

**DEPARTMENT  
OF  
MECHANICAL  
ENGINEERING**

# **2021 REGULATION**

**DEPARTMENT OF MECHANICAL ENGINEERING**  
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**PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

<b>PEO 1</b>	Effectuating success in careers by exploring with the design, digital and computational analysis of engineering systems, experimentation and testing, smart manufacturing, technical services, and research.
<b>PEO 2</b>	Amalgamating effectively with stakeholders to update and improve their core competencies and abilities to ethically compete in the ever-changing multicultural global enterprise
<b>PEO 3</b>	To encourage multi-disciplinary research and development to foster advanced technology, and to nurture innovation and entrepreneurship in order to compete successfully in the global economy.
<b>PEO 4</b>	To globally share and apply technical knowledge to create new opportunities that proactively advances our society through team efforts and to solve various challenging technical, environmental and societal problems
<b>PEO 5</b>	To create world class mechanical engineers capable of practice engineering ethically with a solid vision to become great leaders in academia, industries and society.

**PROGRAM OUTCOMES (POs)**

<b>PO1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO2</b>	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
<b>PO3</b>	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
<b>PO4</b>	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
<b>PO5</b>	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
<b>PO6</b>	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
<b>PO7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
<b>PO8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
<b>PO9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO10</b>	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give

	and receive clear instructions.
<b>PO11</b>	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
<b>PO12</b>	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

#### **PROGRAM SPECIFIC OUTCOMES (PSOs)**

<b>PSO1</b>	Apply the knowledge gained in Mechanical Engineering for design and development and manufacture of engineering systems.
<b>PSO2</b>	Apply the knowledge acquired to investigate research-oriented problems in mechanical engineering with due consideration for environmental and social impacts.
<b>PSO3</b>	Use the engineering analysis and data management tools for effective management of multidisciplinary projects.

# LIST OF COURSES

## REGULATION2021

<b>MECHANICAL ENGINEERING</b>		
<b>SEMESTER I</b>		
<b>S.NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>
1	IP3151	Induction Programme
<b>THEORY</b>		
2	HS3152	Professional English-I
3	MA3151	Matrices and Calculus
4	PH3151	Engineering Physics
5	CY3151	Engineering Chemistry
6	GE3151	Problem Solving and Python Programming
7	GE3152	Heritage of Tamils
<b>PRACTICALS</b>		
8	GE3171	Problem Solving and Python Programming Laboratory
9	BS3171	Physics and Chemistry Laboratory
10	GE3172	English Laboratory
<b>SEMESTER II</b>		
<b>S.NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>
<b>THEORY</b>		
1	HS3252	Professional English-II
2	MA3251	Statistics and Numerical Methods
3	PH3256	Physics for Information Science
4	BE3251	Basic Electrical and Electronics Engineering
5	GE3251	Engineering Graphics
6	CS3251	Programming in C
7	GE3252	Tamils and Technology
8		NCC Credit Course Level1 <sup>#</sup>
<b>PRACTICALS</b>		
9	GE3271	Engineering Practices Laboratory
10	CS3271	Programming in C Laboratory
11	GE3272	Communication Laboratory/Foreign Language
<b>SEMESTER III</b>		
<b>S.NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>
<b>THEORY</b>		
1	MA3351	Transforms and Partial Differential Equations
2	ME3351	Engineering Mechanics
3	ME3391	Engineering Thermodynamics
4	CE3391	Fluid Mechanics and Machinery
5	ME3392	Engineering Materials and Metallurgy

