

23CE22T3 STRUCTURAL ANALYSIS

Course Category	Professional Core	Credits	3
Course Type	Theory	Lecture – Tutorial –Practical	2-1-0
Prerequisite	Engineering Mechanics, Strength of Materials	Sessional Evaluation	30
		Semester End Exam. Evaluation	70
		Total Marks	100

Course Objectives	<ol style="list-style-type: none"> To know different types of energy theorems in the analysis of simple beams and trusses. To know the Castigliano’s theorem for the analysis of indeterminate structures. To learn the analysis of fixed and continuous beams. To learn the slope deflection method. To learn the moment distribution method. 		
Course Outcomes	COs	Statements	Blooms Level
	CO1	Apply energy theorems to analyze trusses.	L3
	CO2	Analyze indeterminate structures by using Castigliano’s-II theorem.	L4
	CO3	Analyze of fixed and continuous beams.	L4
	CO4	Analyze continuous beams and portal frames by using slope-deflection method.	L4
	CO5	Analyze continuous beams and portal frames by using moment distribution method.	L4
Course Content	<p align="center">UNIT I</p> <p>Energy Theorems: Introduction - Strain energy in linear elastic system, expression of strain energy due to axial load; bending moment and shear forces; Castigliano’s first theorem; Deflections of simple beams and pin jointed trusses.</p> <p align="center">UNIT II</p> <p>Analysis of Indeterminate Structures: Indeterminate Structural Analysis; Determination of static and kinematic indeterminacies; Solution of trusses with upto two degrees of internal and external indeterminacies; Castigliano’s-II theorem.</p> <p align="center">UNIT III</p> <p>Fixed Beams: Introduction to statically indeterminate beams -Analysis of fixed beams for central point load, eccentric point load, number of point loads, UDL, and load combinations – Effect of sinking of supports- effect of rotation of a support -Shear force and bending moment diagrams.</p>		

	<p>Continuous Beams: Introduction – Clapeyron’s theorem of three moments; Analysis of continuous beams with up to three spans- central point load, eccentric point load, number of point loads, UDL , and load combinations, Constant moment of inertia with one or both ends fixed; Continuous beam with overhang; Effect of sinking of supports; Shear force and bending moment diagrams.</p> <p style="text-align: center;">UNIT IV</p> <p>Slope-Deflection Method: Introduction - derivation of slope deflection equations; application to continuous beams with and without settlement of supports; Analysis of single bay portal frames without sway.</p> <p style="text-align: center;">UNIT V</p> <p>Moment Distribution Method: Introduction to moment distribution method; Application to continuous beams with and without settlement of supports; Analysis of single bay storey portal frames without sway.</p>
<p style="text-align: center;">Text books and Reference books</p>	<p>Textbooks:</p> <ol style="list-style-type: none"> 1. Prof. V. N. Vazirani, Dr. M. M. Ratwani, Dr. S.K. Duggal “<i>Analysis of Structures–Vol-I & II</i>”, Khanna Publications, 17th edition, 2012. 2. S. Ramamrutham, R. Narayan, “<i>Theory of Structures</i>”, Dhanpat Rai Publishing Company Private Limited-New Delhi, 9th edition, 2014. 3. C. S. Reddy, “<i>Basic Structural Analysis</i>”, Tata McGraw Hill Publishers. 3rd edition, 2017. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Dr. R.Vaidyanathan and Dr. P Peruma, “<i>Structural Analysis Vol. I and II</i>” Laxmi publications, 3rd edition, 2016. 2. B.C. Punmia, “<i>Strength of Materials and Mechanics of Structures</i>”, Khanna Publications, New Delhi. 3. Aslam Kassimali, “<i>Structural Analysis</i>” Cengage publications, 6th edition, 2020. 4. Surendra Singh, “<i>Strength of Materials</i>”, S.K. Kataria & Sons, reprint edition, 2013.
<p style="text-align: center;">E- resources</p>	<ol style="list-style-type: none"> 1. https://archive.nptel.ac.in/courses/105/105/105105166/ 2. https://gate.nptel.ac.in/video.php?branchID=5&cid=1 3. https://archive.nptel.ac.in/courses/105/106/105106050/ 4. https://archive.nptel.ac.in/courses/105/101/105101085/ 5. https://archive.nptel.ac.in/courses/105/101/105101086/ 6. https://archive.nptel.ac.in/courses/105/105/105105109/

CO-PO Mapping: 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	3	3	2	-	2	-	-	-	1	-	-	1	1	1	-
CO 2	3	3	2	3	2	-	-	-	1	-	-	1	1	1	-
CO 3	3	3	2	3	2	-	-	-	1	-	-	1	2	1	-
CO 4	3	3	2	3	2	-	-	-	1	-	-	1	2	1	1
CO 5	3	3	2	3	2	-	-	-	1	-	-	1	2	1	1