

Branch Name:	CIVIL ENGINEERING
Program Code:	ET106
Course Title:	Structural Analysis II
Course Code:	2ET1060502T
Pre-requisite Course:	Basic knowledge of mechanics of solids and structural analysis I

Course Objectives:

- CO-1. To impart the principles of elastic and plastic structural analysis and behaviour of indeterminate structures.
- CO-2. To impart knowledge about various methods involved in the analysis of indeterminate structures.
- CO-3. To apply these methods for analyzing the indeterminate structures to evaluate the response of structures

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
4	3	1	-	4	24	60	16	40	-	-	-	-	100

Course Contents:

Unit No	Topic	Total Hours	Weight age (%)
01	Fixed Beams & Consistent Deformation Method: Computation of fixed-end actions for various types of loads and secondary Effects using basic principles, beams of varying moment of inertia. Analysis of propped cantilever beams & beams of varying moment of inertia using Consistent Deformation Method	08	20
02	Energy principles: Castigliano's theorems, computation of displacements of statically determinate beams, trusses and frames by unit load method, analysis of indeterminate structures – beams, trusses, frames & two hinge arches	06	15
03	Slope deflection method: Analysis of continuous beams for various loading including settlement/rotation of support, analysis of simple portal frame with sway.	06	20
04	Moment distribution: Analysis of continuous beams & frames including sway, use of symmetry of structure upto two storeyed / two bay frames.	06	15

05	Matrix Methods: Types of skeletal structures, Internal forces and deformations. Introduction and applications of stiffness method to analyze beams, Trusses and plane frames by system approach. Introduction and applications of Flexibility method to analyze beams, Trusses and plane frames by system approach.	06	15
06	Domes: Uses of domes, Types of domes, Nature of stresses in conical and spherical domes, Analysis of conical and spherical domes subjected to uniformly distributed load/ concentrated load at crown, Analysis of domes with opening.	04	05
07	Plastic Method: Concept, Assumptions, Shape factor for different cross section, Collapse load, Load factor, Plastic modulus of section, Plastic moment of resistance, Computation of collapse load for fixed beam, Continuous beam and plane frame subjected to various load cases	06	10

List of Text and Reference Books:

1. Junnarkar S.B. & Shah H.J.; Mechanics of Structures Vol-II; Charotar publishing house, Anand
2. Wang C.K.; Intermediate Structural Analysis; Mc Graw Hill book Company, New Delhi
3. Reddy C.S.; Basic Structural Analysis; Tata Mc Graw Hill Publishing Company Ltd, New Delhi
4. Dr. Punmia B. C., Jain Ashok & Jain Arun; Strength of materials & Theory of Structures; Laxmi Pub., New Delhi
5. William Weaver, Jr & James M. Gere; Matrix Analysis of Framed Structures; CBS Publishers & Distributors, Delhi

E-Resources:

1. <http://nptel.ac.in/>
2. <http://ocw.mit.edu/courses/civil-and-environmental-engineering/>

Course Learning Outcomes (CLO):

1. Apply equilibrium and compatibility equations to determine response of statically determinate and indeterminate structures.
2. Determine displacements and internal forces of statically indeterminate structures by classical, iterative and matrix methods.
3. Determine internal forces and reactions in determinate and indeterminate structures subjected to moving loads.
4. Determine stresses in domes.
5. Determine collapse load for indeterminate structures.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Apply equilibrium and compatibility equations to determine response of statically determinate and indeterminate structures.	L-1
CLO2	Determine displacements and internal forces of statically indeterminate structures by classical, iterative and matrix methods.	L-6
CLO3	Determine internal forces and reactions in determinate and indeterminate structures subjected to moving loads.	L-5, L-6
CLO4	Determine stresses in domes.	L-3, L-4
CLO5	Determine collapse load for indeterminate structures.	L-2, L-3

L1- Remember, **L2-** Understand, **L3-** Apply, **L4-** Analyze, **L5-** Evaluate, **L6-** Create

Mapping of CLOs with POs & PSOs

	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Course Learning Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CLO1	H	M				H		H			H				
CLO2	H	H	H		H	H		H			H		H	H	H
CLO3	H	H	H		H	H					H		H	H	H
CLO4	H	H	H		H	H		H			H		H	H	H
CLO5	H	H	M	M		H		H			H		H	H	H

H: High, **M:** Medium, **L:** Low