6	ME3393	Manufacturing Processes
<b>PRACTICALS</b>		
7	ME3381	Computer Aided Machine Drawing
8	ME3382	Manufacturing Technology Laboratory
9	GE3361	Professional Development\$
<b>SEMESTER IV</b>		
<b>S.NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>
<b>THEORY</b>		
1	ME3491	Theory of Machines
2	ME3451	Thermal Engineering
3	ME3492	Hydraulics and Pneumatics
4	ME3493	Manufacturing Technology
5	CE3491	Strength of Materials
6	GE3451	Environmental Sciences and Sustainability
<b>PRACTICALS</b>		
7	CE3481	Strength of Materials and Fluid Machinery Laboratory
8	ME3461	Thermal Engineering Laboratory
<b>SEMESTER V</b>		
<b>S.NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>
<b>THEORY</b>		
1	ME3591	Design of Machine Elements
2	ME3592	Metrology and Measurements
3	CME386	Gas Dynamics and Jet Propulsion
4	CME384	Power Plant Engineering
5	CME387	Non-traditional Machining Processes
<b>PRACTICALS</b>		
6	ME3781	Mechatronics and Io T Laboratory
<b>SEMESTER VI</b>		
<b>S.NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>
<b>THEORY</b>		
1	ME3691	Heat and Mass Transfer
2		Professional Elective IV
3		Professional Elective V
4		Professional Elective VI
5		Professional Elective VII
6		Open Elective – I
7		Mandatory Course-II&
8		NCC Credit Course Level 3#
<b>PRACTICALS</b>		
9	ME3681	CAD/CAM Laboratory
10	ME3611	Heat Transfer Laboratory
<b>SEMESTER VII / VIII</b>		
<b>S.NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>
<b>THEORY</b>		

1	ME3791	Mechatronics and IoT
2	ME3792	Computer Integrated Manufacturing
3	GE3791	Human Values and Ethics
4	GE3792	Industrial Management
5		Open Elective – II
6		Open Elective – II
7		Open Elective – IV
<b>PRACTICALS</b>		
8	ME3781	Mechatronics and IoT Laboratory
9	ME3711	Summer Internship#
<b>SEMESTER VIII /VII</b>		
<b>S.NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>
<b>PRACTICALS</b>		
1	ME3811	Project Work / Internship

## COURSE OUTCOME FOR MECHANICAL ENGINEERING

<b>DEGREE</b>	<b>U.G</b>
<b>PROGRAMME</b>	<b>B.E.– MECHANICAL ENGINEERING</b>
<b>ACADEMIC YEAR</b>	<b>2022-23</b>
<b>REGULATION</b>	<b>2021</b>

SEMESTER-01		
1.Course Code and Name: HS3152- PROFESSIONAL ENGLISH-I		
	CO Statements	Knowledge Level
At the end of the course, learners will be able		
1	To use appropriate words in a professional context	K2
2	To gain understanding of basic grammatical structures and use them in right context.	K2
3	To read and infer the denotative and connotative meanings of technical texts	K2
4	To read and interpret information presented in tables, charts and other graphic forms	K3
5	To write definitions, descriptions, narrations and essays on various topics	K4
2.Course Code and Name: MA3151-MATRICES AND CALCULUS		
	CO Statements	Knowledge Level
At the end of the course the students will be able to		
1	Use the matrix algebra methods for solving practical problems.	K3
2	Apply differential calculus tools in solving various application problems.	K3
3	Able to use differential calculus ideas on several variable functions.	K3
4	Apply different methods of integration in solving practical problems.	K3
5	Apply multiple integral ideas in solving areas, volumes and other practical problems.	K3
3.Course Code and Name: PH3151-ENGINEERING PHYSICS		
	CO Statements	Knowledge Level
After completion of this course, the students should be able to		
1	Understand the importance of mechanics.	K2
2	Express their knowledge in electromagnetic waves.	K2
3	Demonstrate a strong foundational knowledge in oscillations, optics and lasers.	K3
4	Understand the importance of quantum physics.	K2
5	Comprehend and apply quantum mechanical principles towards the formation of energy bands.	K3
4.Course Code and Name :CY3151-ENGINEERING CHEMISTRY		
	CO Statements	Knowledge Level
At the end of the course, the students will be able:		



1	To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.	K2
2	To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nonmaterial's for engineering and technology applications.	K2
3	To apply the knowledge of phase rule and composites for material selection requirements.	K2
4	To recommend suitable fuels for engineering processes and applications.	K2
5	To recognize different forms of energy resources and apply them for suitable applications in energy sectors.	K2

**5.Course Code and Name: GE3151-PROBLEM SOLVING AND PYTHON PROGRAMMING**

	<b>CO Statements</b>	<b>Knowledge Level</b>
Upon completion of the course, students will be able to		
1	Develop algorithmic solutions to simple computational problems	K2
2	Develop and execute simple Python programs.	K3
3	Implement programs in Python using conditionals and loops for solving problems.	K3
4	Deploy functions to decompose a Python program.	K3
5	Process compound data using Python data structures.	K3
6	Utilize Python packages in developing software applications.	

