

Course-Plan

School of Engineering Department of Civil Engineering Course Code: CE322, 3L-0T-0: 3Cr, 3Hr Course Name: Structural Analysis II	<u>Instructor</u> - K. Bharadwaj Email: karabi@tezu.ernet.in
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1. Abstract:

Structural Analysis-II generally consists of study of **indeterminate beams, frames etc.** The aim of the course is to understand the behavior and analysis of different structural members, frames etc. This course will give the knowledge of structural behavior, analysis of structures and its application in different fields.

2. Objective:

The course will try to introduce the overall concept of structural analysis of different structures especially indeterminate beams, frames etc. which will help the student to understand and evaluate the internal forces in the different structural members of a structure and the structural system as a whole.

3. Prerequisites: Basic mathematics, Strength of Materials, Structural Analysis-I.

4. Syllabus

Indeterminate beams: Propped cantilevers, fixed beam, continuous beams, sinking of support, temperature effect, method of consistent deformation, three moment equation.

Classical displacement method: Slope deflection method, moment distribution method, Kani's method & their applications.

Classical force method: Trusses & rigid frames by column analogy & elastic centre method. Masonry dams, retaining walls, condition for no tension, introduction to creep, fatigue & stress concentration.

Matrix method of structural analysis: Stiffness method: Local and global stiffness matrices, assembly, band storage, solution of resulting simultaneous algebraic equation, boundary conditions, application to plane and space truss, analysis of plane frame, grid and three-dimensional frame.

5. Course Outline and Tentative Schedule

Module No.	Lecture Topic	No. of Lectures
Module 1	Indeterminate beams:	14 L
<i>M 1.1</i>	Fixed beam	
<i>M 1.2</i>	Continuous beams	
<i>M 1.3</i>	Sinking of support	
<i>M 1.4</i>	Temperature effect	
<i>M 1.5</i>	Method of consistent deformation	
<i>M 1.6</i>	Three moment equation	
Module 2	Classical displacement method:	12 L
<i>M 2.1</i>	Slope deflection	
<i>M 2.2</i>	Moment distribution method	
<i>M 2.3</i>	Kani's method & their applications.	
Module 3	Classical force method:	8 L
<i>M 3.1</i>	Trusses & rigid frames by column analogy & elastic centre method	
<i>M 3.2</i>	Masonry dams	
<i>M 3.3</i>	Retaining walls	
<i>M 3.4</i>	Condition for no tension, introduction to creep, fatigue & stress concentration.	
Module 4	Matrix method of structural analysis: Stiffness method: Local and global stiffness matrices, assembly, band storage, solution of resulting simultaneous algebraic equation, boundary conditions, application to plane and space truss, analysis of plane frame, grid and three-dimensional frame.	12 L
Total Number of Lectures		46L

6. Grading Policy

Sl.	Mode of assessment	Type	Marks	Duration	Syllabus
1	Test 1	Written/assignment /viva/presentation	25	45 minutes	<i>From beginning</i>
2	Test 2	Written/assignment /viva/presentation	40	120minutes	<i>From beginning</i>
3	Test 3	Written/assignment /viva/presentation	25	45 minutes	<i>From Test-II till Test-III</i>
4	Test 4 End Term	Written	60	180 minutes	<i>From Test-II till Test IV and the course instructor may include some units of the syllabus covered under Test-I and Test-II</i>
Grand total			150 marks		

7. Text/Reference Book

1. D. Menon, *Structural Analysis*, Narosa
2. R. C. Hibbler, *Structural Analysis*, Pearson

Reference Book

1. Utku, S., Norris, C.H. and Wilbur, J.B. *Elementary Structural Analysis* (Tata McGraw Hill, Fourth edition, 2003)
2. Wang, C.K. *Intermediate Structural Analysis* (Tata McGraw Hill, 2010)

8. Pedagogy

Lecture and Discussion; Presentations; Quiz; Tutorials

9. Course Articulation Matrix

CO	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Recognize the fundamentals of indeterminate structures.	2	3	-	-	-	-	-	-	-	-	-	-	1	-	-

CO2	Examine numerous solution strategies to analyze diverse structures, notably indeterminate ones.	2	3	2	-	-	-	-	-	-	-	-	-	2	2	-
CO3	Develop a working knowledge of contemporary structural analysis techniques and the ability to use these approaches to tackle challenging structural issues.	2	1	-	-	3	-	-	-	-	-	-	-	-	2	-
CO4	Incorporate critical thinking and problem-solving abilities, such as the capacity to examine intricate structural issues, create and assess other solutions, and reach well-informed conclusions	1	-	-	-	-	-	-	-	2	1	-	3	-	-	2
CE322		1.75	2.33	2	-	3	-	-	-	2	1	-	3	1.5	2	2