STRUCTURAL ANALYSIS – II

Lectures / Tutorials : 4 / 1 Periods/Week Semester End Exam. : 3 Hours

Sessional marks: 40 Semester End Exam. marks: 60 Credits : 4

Course objectives:

- To develop a technical competence in the fundamental concepts and application of displacement methods of statically indeterminate, structures.
- Awareness of the Displacement methods for solving statically indeterminate beams and frames by using slope deflection, moment distribution method.
- To understand the plastic behaviour of structures and collapse load analysis of the structures
- To understand the concept of stiffness and flexibility in matrix form
- To know how to analyse the structures like beams and simple frames using stiffness and flexibility matrix methods

Course Outcomes:

- Students will have an ability identify, formulate, and determine stability of structures; external reactions, internal forces, and deflection for determinate and up to three-degree of freedom indeterminate structures.
- Student will be able to develop a computer program by Staad Pro, Sap and various software's and also Solve problems similar to problems done "by hand."
- Behaviour of structures beyond yield load, finding shape factors, length of plastic hinge etc
- Collapse load analysis
- Analysing the structures like continuous beams and single bay, storey rigid jointed frames for internal forces using stiffness and flexibility matrix methods
- Analysing the structures like pin jointed frames for internal forces using stiffness matrix method

UNIT – I

Slope Deflection Method

Slope - deflection equations; Principles of the method; Applications of the method to the analysis of continuous beams and portal frames (Single bay, single storey with vertical legs only) without and with sidesway.

$\mathbf{UNIT}-\mathbf{II}$

Moment Distribution Method

Principles of the method; Application of the method to analysis of continuous beams and portal frames (Single bay, single storey with vertical legs only) without and with side sway.

UNIT – III

Matrix methods of Structural analysis

Flexibility and stiffness; Flexibility matrix; Stiffness matrix; Relationship between flexibility matrix and stiffness matrix; Analysis of continuous beams and rigid jointed plane frames (Single bay, single storey with vertical legs only) by flexibility and stiffness methods

UNIT – IV

Plastic analysis of structures

Introduction, Stress-strain curve, Plastic moment – Plastic section modulus, Shape factor, Load factor, Failure mechanisms; Methods of analysis - Static method and Mechanism method; Analysis of continuous beams and single bay rectangular portal frames

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

Basic structural analysis by CS Reddy, 3rd Edition, Tata McGraw-Hill ,2010.

REFERENCE BOOKS

1.Structural Analysis by Devdas Menon, Narosa Publishinh House, 2008.

2. Intermediate structural analysis by CK Wang, Tata McGraw-Hill, 2010.

3.Structural Analysis – A matrix approach by G. S. Pandit & S. P. Gupta; Tata Mc Graw – Hill Publishing Co. Ltd., 2008.

4. Fundamentals of limit analysis of structures by Manicka Selvam, Dhanpat Rai & Sons

WEB REFERENCES:

- <u>http://www.cdeep.iitb.ac.in/nptel/Civil%20Engineering/Structural%20Mechanic%20II/Course%2</u> <u>0Objective.html</u>.
- <u>http://nptel.iitm.ac.in/courses/Webcourse-</u> contents/IIT%20Kharagpur/Structural%20Analysis/New_index1.html