**6.Course Code and Name:BS3171-PHYSICS AND CHEMISTRY LABORATORY**

	<b>CO Statements</b>	<b>Knowledge Level</b>
Upon completion of the course, the students should be able to		
1	Understand the functioning of various physics laboratory equipment.	K2
2	Use graphical models to analyze laboratory data.	K3
3	Use mathematical models as a medium for quantitative reasoning and describing physical reality. .	K3
4	Access, process and analyze scientific information.	K3,K4
5	Solve problems individually and collaboratively.	K3
6	To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and do.	K4
7	To determine the amount of metal ions through volumetric and spectroscopic techniques	K5
8	To analyse and determine the composition of alloys.	K4
9	To learn simple method of synthesis of nanoparticles	K3
10	To quantitatively analyse the impurities in solution by electro analytical techniques	K4

**7.Course Code and Name:GE3172-ENGLISH LABORATORY**

	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course, learners will be able		
1	To listen to and comprehend general as well as complex academic information	K2
2	To listen to and understand different points of view in a discussion	K3
3	To speak fluently and accurately in formal and informal communicative contexts	K3
4	To describe products and processes and explain their uses and purposes clearly and accurately	K3

5	To express their opinions effectively in both formal and informal discussions	K3
<b>8.Course Code and Name: GE3171-PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
On completion of the course, students will be able to:		
1	Develop algorithmic solutions to simple computational problems	K6
2	Develop and execute simple Python programs.	K6
3	Implement programs in Python using conditionals and loops for solving problems.	K6
4	Deploy functions to decompose a Python program.	K6
5	Process compound data using Python data structures.	K3
6	Utilize Python packages in developing software applications.	K3
<b>SEMESTER 02</b>		
<b>1.Course Code and Name :HS3252-PROFESSIONAL ENGLISH - II</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course, learners will be able		
1	To compare and contrast products and ideas in technical texts.	K2
2	To identify and report cause and effects in events, industrial processes through technical texts	K2
3	To analyse problems in order to arrive at feasible solutions and communicate them in the written format.	K2
4	To present their ideas and opinions in a planned and logical manner	K3
5	To draft effective resumes in the context of job search.	K3
<b>2.Course Code and Name:MA3251-STATISTICSAND NUMERICAL METHODS</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
Upon successful completion of the course, students will be able to:		
1	Apply the concept of testing of hypothesis for small and large samples in real life problems	K3
2	Apply the basic concepts of classifications of design of experiments in the field of agriculture.	K3
3	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.	K3
4	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.	K3
5	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.	K3
<b>3.Course Code and Name: PH3251–MATERIALS SCIENCE</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course, the students should be able to		
1	Know basics of crystallography and its importance for varied materials properties	K2
2	Gain knowledge on the electrical and magnetic properties of materials and their applications	K2
3	Understand clearly of semiconductor physics and functioning of semiconductor devices	K2

4	Understand the optical properties of materials and working principles of various optical devices	K2
5	Appreciate the importance of functional nano electronic devices.	K2
<b>4..Course Code and Name:BE3251-BASICELECTRICAL AND ELECTRONICS ENGINEERING</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
After completing this course, the students will be able to		
1	Compute the electric circuit parameters for simple problems	K5
2	Explain the working principle and applications of electrical machines.	K1
3	Analyze the characteristics of analog electronic devices	K4
4	Explain the basic concepts of digital electronics	K1
5	Explain the operating principles of measuring instruments	K1
<b>5.Course Code and Name:GE3251-ENGINEERING GRAPHICS</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
On successful completion of this course, the student will be able to		
1	Use BIS conventions and specifications for engineering drawing.	K2
2	Construct the conic curves, involutes and cycloid.	K3
3	Solve practical problems involving projection of lines.	K5
4	Draw the orthographic, isometric and perspective projections of simple solids	K2
5	Draw the development of simple solids.	K6
<b>6.Course Code and Name:GE3271-ENGINEERING PRACTICES LABORATORY</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
Upon completion of this course, the students will be able to:		
1	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.	K6
2	Wire various electrical joints in common household electrical wire work.	K6
3	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 equipments; Make a tray out of metal sheet using sheet metal work.	K6
4	Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.	K6
<b>7.Course Code and Name: BE3271-BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
After completing this course, the students will be able to		
1	Use experimental methods to verify the Ohm's and Kirchhoff's Laws	K6
2	Analyze experimentally the load characteristics of electrical machines	K6
3	Analyze the characteristics of basic electronic devices	K6
4	Use DSO to measure the various parameters	K6
<b>8.Course Code and Name:GE3272- COMMUNICATION LABORATORY/FOREIGN LANGUAGE</b>		

