4/4 B.Tech. EIGTH SEMESTER

CE8T3A   **ADVANCED STRUCTURAL ANALYSIS**   **Credits: 3**
Lecture: 3 periods/week   **Internal assessment: 30 marks**
Tutorial: 1 period /week   **Semester end examination: 70 marks**

Pre-requisites: Structural analysis I & II

Learning objectives:
- To gain a working knowledge on matrix analysis of elastic structures, plastic behavior of structures, buckling of elastic structures. Students will do this by building on the knowledge gained.
- To get an adequate insight of elastic, plastic, and bucking behavior of structures as well as specific structural analysis tools needed in the professional practice of modern structural engineer

Course outcomes:
At the end of course, the student will be able to:
1. Analyse a building frame by using portal method, cantilever method and substitute frame method.
2. Determine the plastic hinge, collapse moment and shape factors for various sections,
3. Calculate the degree of static and kinematic indeterminacies, formation of flexibility and stiffness matrices
4. Analyse a beam including sinking of supports by using flexibility method
5. Analyse a beam including sinking of supports by using stiffness method

UNIT - I
LATERAL LOAD ANALYSIS
Application to building frames, analysis for lateral loads (i) Portal method (ii) Cantilever method Analysis of tall buildings subjected to seismic loads

UNIT – II
PLASTIC ANALYSIS
Introduction – Idealized stress– shape factors for various sections – Moment curvature relationship – ultimate moment – Plastic hinge – lower and upper bound theorems – ultimate strength of fixed and continuous beams.

UNIT - III
FLEXIBILITY AND STIFFNESS MATRICES
Degree of static and Kinematic indeterminacies, Formation of Flexibility and Stiffness matrices up to second degree for continuous beams and rigid jointed frames.

UNIT - IV
FLEXIBILITY METHOD
Introduction to the structural analysis by flexibility matrix approach and application to continuous beams including settlement of supports and application to rigid jointed frames.

UNIT - V
STIFFNESS METHOD
Introduction to the structural analysis by stiffness matrix approach and application to continuous beams including settlement of supports and rigid jointed frames.

Learning resources:

Text books:
1. Matrix methods of Structural Analysis by Pandit and Gupta – Tata Mc.Graw Hill
2. Analysis of structures Vol. I & II by Vazrani and Ratwani. Khanna publications.
3. Comprehensive Structural Analysis Vol.1 & 2 by Dr. Vaidyanathan and Dr. P.Perumal - by Laxmi publications Pvt. Ltd.,New Delhi

Reference books:
1. Structural Analysis by D.S. Prakash Rao - Sagar books
2. Structural Analysis Vol. I & II by Bhavi Katti, Vikas Publications.
3. Matrix structural analysis by T.N.Gayl; Tata Mc.Graw Hill company

e-learning resources:
http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/