

Branch Name:	MECHANICAL ENGINEERING / CIVIL ENGINEERING / ELECTRICAL ENGINEERING
Program Code:	ET101 / ET106 / ET109
Course Title:	Elements of Mechanical Engineering
Course Code:	2ET1000114T
Pre-requisite Course:	Zeal to learn the subject

Course Objectives:

- CO1. Identify and comprehend the different sources of energy, their conversion processes, working principles of Pumps, IC Engines.
- CO2. Recognize the various properties of steams, principles of various power transmission Elements and their applications in an engineering industry

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Course Contents:

Unit No	Topic	Total Hours	Weightage (%)
1	Introduction: Concept of Force, Pressure, Energy, Work, Power, System, Heat, Temperature, Specific heat capacity, Change of State, Path, Process, Cycle, Internal energy, Enthalpy, Laws of Thermodynamics.	05	10
2	Energy conversion: Prime movers and its types, Fuels & Calorific Values Nuclear, Hydro, Solar and Wind power plant.	03	05
3	Properties of Gases: Gas laws, Boyle's law, Charle's law, Combined gas law, Gas constant, Relation between Cp and Cv, Various non-flow processes like constant volume process, constant pressure process, Isothermal process, Adiabatic process, Poly-tropic process.	05	20
4	Properties of Steam: Steam formation, Types of Steam, Enthalpy, Specific volume, Internal energy and dryness fraction of steam, use of Steam tables, steam calorimeters.	06	15
5	Steam Boilers: Introduction, Classification, Cochran, Lancashire and Babcock and Wilcox boiler, Functioning of different mountings and accessories.	00	15
6	Heat Engines: Heat Engine cycle and Heat Engine, working substances, Classification of heat engines, Description and thermal efficiency of Carnot; Rankine; Otto cycle and Diesel cycles.	05	10

7	Internal Combustion Engines: Introduction, Classification, Engine details, four-stroke/ two-stroke cycle Petrol/Diesel engines, Indicated power, Brake Power, Efficiencies	04	15
8	Pumps: Types and operation of Reciprocating, Rotary and Centrifugal pumps, Priming.	03	05
9	Transmission of Motion and Power: Shaft and axle, Belt drive, Chain drive, Friction drive, Gear drive.	04	05

Note: Topic No. 5 of the above syllabus to be covered in Practical Hours.

Reference Books:

1. Elements of Mechanical Engineering by P. S. Desai and S. B. Soni, Atul Prakashan
2. Elements of Mechanical Engineering by Sadhu Singh S. Chand Publication
3. Basic Mechanical Engineering by Pravin Kumar, Pearson

List of Open-Source Software/learning website:

1. <http://www.howstuffworks.com/> -- Tech stuff
2. <https://nptel.ac.in/courses>
3. <https://www.vlab.co.in/>

Course Learning Outcomes (CLO):

CLO	Description	Bloom's Taxonomy Level
CLO1	Discuss the various sources of energy and basic terminology of Mechanical engineering	3 Applying 6 Creating
CLO2	Make calculations for commonly used working fluids i.e. ideal gases and steam.	1 Remembering
CLO3	Discuss working and applications of steam boilers and various energy conversion systems	2 Understanding 3 Applying
CLO4	Discuss various power transmission elements and properties of various engineering materials with their applications	2 Understanding 1 Remembering
CLO5	Analyze various heat engine cycles and understand construction and working of IC engines	3 Applying 5 Evaluating
CLO6	perceive the inter-disciplinary role and importance of mechanical engineering related to various engineering domains	3 Applying

Mapping of CLO with PO and PSO

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CLO1	H	M	M	H		H	M	H				H		H
CLO2	M	H	L	H								L	M	
CLO3	H	M	L								L			L
CLO4	M	L	H	M			L							
CLO5	L	H	H	M	M	H	M				M			M
CLO6		M	H	M		L		M	H		M		M	

H: High, M: Medium, L: Low