	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course, learners will be able		
1	Speak effectively in group discussions held in a formal/semi formal contexts.	K6
2	Discuss, analyse and present concepts and problems from various perspectives to arrive at suitable solutions	K6
3	Write emails, letters and effective job applications	K6
4	Write critical reports to convey data and information with clarity and precision	K6
5	Give appropriate instructions and recommendations for safe execution of tasks	K6
<b>Semester 3</b>		
<b>1. Course Code and Name: MA3351 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
Upon successful completion of the course, students should be able to:		
1	Understand how to solve the given standard partial differential equations.	K2
2	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.	K3
3	Appreciate the physical significance of Fourier series techniques in solving one- and two dimensional heat flow problems and one-dimensional wave equations.	K3
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.	K2
5	Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems	K3
<b>2. Course Code and Name:ME3351 ENGINEERING MECHANICS</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course the students would be able to		
1	Illustrate the vector and scalar representation of forces and moments	K2
2	Analyze the rigid body in equilibrium	K4
3	Evaluate the properties of distributed forces	K5
4	Determine the friction and the effects by the laws of friction	K5
5	Calculate dynamic forces exerted in rigid body	K5
<b>3. Course Code and Name:ME3391 ENGINEERING THERMODYNAMICS</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course the students would be able to		
1	Apply the zeroth and first law of thermodynamics by formulating temperature scales and calculating the property changes in closed and open engineering systems.	K3
2	Apply the second law of thermodynamics in analyzing the performance of thermal devices through energy and entropy calculations	K6
3	Apply the second law of thermodynamics in evaluating the various properties of steam through steam tables and Mollier chart	K3
4	Apply the properties of pure substance in computing the macroscopic properties of ideal and real gases using gas laws and appropriate thermodynamic relations	K2

5	Apply the properties of gas mixtures in calculating the properties of gas mixtures and applying various thermodynamic relations to calculate property changes.	K3
<b>4. Course Code and Name:CE3391 FLUID MECHANICS AND MACHINERY</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
On completion of the course, the student is expected to be able to		
1	Understand the properties and behavior in static conditions. Also, to understand the conservation laws applicable to fluids and its application through fluid kinematics and dynamics	K3
2	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	K3
3	Formulate the relationship among the parameters involved in the given fluid phenomenon and to predict the performances of prototype by model studies	K4
4	Explain the working principles of various turbines and design the various types of turbines.	K4
5	Explain the working principles of centrifugal, reciprocating and rotary pumps and design the centrifugal and reciprocating pumps	K3
<b>5. Course Code and Name:ME3392 ENGINEERING MATERIALS AND METALLURGY</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course the students would be able to		
1	Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification	K2
2	Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.	K2
3	Clarify the effect of alloying elements on ferrous and non-ferrous metals.	K4
4	Summarize the properties and applications of non-metallic materials.	K2
5	Explain the testing of mechanical properties.	K2
<b>6. Course Code and Name: ME3392 ENGINEERING MATERIALS AND METALLURGY</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course the students would be able to		
1	Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification	K2
2	Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.	K2
3	Clarify the effect of alloying elements on ferrous and non-ferrous metals.	K4
4	Summarize the properties and applications of non-metallic materials.	K2
5	Explain the testing of mechanical properties.	K2
<b>7. Course Code and Name:ME3393 MANUFACTURING PROCESSES</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>

