

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Civil Engg.) (Full Time)				
Subject Code & Name		Instructions Hours per Week			Credits			
VLR3G1: Structural Mechanics		L	T	P	L	T	P	Total
		3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours								

Learning Objectives:

- To Analyze determinate beams and sketch S.F. and B.M. diagram.
- To derive simple bending equation and understand its applications.
- To Analysis of propped cantilever & fixed beam and draw SFD, BMD.
- To understand the behavior of columns under different conditions
- To understand the concept of unsymmetrical bending

Pre requisites: Engineering Mechanics, Strength of materials

COURSE CONTENTS

Unit I: Shear force and Bending Moment

Types of beams, Types of supports, shear force and bending moment at any cross section of a beam. Sketching of shear force and bending moment diagrams for cantilever, simply supported and over hanging beams for any type of loading, Significance of point of contra flexure, Relationship between rate of loading, shear force and bending moment.

Unit II: Stresses and Deflection in beams

Theory of simple bending: Equation of bending. Neutral axis, Section-Modulus, Bending & shear stress distribution across a section in Beams.

Slope and deflection of beam by Double Integration Method. Conjugate Beam Method, Area Moment Method,

Unit III: Fixed and Continuous Beams

Beams fixed at ends, Beams of varying Cross-Sections, Partially Fixed at Ends. Effect of Settlement of Supports. Three Moment Theorem for Continuous Beams, Beams of uniform and varying Cross-Sections. Effect of Settlement of Supports.

Unit IV : Columns And Struts

Behavior of axially loaded short, medium and long column members , Buckling load , Euler's theory , Different

end conditions , Empirical formulae, Rankine's formula Straight line formula , Secant formula for columns subjected to eccentric loading.

UNIT V: Unsymmetrical Bending and Curved Beam

Unsymmetrical Bending: Principal Moment of Inertia, Unsymmetrical Bending of Standard Structural Section, Change in Orientation of Neutral axis-plane, Shear Centre.

Curved Beams: stresses due to bending by Winkler Bach theory rectangular, trapezoidal, circular solid sections, crane hook problem.

Books recommended:

1. R.K. Rajput, strength of materials
1. Nash; Strength of Materials (Schaum), TMH.
2. Rattan SS; strength of Materials; TMH
3. Negi; Strength of materials; TMH
4. Surendra Singh; Strength of Materials,
5. Ramamrutham; Strength of Materials,
6. Subramaniam; Strength of Materials; R; Oxford

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Learn behavior of different beams under different types of loading.
2. Understand the basic concepts of columns and struts.
3. Learn the distribution of stresses along a structural Component.
4. Design the column & struts used in Mechanical as well as Civil Engineering.