

OBJECTIVES:

To enable a student to understand the effect of action of forces on a body and the concept of equilibrium of the body through exercises.

To determine the internal forces induced in truss members due to external loads by working out problems.

To calculate the sectional properties (centroid, moment of inertia, section modulus and radius of gyration) for various sections by working out problems.

To study the stress – strain behaviors of steel and concrete due to axial loads and to determine the stresses and strains developed in solids due to external action through select problems.

To derive the relationship between elastic constants and solving problems.

UNIT I	FORCES AND STRUCTURAL SYSTEMS	8
Types of force systems - Resultant of forces-Lami's theorem- principle of moments varignon's theorem - principle of equilibrium (no reaction problems) - simple problems		
UNIT II	ANALYSIS OF PLANE TRUSSES	10
Introduction to Determinate and Indeterminate plane trusses - Analysis of simply supported and cantilevered trusses by method of joints.		
UNIT III	PROPERTIES OF SECTION	10
Centroid- Moment of Inertia - Section modulus – Radius of gyration - Theorem of perpendicular axis - Theorem of parallel axis –simple problems.		
UNIT IV	ELASTIC PROPERTIES OF SOLIDS	10
Stress strain diagram for mild steel, High tensile steel and concrete - Concept of axial and volumetric stresses and strains. (excluding composite bar)		
UNIT V	ELASTIC CONSTANTS	7
Elastic constants - Relation between elastic constants - Application to problems.		

**TOTAL: 45
PERIODS**

OUTCOMES:

At the end of the course, the student should be able to:

Apply the concepts of action of forces on a body and should be able to apply the equilibrium concepts.

Analyze any type of determinate trusses with different end conditions. To solve the sectional properties for any geometrical shapes.

The concepts of elastic constants and its applications for various types of problems with a thorough understanding of stresses and strain.

REQUIRED READINGS

Bansal R.K.– A text book on Engineering Mechanics, Laxmi Publications, Delhi, 2005.

Bansal R.K. – A textbook on Strength of Materials, Lakshmi Publications, Delhi 2007.

REFERENCES:

Punmia P.C., “Strength of Materials and Theory of Structures”; Vol. I, Lakmi Publications, Delhi 1994.

Ramamrutham S., “Strength of Materials”, Dhanpatrai & Sons, Delhi, 1990.

Nash W.A., “Strength of Materials” – Schaums Series, McGraw Hill Book Company, 1989.

Rajput R.K., “Strength of Materials”, S. Chand & Company Ltd., New Delhi, 1996.