At the end of the course the students would be able to		
1	Explain the principle of different metal casting processes	K2
2	Describe the various metal joining processes.	K4
3	Illustrate the different bulk deformation processes.	K2
4	Apply the various sheet metal forming process	K3
5	Apply suitable molding technique for manufacturing of plastics components.	K3
<b>8. Course Code and Name:ME3381COMPUTER AIDED MACHINE DRAWING</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course the students would be able to		
1	Prepare standard drawing layout for modeled assemblies with BoM	K3
2	Model orthogonal views of machine components.	K3
3	Prepare standard drawing layout for modeled parts	K2
<b>9. Course Code and Name:ME3382 MANUFACTURING TECHNOLOGY LABORATORY</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course the students would be able to		
1	Demonstrate the safety precautions exercised in the mechanical workshop and join two metals using GMAW.	K4
2	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.	K5
3	The students become make the gears using gear making machines and analyze the defects in the cast and machined components	K5
<b>10. Course Code and Name:GE3361 PROFESSIONAL DEVELOPMENT</b>		
On successful completion the students will be able to		
	<b>CO Statements</b>	<b>Knowledge Level</b>
1	Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements	K3
2	Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding	K4
3	Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.	K3
<b>Semester 4</b>		
<b>1. Course Code and Name:ME3491 THEORY OF MACHINES</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course the students would be able to		
1	Discuss the basics of mechanism	K4

2	Solve problems on gears and gear trains	K3
3	Examine friction in machine elements	K2
4	Calculate static and dynamic forces of mechanisms.	K3
5	Calculate the balancing masses and their locations of reciprocating and rotating masses. Computing the frequency of free vibration, forced vibration and damping coefficient.	K3

### 2. Course Code and Name:ME3451 THERMAL ENGINEERING

	CO Statements	Knowledge Level
At the end of the course the students would be able to		
1	Apply thermodynamic concepts to different air standard cycles and solve problems.	K3
2	To solve problems in steam nozzle and calculate critical pressure ratio.	K3
3	Explain the flow in steam turbines, draw velocity diagrams, flow in Gas turbines and solve problems.	K2
4	Explain the functioning and features of IC engine, components and auxiliaries.	K2
5	Calculate the various performance parameters of IC engines	K4

### 3. Course Code and Name:ME3492 HYDRAULICS AND PNEUMATICS

	CO Statements	Knowledge Level
At the end of the course the students would be able to		
1	Apply the working principles of fluid power systems and hydraulic pumps.	K3
2	Apply the working principles of hydraulic actuators and control components.	K3
3	Design and develop hydraulic circuits and systems	K5
4	Apply the working principles of pneumatic circuits and power system and its components	K3
5	Identify various troubles shooting methods in fluid power systems.	K3

### 4. Course Code and Name:ME3493 MANUFACTURING TECHNOLOGY

	CO Statements	Knowledge Level
At the end of the course the students would be able to		
1	Apply the mechanism of metal removal process and to identify the factors involved in improving machinability.	K3
2	Describe the constructional and operational features of center lathe and other special purpose lathes.	K4
3	Describe the constructional and operational features of reciprocating machine tools	K4
4	Apply the constructional features and working principles of CNC machine tools.	K3



5	Demonstrate the Program CNC machine tools through planning, writing codes and setting up CNC machine tools to manufacture a given component.	K2
<b>5. Course Code and Name: CE3491 STRENGTH OF MATERIALS</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course the students would be able to		
1	Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes.	K2
2	Understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment.	K2
3	Apply basic equation of torsion in designing of shafts and helical springs	K3
4	Calculate slope and deflection in beams using different methods	K4
5	Analyze thin and thick shells for applied pressures.	K4
<b>6. Course Code and Name: GE3451 ENVIRONMENTAL SCIENCES AND SUSTAINABILITY</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course the students would be able to		
1	To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.	K2
2	To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.	K3
3	To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.	K3
4	To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.	K3
5	To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.	K3
<b>7. Course Code and Name: CE 3481 STRENGTH OF MATERIALS AND FLUID MACHINERY LABORATORY</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
On completion of the course, the student is expected to be able to		
1	Determine the tensile, torsion and hardness properties of metals by testing	K2
2	Determine the stiffness properties of helical and carriage spring	K2
3	Apply the conservation laws to determine the coefficient of discharge of a venturimeter and finding the friction factor of given pipe	K3
4	Apply the fluid static and momentum principles to determine the metacentric height and forces due to impact of jet	K3
5	Determine the performance characteristics of turbine, rot dynamic pump and positive displacement pump.	K2
<b>8. Course Code and Name: ME 3461 THERMAL ENGINEERING LABORATORY</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>



