BVM ENGINEERING COLLEGE [AN AUTONOMOUS INSTITUTION]

2SE03: STRUCTURAL ANALYSIS - I
CREDITS - 2.5 (LTP:2,0,0.5)

Course Objectives:

To impart knowledge of structural analysis for simple structures by manual methods.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per week)			Credits	Assessment Scheme				Total Marks
				Theory		Practical		
L	T	P	C	ESE	CE	ESE	CE	
2	0	1	2.5	30	20	20	30	100

Course Contents:

Unit No.	Topics	Teaching Hours
1	**Fundamentals of Statically Determinate and Indeterminate Structures:** Introduction and types of statically determinate & indeterminate structures. Static and kinematic indeterminacy, stability of structures, Principle of superposition and Maxwell's reciprocal theorems. Computation of internal forces in statically determinate Structures such as plane frame and grids.	06
2	**Strain Energy:** Resilience, Proof resilience, modulus of resilience. Strain energy due to axial gradual, sudden and impact loads. Strain energy for flexure, Shear and Torsion.	03
3	**Displacement of Structures:** Differential equation of elastic curve, relation between moment, slope and deflection, Double integration method, Macaulay's method, Moment area method and Conjugate beam method, Castigliano's theorems and Unit Load Method for beam, plane frame and plane truss.	10
4	**Influence lines for Structures:** Introduction to influence line diagrams for support reaction, Shear force and bending moment for determinate beams for various types of loading conditions. Influence line diagrams for members of trusses. Muller Breslau Principle, Influence line diagrams for indeterminate beams.	06
5	**Arches and Cables:** Calculation internal forces in cables and three hinged arches. Parabolic, Circular and Segmental arches subjected to various types of loading. Two hinged parabolic arch.	05
	Total	**30**

List of References:

1. Junarkar S.B. and Shah H.J.; "*Mechanics of Structures Vol-I*", Charotar publishing house, Anand.
2. Bhavikatti S S, "*Structural Analysis*" New age publications.
3. Patil H.S., Patil Y.D. and Patel Jignesh, "*Structural Analysis-I*", Synergy Knowledgeware.
4. Popov E.P., "Engineering *Mechanics of Solids*" Prentice Hall of India, New Delhi.
5. Hibbler R C, "*Structural Analysis*" Pearson Education.
6. Wang C. K., "Indeterminate Structures", McGrow Hill.
7. **www.nptel.iitm.ac.in/courses/**

Course Outcomes (COs):

At the end of this course students will be able to.

1. Understand the fundamentals of structures and compute internal forces as well as displacements in statically determinate structures.
2. Apply the concept of Strain Energy to compute displacements in statically determinate structures.
3. Understand the influence line diagrams of various quantities for beams and members of trusses.
4. Analyze different arches and cables under various loading conditions.