and Raspberry Pi.	K3
			CO5: <b>Design</b> and <b>Develop</b> an apt mechatronics/IoT based system for the given real-time application.	K4
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
IV/VII	ME3792	Computer Integrated Manufacturing	CO1: <b>Discuss</b> the basics of computer aided engineering.	K2
			CO2: <b>Choose</b> appropriate automotive tools and material handling systems.	K3
			CO3: <b>Discuss</b> the overview of group technology, FMS and automation identification methods.	K2
			CO4: <b>Apply</b> computer-aided process planning for manufacturing various components.	K3
			CO5: <b>Acquire</b> knowledge in computer process control techniques.	K1

At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
IV/VII	GE3791	Human Values and Ethics	CO1: <b>Identify</b> the importance of democratic, secular and scientific values in harmonious functioning of social life	K1
			CO2: <b>Practice</b> democratic and scientific values in both their personal and professional life	K3
			CO3: <b>Find</b> rational solutions to social problems.	K4
			CO4: <b>Behave</b> in an ethical manner in society	K5
			CO5: <b>Practice</b> critical thinking and the pursuit of truth.	K3
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
IV/VII	GE3792	Industrial Management	CO1: <b>Discuss</b> basic concepts of management; approaches to management; contributors to management studies; various forms of business organization and trade unions function in professional organizations.	K2
			CO2: <b>Discuss</b> the planning; organizing and staffing functions of management in professional organization.	K2
			CO3: <b>Apply</b> the leading; controlling and decision making functions of management in professional organization.	K3
			CO4: <b>Discuss</b> the organizational theory in professional organization.	K2
			CO5: <b>Apply</b> principles of productivity and modern concepts in management in professional organization.	K3
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
IV/VII	OCS352	IOT concepts and applications	CO1: <b>Explain</b> the concept of IoT.	K2
			CO2: <b>Understand</b> the communication models and various protocols for IoT.	K2
			CO3: <b>Design</b> portable IoT using Arduino/Raspberry Pi /open platform	K3
			CO4: <b>Apply</b> data analytics and use cloud offerings related to IoT.	K3
			CO5: <b>Analyze</b> applications of IoT in real time scenario.	K4
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
IV/VII	OML351	Introduction to Non-Destructive Testing	CO1: <b>Realize</b> the importance of NDT in various engineering fields.	K2
			CO2: <b>Have</b> a basic knowledge of surface NDE techniques which enables to carry out various inspection in accordance with the established procedures.	K3
			CO3: <b>Calibrate</b> the instrument and inspect for in-service damage in the components by means of Eddy current testing as well as Thermography testing.	K4
			CO4: <b>Differentiate</b> various techniques of UT and AET and select appropriate NDT methods for better evaluation.	K4
			CO5: <b>Interpret</b> the results of Radiography testing and also have the ability to analyse the influence of various parameters on the testing.	K4
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
IV/VII	OIM353	Production Planning and Control	CO1: <b>Prepare</b> production planning and control act work study	K3
			CO2: <b>Prepare</b> product planning	K3
			CO3: <b>Prepare</b> production scheduling	K3
			CO4: <b>Prepare</b> Inventory Control.	K3
			CO5: <b>Plan</b> manufacturing requirements manufacturing requirement Planning (MRP II) and Enterprise Resource Planning (ERP).	K4

At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
IV/VII	ME3781	Mechatronics and IOT Laboratory	CO1: <b>Demonstrate</b> the measurement of physical parameters using transducers.	K3
			CO2: <b>Implement</b> motor control techniques using microcontrollers and PLCs.	K3
			CO3: <b>Develop</b> and <b>Execute</b> basic programs for microcontrollers in automation.	K4
			CO4: <b>Design</b> and <b>Analyze</b> hydraulic, pneumatic, and electro-pneumatic circuits.	K4
			CO5: <b>Apply</b> IoT concepts for remote control and data acquisition applications.	K3
At the end of the course, students will able to:				
YEAR/ SEM	COURSE CODE	COURSE NAME	COURSE OUTCOMES (CO)	KNOWLEDGE LEVEL
IV/VIII	ME3811	Project Work / Internship	CO1: <b>Identify</b> and <b>Define</b> real-world engineering problems through a systematic literature review and problem analysis.	K3
			CO2: <b>Develop</b> and <b>Implement</b> appropriate methodologies and strategies to solve complex technical problems.	K4
			CO3: <b>Demonstrate</b> teamwork, leadership, and communication skills while working collaboratively in a group project.	K3
			CO4: <b>Prepare</b> and present a comprehensive project report, including technical documentation and findings, in a professional manner.	K5
			CO5: <b>Defend</b> the project work effectively through oral presentations and viva voce examinations.	K6