SAPTHAGIRI
College of Engineering
Creating Tomorrow

Sapthagiri College of Engineering

(Affiliated to Visvesvaraya Technological University, Belagavi & Approved by AICTE, New Delhi)
#14/5, Chikkasandra, Hesaraghatta Main Road, Bengaluru – 560057
Phone: 080-28372800/1/2 www.sapthagiri.edu.in Fax: 080-28372797

Department of Mechanical Engineering

1.3.1 Institution integrates cross-cutting issues relevant to Gender, Environment and Sustainability, Human Values and Professional Ethics into the Curriculum

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

The program educational objectives of Bachelor of Engineering in Mechanical at Sapthagiri College of Engineering are broadly defined on following four counts.

PEO 1: Employability: An ability to contribute to industrial services and/or government organizations by applying their skills through formal education and co-operative educational experiences.

PEO 2: Core Competence: An ability to apply Scientific, Mathematics and Engineering fundamentals gained to comprehend, analyze, design and create novel products and solutions for real life problems.

PEO 3: Professionalism: An ability to embrace professional and ethical attitude/effective communication skills, team skills, multidisciplinary approach to resolve problems and inform, educate and persuade diversified audiences.

PEO 4: Learning Environment & Socialism: A skill to update knowledge with emerging technologies by professional communities, higher education to nourish ever-developing careers and to strengthen human values and social responsibilities to contribute towards society.

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PROGRAM SPECIFIC OUTCOMES (PSO)

At the end of the B.E Mechanical engineering program, the students are expected to have developed the following program specific outcomes.

PSO 1: Expertise in specialized areas of Mechanical Engineering such as Design, Thermal, Materials and Manufacturing Engineering with a focus on research and innovation.

PSO 2: Ability of problem solving by adopting analytical, numerical and experimental skills with awareness of societal impact for mechanical engineering.

PROGRAM OUTCOMES (POs)

Program outcomes are narrower statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge and behavior. Graduation of **Bachelor of Mechanical Engineering** program at Sapthagiri College of Engineering will attain the following program outcomes **in the field of Mechanical.**

PO 1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3. Design/development of solutions: 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.

PO 4. Conduct investigations of complex problems: 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.

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PO 5. Modern tool usage: 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.

PO 6. The engineer and society: 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.

PO 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10. Communication: 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.

PO 11. Project management and finance: 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.

PO 12. Life-long learning: 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.

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Courses that integrates with Gender, Environment and Sustainability, Human Values and Professional Ethics into the Curriculum.

Sl. No.	Subject	Subject Code	Curriculum	Deployment Strategy and Tool	PO	PSO	CO	Cross-cutting issues integrated
1	MATERIAL SC. & METALLURGY	15ME32A	Empower students to basic knowledge of materials crystal structure, Describe the role of heat treatment on various materials and their properties	Chalk and Talk method PPT	PO 1,2,3,5,6,7,8, 12	PSO, 1,2	C0-(1-5)	**Environmental Sustainability, Professional Ethics**
2	BASIC THERMODYNAMICS	15ME33	Able to determine heat and work interactions in different thermodynamic systems' Able to apply first and second law of thermodynamics for work and heat interactions	Chalk and Talk method PPT	PO 1,2, 7,8,9, 12	PSO, 1,2	CO-(1-6)	**Human Values, Professional Ethics**
3	MECHANICS OF MATERIALS	15ME34	Introduce the students with the basic concepts stress, strain and elastic modulus and their role in mechanical deformation and failure. Bring the ability in students to find the magnitude and direction of location of principal stresses in engineering components.	Chalk and Talk method PPT	PO 1,2,3,4,8,9,11	PSO, 1,2	CO-(1-5)	**Human Values, Professional Ethics**

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4	METAL CASTING AND WELDING	15ME35A	Students understanding the concepts of sand moulding and Moulding process,	Chalk and Talk method PPT	PO 1,2,3,5,,9,10, 12	PSO, 1,2	CO-(1-5)	**Human Values, Professional Ethics**
5	MECHANICAL MEASUREMENTS & METROLOGY	15ME36B	Understand concept and principles measurement, standards, metrology and measuring instruments. Impart the knowledge of limits ,fits, tolerances and comparators	Chalk and Talk method PPT	PO 1,2,3,4, 6, 7, 8,11,12	PSO, 1,2	C0-(1-5)	**Human Values, Professional Ethics**
6	COMPUTER AIDED MACHINE DRAWING	15ME36A	CAD software and its features. To familiarize the students with Indian Standards on drawing practices. To impart knowledge of thread forms, fasteners, keys, joints and couplings.	Chalk and Talk method PPT	PO 1,2,3,4,5,6,7,8, 9,10	PSO, 1,2	CO-(1-4)	**Human Values, Professional Ethics**
7	METALLOGRAPHY & MATERIAL TESTING LAB	15MEL37A	Empower the students to test the materials for finding properties.	Chalk and Talk method	PO 1,2,3,5,6,7	PSO, 1,2	CO-(1-4)	**Human Values, Professional Ethics**
8	MECH. MEASUREMENTS & METROLOGY LAB	15MEL37B	Ability to measure the mechanical components	Chalk and Talk method	PO 1,2,3,5,8,11,12	PSO, 1,2	CO-(1-3)	**Human Value and Professional ethics**
9	FOUNDRY & FORGING LAB	15ME38A	Ability to learn casting and forging operation.	Demonstration	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-3)	**Environmental Sustainability**

