INSTITUTE	**FACULTY OF TECHNOLOGY**
PROGRAM	**BACHELOR OF TECHNOLOGY (CIVIL ENGINEERING)**
SEMESTER	**5**
COURSE TITLE	**STRUCTURAL ANALYSIS - 2**
COURSE CODE	**01CI1502**
COURSE CREDITS	**4**

Objective:

1 To develop the student's ability, to analyze indeterminate structures like beams, frames, and trusses using various classical and matrix methods.

2 To introduce students to the concept of matrix analysis and its application to structural analysis problems

3 To provide students with an understanding of the methods for the analysis of indeterminate structures like the Force Method and Displacement Method.

4 To develop the student's ability, to analyze indeterminate structures like beams, frames, and trusses using various classical and matrix methods

5 To introduce students to the concept of matrix analysis and its application to structural analysis problems.

Course Outcomes: After completion of this course, student will be able to:

1 Apply the slope deflection method to analyze indeterminate beams and plane rigid jointed frames.

2 Use the moment distribution method to analyze indeterminate beams and plane rigid jointed frames.

3 Analyze the fixed beam and propped cantilever beam subjected to gravity loading by employing various methods

4 Evaluate the response of structures by applying the concept of matrix methods.

Pre-requisite of course:SA-1

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	1	0	50	30	20	25	25

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Contents : Unit	Topics	Contact Hours
1	**Analysis of Fixed Beam and Propped Cantilever Beam** Review of Indeterminacy, Analysis of Fixed-beam, Analysis of Continuous Beam, Equations for Fixed End Moment for standard Case, Macaulay's method, Moment Area Method, Consistent Deformation Method, Principle of Least work, Castigliano's Second Theorem, Unit load method for indeterminate structures	14
2	**Analysis of Continuous Beam** Slope Deflection Method: Slope deflection equation, Equilibrium conditions, Analysis of continuous beams and rigid frames using slope deflection method, Moment Distribution Method: Stiffness, Carryover factor, Analysis of continuous beams & frames including sway using Moment Distribution Method	14
3	**Matrix Method** Flexibility and Stiffness, Released and Restrained Structures, Equilibrium and Compatibility conditions, Flexibility Method: Flexibility matrix, Analysis of beam using flexibility method system approach, Stiffness Method – Equivalent joint load, development of structure stiffness matrix, Analysis of beam and frames using stiffness method system approach	14
Total Hours		**42**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Tutorial-1** Analyze fixed beam subjected to gravity load and secondary effect.	2
2	**Tutorial-2** Apply the concept of strain energy principles to identify the support reactions and internal forces for indeterminate structures using Castigliano's second theorem and unit load method.	2
3	**Tutorial-3** Analyze the continuous beams and portal frame using the Slope Deflection method.	2
4	**Tutorial-4** Analyze the continuous beams and portal frame using the Moment Distribution method.	2
5	**Tutorial-5** Analyze the indeterminate structures using force methods like consistent deformation method and Flexibility Method	2
6	**Tutorial-6** Analyze the continuous beams and portal frame using the Direct Stiffness Method	2
7	**Tutorial-7** Apply the concept of structural analysis methods and prepare the generalized computer program.	2
Total Hours		**14**

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Textbook :

1 Mechanics of Structures Vol-I & II, Junarkar S.B. & Shah H.J, Charotar publishing house, 2016

2 Structural Analysis-II, Bhavikatti, S. S, Vikas Publishing House Pvt Ltd, 2019

References:

1 Theory of Structures, Theory of Structures, Ramamrutham, S, Dhanpat Rai Publication, 2020

2 Structural Analysis, Structural Analysis, Hibbler R C, Pearson Education, 2019

3 Intermediate Structural Analysis, Intermediate Structural Analysis, Wang C. K., Tata McGraw Hill book Company, New Delhi, 2019

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
5.00	10.00	35.00	30.00	10.00	10.00

Instructional Method:

1 At the start of the course, the course delivery pattern, and prerequisite of the subject will be discussed

2 Lectures will be taken in the classroom with the use of multi-media presentations, white board– a mix of bot

3 Attendance is compulsory in lectures and Tutorials which carries a 5% component of the overall evaluation

4 Minimum two internal exams will be conducted and an average of two will be considered as a part of a 15% overall evaluation

5 Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular intervals. It carries a weightage of 5%

6 Surprise tests/Quizzes will be conducted which carry a 5% component of the overall evaluation

Supplementary Resources:

1 https://archive.nptel.ac.in/courses/105/105/105105109/

2 https://archive.nptel.ac.in/courses/105/101/105101086/