

4SE42: ADVANCED STRUCTURAL ANALYSIS
CREDITS - 4 (LTP: 3,1,0)

Course Objective:

1. To impart knowledge of analysis of the complex structures using different methods.
2. To impart knowledge of unsymmetrical bending, shear center and failure theories.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per Week)			Credits	Assessment Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE	CE	ESE	CE	150	
3	1	0	4	60	40	20		30

Course Contents:

Unit No.	Topics	Teaching Hours
1	Column Analogy method Analysis of one span beam and one by one storey portal frame for various types of loading including settlement/rotation of support.	6
2	Moment distribution method Analysis of single bay - single storey Inclined columns frames and gable.	6
3	Kani's method Concepts, application to continuous beams and frames, application to Two storey two bay portal frame.	7
4	Unsymmetrical Bending and Shear Center Unsymmetrical Bending: Introduction, Bending stress through product of inertia, Shear center, Shear flow, Bending of open and closed section beams, Shear stress distribution in rectangular, circular, I, T and C section and the compression with bending stresses, Importance of shear center, Shear of open section beams, Shear of closed section beams.	10
5	Beam Curved in Plan Uses of curved beam, types of internal forces, Analysis of curved beam fixed at ends for point load, Uniformly distributed load, Analysis of circular beam supported symmetrically.	6
6	Effects of Shear Deformations Introduction, Shape factors, Shear deflections of statically determinate beams.	5
7	Theories of Failure Various theories of failures, graphical representation and derivation of equation for each and their application to problems.	5
Total		45

List of References:

1. Wang C. K. "Intermediate Structural Analysis", Tata McGraw Hill book Company, New Delhi.

2. Hibbler R C, “*Structural Analysis*”, Pearson Education.
3. Vidyanathan R., Perumal P., “*Structural Analysis Vol. II*”, Laxmi publications.
4. Junarkar S.B. and Shah H.J., “*Mechanics of Structures Vol-I & II*”, Charotar publishing house, Anand.
5. Bhavikatti S.S., “*Structural Analysis Vol I & II*”, new age publications.
6. Bansal R. K., “*Strength of Materials*”, Laxmi publications.
7. Patil H.S., Patil Y.D. and Patel Jignesh, “*Structural Analysis-I*”, Synergy Knowledge ware.

Course Outcomes (COs):

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

1. Understand the theory of shear deformation in addition to bending theory.
2. Apply the concept of shear centre to various sections used in steel structures.
3. Apply failure theories to different types of materials used in structures.
4. Analyse the complex structures with symmetrical and unsymmetrical loadings using different methods.