SUBJECT CODE	TITLE OF THE SUBJECT	L	T	P	C	QP
	ELEMENTS OF MECHANICAL ENGINEERING	**3**	**1**	**0**	**4**	

Pre -Requisite: Math and Physics

Course Educational Objective

CEO1:	To understand the basics of forces and force analysis.
CEO2:	To apply the established engineering methods to complex engineering problem.
CEO3:	To understand the fundamental Concepts of thermodynamics and to distinguish the components and working principle of heat engine and determine the COP of heat pump and refrigerator.
CEO4:	To impart basic knowledge on automation and basic codes in CNC machining.

Course outcomes: At the end of the course, the student will be able to:

CO1	Determine the resultant force and moment for given force system. Locate the centroid and compute MOI of composite plane sections.
CO2	Evaluate the forces in members of trusses, frames and problems related to friction
CO3	To understand the basics of thermodynamics and application of various Laws and gain knowledge on heat power energy systems and its applications
CO4	To enable the students to understand on CNC coding and flexible manufacturing system.

CO-PO & PSO Mapping

COs	PROGRAMME OUTCOMES												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2												
CO2	3	2												
CO3	2	2												
CO4	3	3												

Unit:1 [10 hours]

STATICS OF PARTICLES

Force System: Force, Parallelogram Law, Free body diagram, Determination of reactions, Lami's theorem, Principle of Transmissibility of forces. Moment of a force, Couple, Varignon's theorem, Resolution of a force into a force and a couple. Resultant of coplanar force system. Equilibrium of coplanar force system.

Concept of Centre of Gravity: Basic definition **of** Centroid and centre of mass, Area Moment of Inertia, Perpendicular axis theorem and Parallel axis theorem, Radius of gyration

UNIT:2 [10 Hours]

ANALYSIS OF TRUSSES AND FRICTION

Plane Truss: Perfect and imperfect truss, Assumptions and Analysis of Plane Truss by Method of joints and

Method of section.

Laws of Friction - Angle of Friction-Angle of Repose-Ladder and Wedge Friction, Numerical problems on ladder and free body diagram on analysis of wedge friction.

UNIT:3 [14 Hours]

Fundamental Concepts and Definitions: Definition of Thermodynamics, System, surrounding and universe, Macroscopic & microscopic point of view. Property, State, Path, process, Cyclic process, Density, Specific volume, Pressure, temperature. Thermodynamic equilibrium, Quasi-static process, concept of ideal gas, Work and heat transfer, Zeroth law. First law: First law of thermodynamics. Application of first law in non-flow and flow processes. Steady flow energy equation, limitation of first law. Second law: Thermal reservoir, Statements of second law, Heat engines, COP of heat pump and refrigerator. Carnot cycle. Basic concepts of power plant and IC engines. Numerical based on simple formula.

UNIT:4 [8 Hours]

Robotics and Automation

Basic concept of Robotics and its Classification, Numerical Control of machine tools, Introduction to CNC machine, Basic codes used in CNC, Introduction to Flexible manufacturing system.

Teaching Methods: Chalk& Board, PPT, Blended , Cut Model Demonstrations

Text Books:

1. Engineering Mechanics by S. S. Bhavikatti, K. G. Rajashekarappa, New Age International
2. Engineering Mechanics by R K Bansal, Laxmi Publications
3. Basic Mechanical Engineering by Agrawal&Agrawal, Wiley
4. Engineering Thermodynamics by P.K.Nag, McGraw Hill
5. Machine tool design by N.K Meheta, McGraw Hill, Third edition,2018
6. Computer aided Design and Manufacturing by Mikell P. Groover,McGraw-Hill Inc, 2007

Ref. Books:

1. S.Timoshenko, and D.H.Young, “Engineering Mechanics”, Tata Mc-Graw Hill Book,5th edition
2. Engineering Mechanics: Statics by J.L Meriam , Wiley
3. Engineering Mechanics : Statics and Dynamics by R. C. Hibbler, Pearson
4. Thermodynamics An Engineering Approach by Cengel& Boles, McGraw Hill
5. An Introduction to Mechanical Engineering by Wickert & Lewis, Cengage Learning
6. Thermal engineering by domkundwar and kothandaraman, Dhanpatrai Publishing Company