At the end of the course the students would be able to		
1	Conduct tests to evaluate performance characteristics of IC engines	K4
2	Conduct tests to evaluate the performance of refrigeration cycle	K4
3	Conduct tests to evaluate Performance and Energy Balance on a Steam Generator.	K4
<b>Semester 5</b>		
<b>1. Course Code and Name: ME3591 DESIGN OF MACHINE ELEMENTS</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course the students would be able to		
1	Explain the design machine members subjected to static and variable loads.	K2
2	Apply the concepts design to shafts, key and couplings.	K3
3	Apply the concepts of design to bolted, Knuckle, Cotter, riveted and welded joints	K3
4	Apply the concept of design helical, leaf springs, flywheels, connecting rods and crank shafts	K3
5	Apply the concepts of design and select sliding and rolling contact bearings, seals and gaskets.	K3
<b>2. Course Code and Name: ME3592 METROLOGY AND MEASUREMENTS</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course the students would be able to		
1	Discuss the concepts of measurements to apply in various metrological instruments	K4
2	. Apply the principle and applications of linear and angular measuring instruments, assembly and transmission elements.	K3
3	Apply the tolerance symbols and tolerance analysis for industrial applications.	K3
4	Apply the principles and methods of form and surface metrology.	K3
5	Apply the advances in measurements for quality control in manufacturing Industries.	K3
<b>3. Course Code and Name : CME386 GAS DYNAMICS AND JET PROPULSION</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course the students would be able to		
1	Apply the fundamentals of compressible flow concepts and the use of gas tables.	K3
2	Analyze the compressible flow behavior in constant area ducts.	K4
3	Analyze the development of shock waves and its effects.	K4
4	Explain the types of jet engines and their performance parameters	K5
5	Explain the types of rocket engines and their performance parameters.	K5
<b>4. Course Code and Name : CME384 POWER PLANT ENGINEERING</b>		

	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course the students would be able to		
1	At the end of the course the students would be able to 1. Explain the layout, construction and working of the components inside a thermal power plant	K5
2	Explain the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power plants	K5
3	Explain the layout, construction and working of the components inside nuclear power plants.	K5
4	Explain the layout, construction and working of the components inside Renewable energy power plants	K5
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.	K5

### **5. Course Code and Name: CME387 NON-TRADITIONAL MACHINING PROCESSES**

	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course the students would be able to		
1	Formulate different types of non-traditional machining processes and evaluate mechanical energy based non-traditional machining processes.	K2
2	Illustrate chemical and electro chemical energy based processes.	K2
3	Evaluate thermo-electric energy based processes.	K2
4	Interpret nano finishing processes.	K2
5	Analyse hybrid non-traditional machining processes and differentiate non-traditional machining processes.	K4

### **6. Course Code and Name: MX3084 DISASTER RISK REDUCTION AND MANAGEMENT**

	<b>CO Statements</b>	<b>Knowledge Level</b>
1	To impart knowledge on the concepts of Disaster, Vulnerability and Disaster Risk reduction (DRR)	K4
2	To enhance understanding on Hazards, Vulnerability and Disaster Risk Assessment prevention and risk reduction	K4
3	To develop disaster response skills by adopting relevant tools and technology	K6
4	Enhance awareness of institutional processes for Disaster response in the country	K2
5	Develop rudimentary ability to respond to their surroundings with potential Disaster response in areas where they live, with due sensitivity	K3

### **7. Course Code and Name: ME3581 METROLOGY AND DYNAMICS LABORATORY**

	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course the students would be able to		
1	The students able to measure the gear tooth dimensions, angle using sine bar, and straightness.	K2
2	Determine mass moment of inertia of mechanical element, governor effort and range of sensitivity.	K5
3	Determine the natural frequency and damping coefficient, critical speeds of shafts	K5