

<b>Devi Ahilya Vishwavidhyalaya, Indore, India Institute of Engineering &amp; Technology</b>				<b>II Year B.Tech. (Civil Engineering)</b>		
<b>Course Code &amp; Name</b>	<b>Instructions Hours per Semester and Credits</b>					
<b>3RVPC4 Structural Mechanics</b>	<b>Classroom Instruction (CI)</b>		<b>Lab Instruction (LI)</b>	<b>Term Work (TW) and Self Learning (SL)</b>	<b>Total no. of Hours Per semester</b>	<b>Total Credits (Total Hours/30)</b>
	<b>L</b>	<b>T</b>	<b>P</b>	<b>TW+SL</b>	<b>90</b>	<b>3</b>
	<b>20</b>	<b>10</b>	<b>0</b>	<b>60</b>		

**Course Learning Objectives:**

1. To Analyse determinate beams and sketch S.F. and B.M. diagram.
2. To derive simple bending equation and understand its applications.
3. To Analysis of propped cantilever & fixed beam and draw SFD, BMD.
4. To understand the behaviour of columns under different conditions
5. To understand the concept of unsymmetrical bending

**Prerequisites:** 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.

**Course Outcome:**

CO. No.	CO	PO
CO1	Identify the behaviour of different beams under different types of loading.	PO-2
CO2	Determine Stresses and Deflection in beams by various methods of analysis	PO-1, PO-2
CO3	Develop the distribution of stresses along a structural Component.	PO-1, PO-2, PO-3
CO4	Apply the basic concepts of columns and struts for civil engineering structures	PO-3, PO-4
CO5	Apply the knowledge of unsymmetrical bending and curved beam for complex structural components	PO-1, PO-2, PO-4,

**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

**CO-PO Relationship**

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO 1	PSO 2	PSO 3
3RVPC4.CO1		3										1	3	
3RVPC4.CO2	3	3										2	3	
3RVPC4.CO3	2	3	2									2	3	
3RVPC4.CO4			3	3								2	3	
3RVPC4.CO5	3	3	2									2	3	