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| **19ME2T02** | **Basics of Mechanical Engineering** | **EEE** |

COURSE OBJECTIVES

1. To understand the vectoral and scalar representation of forces and moments, static equilibrium of particles and rigid bodies
2. To understand the basic concepts of fluid flow and hydraulic machines.
3. To understand the basic concepts of thermodynamics.

COURSE OUTCOMES

At the end or the course student able to:

1. Analyze the principles of statics of particles to solve engineering problems.[K4]
2. Calculate the centroids of different composite plane figures.[K3]
3. Understand the concepts of properties of fluids, fluid flow and flow measuring devices.[K1]
4. Identify and differentiate different types of turbines and pumps.[K1,K2]
5. Describe the basics of various thermodynamic concepts.[K1]

Unit I **ENGINEERING MECHANICS: STATICS**

CONCURRENT FORCES IN A PLANE: Principles of statics, Composition and resolution of forces, Equilibrium of concurrent forces in a plane, Method of projections, Equilibrium of three forces in a plane, method of moments.

Unit II **CENTER OF GRAVITY**

PARALLEL FORCES IN A PLANE:Two parallel forces, General case of parallel forces in a plane, Center of parallel forces. Center of gravity, centroids of composite plane figures and curves, Distributed force in a plane

Unit III **FLUID MECHANICS**

Dimensions and units- physical properties of fluids- specific gravity, viscosity and surface tension- atmospheric, gauge and vacuum pressure –measurement of pressure- Piezometer, U- Tube and Differential manometers, Classification of flows-steady & unsteady, uniform, non-uniform, laminar, turbulent, rotational, and irrational flows-Equation of continuity for one dimensional flow, Euler‘s and Bernoulli‘s equations for flow, venture meter, orifice meter.

Unit IV **HYDRAULIC MACHINES**

**Turbines:** Classification of turbines, working principle of Pelton Wheel, Francis and for Kaplan turbines, Governing of Pelton wheel turbine and centrifugal turbines, Cavitation, Surge tank, Water hammer.

**Pumps:** Types of pumps, working principle of Reciprocating pumps (single acting and double acting) and Centrifugal Pumps.

Unit V **BASIC CONCEPTS OF THERMODYNAMICS**

System, Control Volume, Surrounding, Boundaries, Universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Cycle, Reversibility, Quasi – static Process, Irreversible Process, Causes of Irreversibility, Energy in State and in Transition, Types, Work and Heat, Point and Path function. Zeroth Law of Thermodynamics, Concept of Temperature, Principles of Thermometry, Reference Points, Constant Volume gas Thermometer, Scales of Temperature, Ideal Gas Scale.

TEXT BOOKS:

1. Engineering Mechanics - S. Timoshenko & D.H. Young, McGraw Hill.2017

3. A text book of Fluid Mechanics and Hydraulic Machines by R.K.Bansal, Laxmi Publications 2004.

2. A text Book of Engineering Thermodynamics- Fourth Edition, R.K. Rajput - Lakshmi

Publications. 2015.

REFERENCE BOOKS:

1. Engineering Mechanics - S. S. Bhavikatti, New Age Publishers.2010.

2. Hydraulics and fluid mechanics by P.N. MODI and S.M.SETH, Standard book house. 2015.

3. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.2007.

4. Engineering Thermodynamics *-* P.K. Nag, 4th Edition, Tata McGraw Hill Education Private Limited, New Delhi. 2008.

5. Thermodynamics – An Engineering Approach – Yunus Cengel & M.A.Boles, Tata McGraw Hill Publishing Company Limited, New Delhi. 2014.