STRUCTURAL ANALYSIS SYLLABUS

Course Code	23CE3402	Year	II	Semester	II
Course Category	Professional Core	Branch	CIVIL	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Mechanics of Solids, Mathematics
Continuous Internal Evaluation	30	Semester End Evaluation:	70	Total Marks:	100

Course Objectives:

The objective of this course is to:

- 1. Learn energy theorems
- 2. Learn the analysis of indeterminate structures
- 3. Analysis of fixed and continuous beams
- 4. Learn about slope-deflection method
- 5. Learn about moment-distribution method

Course Outcomes:

Course will enable the student to:

СО	Statement					
CO 1	Apply energy theorems to analyze beams and trusses	L3				
CO 2	Analyze indeterminate structures by using Castigliano's -II theorem	L4				
CO 3	Analysis of fixed and continuous beams	L4				
CO 4	Analyze continuous beams and portal frames by using slope-deflection method.	L4				
CO 5	Analyze continuous beams and portal frames by using Moment-distribution method.	L4				

Course Articulation Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	-	-	2	3	-	-	-	-	-	-	2	3
CO2	2	2	-	-	2	3	-	-	-	-	-	-	2	3
CO3	3	3	-	-	3	3	-	-	-	-	-	-	3	3
CO4	2	2	-	-	2	3	-	-	-	-	-	-	2	3
CO5	2	2	-	-	2	3	-	-	-	-	-	-	2	3

Syllabus:

Unit	Contont	Mapped		
No	Content			
I	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.	CO1		
п	ANALYSIS OF INDETERMINATE STRUCTURES: Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies - Solution of trusses with up to two degrees of internal and external indeterminacies– Castigliano's second theorem.	CO2		
ш	FIXED BEAMS & CONTINUOUS BEAMS: Introduction to statically indeterminate beams with uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads – Shear force and bending moment diagrams – Deflection of fixed beams. Effect of sinking of support and effect of rotation of a support.	CO3		
IV	SLOPE-DEFLECTION METHOD: Introduction-derivation of slope deflection equations – Application tocontinuous beams with and without settlement of supports - Analysis of single bay portal frames without sway.	CO4		
V	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.	CO5		

Learning Resource(s)

Text Book(s):

- 1. *Analysis of Structures Vol-I & II* by V.N. Vazirani& M.M. Ratwani, Khanna Publications, New Delhi.
- 2 Basic Structural Analysis by C.S. Reddy, Tata McGraw Hill Publishers, 3rd Edition, 2017.
- 3. *Theory of Structures* by S. Ramamrutham, Publisher. DhanpatRai Publishing company, ninth edition

Reference Book(s):

- 1. Structural Analysis by AslamKassimali, Cengage Publications, 6th Edition, 2020.
- 2. *Structural Analysis Vol. I and II* by Dr. R. Vaidyanathan and Dr. P. Perumal, Laxmi Publications, 3rd Edition, 2016.
- 3. *Introduction to Structural Analysis* by B.D. Nautiyal, New Age International Publishers, New Delhi.
- 4. Structural Analysis by D.S. Prakasarao, University Press.
- 5. *Strength of Materials and Mechanics of Structures* by B.C. Punmia, Khanna Publications, New Delhi.

e-Resources & other digital material

- 1. https://nptel.ac.in/courses/105101085/25-31
- 2 https://onlinecourses.nptel.ac.in/noc17_ce25/preview
- 3. https://www.edx.org/learn/structural-engineering