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10	MACHINE SHOP	15MEL38B	Ability of the students operate various mechanical machines	Chalk and Talk method PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-3)	**Human Values, Professional Ethics**
11	Constitution Of India, Professional Ethics And Human Rights	17CPH39/49	Understand Engineering & Professional ethics and responsibilities of Engineers.	Chalk and Talk method PPT	PO 1,2,3,4,6,8,11, 12	PSO, 1,2	CO-(1-5)	**Human Values, Professional Ethics**
12	KINEMATICS OF MACHINES	15ME42	Empowering students to understand mechanism.	Chalk and Talk method PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-5)	**Human Values, Professional Ethics**
13	APPLIED THERMODYNAMICS	15ME43	Students can gain the knowledge of Propulsion systems and determine performance parameters of Gas Power Cycles.. Students able to analyse the performance parameters of Vapour Power Cycles.	Chalk and Talk method PPT	PO 1,2,3,7,8,11,12	PSO1,2	CO-(1-6)	**Human Values, Professional Ethics**
14	FLUID MECHANICS	15ME44	Empower the students with conditions for stability of floating and submerged vessels in fluid. properties of fluids	Chalk and Talk method PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-4)	**Environmental Sustainability**
15	MACHINE TOOLS OPERATION	15ME45B	Students must be in a position to explain the classification of machines.	Chalk and Talk method PPT	PO 1,2,3,4,5,9,10, 12	PSO, 1,2	CO-(1-5)	**Human Values, Professional Ethics**

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16	MANAGEMENT AND ENGINEERING ECONOMICS	15ME51	Empower students through the concepts of Management and Engineering economics Students able to understand various functions of management.	Chalk and Talk method PPT	PO 1,2,3,4,5,7,8, 11,12	PSO, 1,2	CO-(1-6)	**Human Values, Professional Ethics**
17	DYNAMICS OF MACHINES	15ME52	Understand concept and principles behind analysis of components of mechanisms. Analyze forces in components of mechanisms Analyze various components of mechanisms for balancing. Analyze various characteristics of the governor and gyroscope.	Chalk and Talk method You Tube PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-5)	**Human Values, Professional Ethics**
18	TURBO MACHINES	15ME53	To provide basic knowledge of the parts and working principle of turbo machine. Determine various parameters comparing model with proto type using Dimensionless numbers	Chalk and Talk method You tube PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-6)	**Human Value and Professional ethics**
19	DESIGN OF MACHINE ELEMENTS I	15ME54	Student need to understand the mechanical design procedure. Student able to choose the materials for machine components Student to apply the codes and standards in design process.	Chalk and Talk method PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-5)	**Human Values, Professional Ethics**

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20	NON TRADITIONAL MACHINNIG	15ME554	To know the various different types of Non-Traditional machining processes and their selection parameters. Describe the concepts of USM, AJM and WJM with their advantages, limitations & applications	Chalk and Talk method PPT	PO 1,2,4,6,8,10,12	PSO, 1,2	CO-(1-5)	**Human Values, Professional Ethics**
21	TOTAL QUALITY OF MANAGMENT	15ME563	Empower students through the concepts of Principle and Application of Total Quality Management in Organizations. Students will able to understand the Quality, Roles of Leaders and Principles of Leadership.	Chalk and Talk method PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-5)	**Human Values, Professional Ethics**
22	FLUID MECHANICS & MACHINES LAB	15MEL57	Empower the students to understand basic principle of fluid mechanics	Demonstration	PO 1,2,3,5,8,11,12	PSO, 1,2	CO-(1-4)	**Human Values, Professional Ethics**
23	ENERGY CONVERSION ENGG. LAB	15MEL58	Ability to calculate performance calculations of engines.	Demonstration	PO 1,2,3,5,8,11,12	PSO, 1,2	CO-(1-6)	**Environmental Sustainability**
24	FINITE ELEMENT METHODS	15ME61	Students able to understand the basics of finite element formulation methods. Students able to apply finite element formulation and determine structural behavior of beams and shaft.	Chalk and Talk method PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-6)	**Human Value and Professional ethics**

