Semester: II **Branch: Mechanical Engineering**
Subject: Basic Mechanical Engineering **Code:**

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Course Objectives:

1. To make student understand difference between determinate and indeterminate structures.
2. To understand the methods to analysis of slopes and deflections of structures.
3. To understand the method of strain energy to analyze deflections of structures.
4. To provide an understanding about loads position variation on structures and corresponding
5. Analysis by rolling loads and ILDs.
6. To understand behavior of suspension bridges, cables and arches.

Syllabus:

UNIT- 1:

Resultant and Equilibrium Analysis: Basic concepts and laws of mechanics, system of forces, free body diagram, Resultant and equilibrium of concurrent, parallel and non-concurrent co-planar force system. General numerical applications.

UNIT-2:

(a) ANALYSIS OF PLANE TRUSSES: Perfect truss, basic assumptions for perfect truss, analysis of axial forces in the members by method of joint and method of sections. General numerical applications.
(b) FRICTION: Static, dynamic and limiting friction, Law of limiting friction, Angle of friction, Angle of Repose, Cone of Friction, Wedge friction. General numerical applications

UNIT- 3:

Properties of Surfaces: Centre of Gravity, Second moment of area, determination of second moment of area by integration, polar moment of inertia, radius of gyration of area, Parallel axis theorem, Moment of inertia of composite areas, determination of Product of inertia by integration.

UNIT- 4:

Kinetics of Particles: (a) D'Alembert's principle applied to bodies having rectilinear motion. (b) Principle of work and Energy: General numerical applications (c) Principle of Impulse and momentum: General numerical applications

UNIT-5:

FIRST LAW OF THERMODYNAMICS (a) Thermodynamic System, properties, process, cycle, thermodynamic equilibrium, Quasi-static Process, Zeroth Law of thermodynamics, Work and Heat transfer, flow work, general numerical application. (b) First Law of thermodynamics, internal energy, proof of internal energy as a point function, general numerical application of first law to non-flow process and steady flow process

Text Books:

1. Engineering Mechanics (Statics and Dynamics) ; A. K. Tayal ,Umesh Pub., Delhi

2. Theory of Structures – B.C. Punmia (Laxmi Publication)

Reference Books:

1. Engineering Mechanics (Statics and Dynamics): R.C. Hibbeler, Pearson

2. Engineering Mechanics: Meriam and Kreige ,John Wiley and sons

3. Thermodynamics: Cengel and Boles, TMH

4. Essentials of Engg Mechanics: S.Rajasekharan & G.Shankara Subramaniyam, Vikas Publications

5. Engineering Mechanics: Basudeb Bhatytacharya , Oxford

Course Outcome:

After undergoing this course the students will be able to:

1. Analyze determinate and indeterminate structures.
2. Apply various energy methods for analyzing different structures like bridges of suspension and arches.