

**OBJECTIVES:**

To enable a student to understand the basic concepts of shear force and bending moment acting on beams subjected to various loading conditions through exercises.

To determine the stresses in beams and strength of sections by working out problems.

To calculate deflection of beams using methods.

To study the theory of columns by working out problems.

To understand the concept of inter determinate structure and its analysis.

Case studies and Models wherever feasible.

<b>UNIT I</b>	<b>SHEAR FORCE AND BENDING MOMENT</b>	<b>10</b>
Basic concepts – shear force and bending moment diagrams for cantilever and simply supported beams subjected to various types of loadings (Point loads, uniformly distributed loads) – Over hanging simply supported beams – Point of contra flexure		
<b>UNIT II</b>	<b>STRESSES IN BEAMS</b>	<b>10</b>
Theory of simple bending – Bending stress distribution – Strength of sections – Beams of composite sections (Flitched beams) – Shearing stress distribution in beam sections		
<b>UNIT III</b>	<b>DEFLECTION OF BEAMS</b>	<b>10</b>
Slope and deflection at a point–Double Integration method and Macaulay’s method for simply supported and cantilever beams		

**UNIT IV COLUMNS**

**10**

Short and long columns – Concept of Elastic stability – Euler’s theory – Assumptions and Load carrying capacity of Columns with different end conditions – Concept of Effective length – Slenderness ratio – Limitations of Euler’s theory – Rankine’s formula.

**UNIT V STATICALLY INDETERMINATE BEAMS**

**5**

Introduction – Determination of degree of statically indeterminacy for beams and frames – Concept of Analysis (No Problems)

**TOTAL: 45  
PERIODS**

**OUTCOMES**

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

Apply the concepts of determining the techniques of finding the stresses.

Use the theory of simple bending theory to find the deflection in beams.

Analyze and solve the different types of columns.

Analyze the différent types of indeterminate beams.

**REQUIRED READING:**

R.K. Bansal, “A Text Book on Strength of Materials”, Laxmi Publications, New Delhi, 2006.

B.C. Punmia, “SMTS-I, Strength of Materials”, Laxmi Publications, New Delhi, 1994.

**REFERENCES :**

M.M. Ratwani & V.N. Vazirani, “Analysis of Structures”, Vol. 1, Khanna Publishers, Delhi, 2012.

Timoshenko, S.P. and D.H. Young, “Elements of Strength of Materials”, Fifth edition, East West Press, 1993.

A.R. Jain and B.K.Jain, “Theory and analysis of structures”, Vol. 1, Nemchand and Bros, Roorkee, 1987.

R.K. Rajput “Strength of Materials”, S.Chand, 2006.