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25	COMPUTER INTEGRATED MANUFACTURING	15ME62	Impart the knowledge of automated manufacturing systems and mathematical model to analyze the different types of automated flow lines. Students will able to understand the different types of manufacturing planning and control system using graphics software.	Chalk and Talk method PPT	PO 1,2,3,4,9,11,12	PSO, 1,2	CO-(1-6)	**Human Value and Professional ethics**
26	HEAT & MASS TRANSFER	15ME63	able to determine the conduction heat transfer of steady and unsteady state. to analyze the radiation heat transfer by applying fundamental laws	Chalk and Talk method PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-6)	**Environmental Sustainability**
27	DESIGN OF MACHINE ELEMENTS II	15ME64	Students will be able to compute the stresses in curved beams of different cross sections and thick & thin cylinders. Describe wire ropes and chains with the design of flat and V-belts for power transmission	Chalk and Talk method PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-6)	**Human Value and Professional ethics**
28	AUTOMOBILE ENGINEERING	15ME655	Understand concepts and working of principal parts of an automobile To provide basic knowledge on working of transmission and brake systems	PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-6)	**Human Value and Professional ethics**

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29	HEAT & MASS TRANSFER LAB	15MEL67	Ability to learn heat and mass transfer methods calculation.	Demonstration	PO 1,2,3,5,8,11,12	PSO, 1,2	CO-(1-6)	**Human Value and Professional ethics**
30	CAMA LAB	15MEL68	Empowering the students to learn FEA software to solve engineering problems.	Demonstration	PO 1,2,3,5,8,11,12	PSO, 1,2	CO-(1-4)	**Human Value and Professional ethics**
31	ENERGY ENGINNERING	15ME71	Students will able to understand the study of energy resources. Students will able to understand the study pulverized fuel and ash handling process..	Chalk and Talk method PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-6)	**Environmental Sustainability Human Value and Professional ethics**
32	HYDRAULICS AND PNEUMATICS	15ME72	Understand concept, components and principles of hydraulic systems. Describe the different parts and types of pumps and actuators.	Chalk and Talk method PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-5)	**Human Value and Professional ethics**
33	CONTROL ENGINEERING	15ME73	Students will understand the fundamentals of control system and its applications Gain the knowledge on the system governing equation for physical equation of mechanical and electrical systems	Chalk and Talk method PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-6)	**Human Value and Professional ethics**
34	TRIBOLOGY	15ME744	Empower students through the concepts of tribology Students able to understand various types of bearing and their working	Chalk and Talk method PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-5)	**Human Value and Professional ethics**

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35	MECHATRONICS	15ME753	Impart the knowledge of Evolution, Design of mechatronics, sensors and transducers and its types. Students will able to understand the details of architecture of Microprocessor and Microcontroller.	Chalk and Talk method PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-5)	**Human Value and Professional ethics**
36	PROJECT PHASE-1	15ME78P	Apply engineering, management and ethical principles for Project management and finance. Understand the impact of the engineering solutions in societal and environmental contexts for Sustainable development with commit to professional ethics.	PPT	PO 1,2,3,5, 7,8,11,12	PSO, 1,2	CO-(1-5)	**Human Value and Professional ethics**
37	OPERATION RESEARCH	15ME81	Empower students through the concepts of operations research. Describe the role of operations research in the decision making process and perform calculations in regard to maximize the profit.	Chalk and Talk method PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-4)	**Human Value and Professional ethics**
38	ADDITTIVE MANUFACTURING	15ME82	Empower students through the concepts of additive manufacturing Students able to understand various functions systems ,drives, actuators.	Chalk and Talk method PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-5)	**Human Value and Professional ethics**

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39	PRODUCT LIFE CYCLE MANAGEMENT	15ME835	To know the various strategies of PLM and Product Data Management. Students able to understand the decomposition of product design and model simulation.	Chalk and Talk method PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-6)	**Human Value and Professional ethics**
40	DESIGN LAB	15MEL76	Students able to understand design concepts through experiments	Demonstration	PO 1,2,3,5,8,11,12	PSO, 1,2	CO-(1-6)	**Human Value and Professional ethics**
41	CIM AND AUTOMATION LAB	15MEL77	Students to learn CNC programming language	Demonstration	PO 1,2,3,5,8,11,12	PSO, 1,2	CO-(1-5)	**Human Value and Professional ethics**
42	INTERNSHIP	15ME84	Analyze and design solutions for engineering problems and to Demonstrate apt workplace attitude and ethics.	PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-5)	**Human Value and Professional ethics**
43	PROJECT PHASE-2	15ME85	Apply engineering, management and ethical principles for Project management and finance. Understand the impact of the engineering solutions in societal and environmental contexts for Sustainable development with commit to professional ethics.	PPT	PO 1,2,3,5, 7,8,11,12	PSO, 1,2	CO-(1-5)	**Human Value and Professional ethics**
44	SEMINAR	15MES86	Prepare power point presentation (PPT), communicate and answer the queries on the topic like environmental sustainability, Good laboratory Practices, Professional ethics and Human Values	PPT	PO 1,2,3,7,8,11,12	PSO, 1,2	CO-(1-3)	**Human Value and Professional ethics**

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