III Year - I Semester   **L   T   P   C**

20CE5764   **3   0   0   3**

INTRODUCTION TO STRUCTURAL ANALYSIS

Course Learning Objectives:
- To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions and to draw the diagrams of variation across the length.
- To give preliminary concepts of assessment of bending moment and shear force in Propped cantilevers, fixed beams and continuous beams due to various loading conditions.
- The concepts above will be utilized in measuring deflections in beams under various loading and support conditions

Course Outcomes:
Upon successful completion of this course the student will be able to
- Draw the diagrams indicating the variation of the key performance features like bending moment and shear forces.
- The student will be able to assess the deflections across the length of the beams using various methods
- Distinguish between the determinate and indeterminate structures and calculate the fixed end moments of fixed beams.
- Estimate the bending moment and shear forces in beams for different fixity conditions
- Analyze the continuous beams using three moment theorem.

SYLLABUS

UNIT I
Shear Force And Bending Moment:
Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contraflexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT II
Deflection Of Beams:
Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L. Uniformly varying load. Mohr's theorems – Moment area method – application to simple cases including overhanging beams.

UNIT III
Propped Cantilevers:
Analysis of propped cantilevers-shear force and Bending moment diagrams-Deflection of propped cantilevers.

UNIT IV
Fixed Beams:
Introduction to statically indeterminate beams with U. D. load, central point load, eccentric point load, number of point loads, uniformly varying load, couple & combination of loads - shear force and Bending moment diagrams-Deflection of fixed beams including effect of sinking of support, effect of rotation of a support.

UNIT V
Continuous Beams:
Introduction-Clapeyron's theorem of three moments- Analysis of ontinuous beams with constant moment of inertia with one or both ends fixed continuous beams with overhang, continuous beams with different moment of inertia for different spans-Effects of sinking of supports-shear force and Bending moment diagrams.

TEXT BOOKS:
1. Basic Structural Analysis by C. S. Reddy Tata Mc.Graw-Hill, New Delhi.
2. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi
3. Analysis of Structures- Vol. I and II by V. N. Vazirani and M. M. Ratwani, Khanna Publishers, New Delhi

REFERENCES
1. Theory of Structures by B. C Punmia, A. K Jain &Arun K. Jain, Lakshmi Publications
2. Theory of Structures by R.S. Khurmi, S. Chand Publishers.
3. Structural analysis by R.C. Hibbeler, Pearson, New Delhi.
4. Structural Analysis-I by Hemanth Patel, Yogesh Patel, Synergy Knowledgeware, Mumbai
5. Analysis of Statically Determinate Structures byP. N. Chandramouli, Yesdee Publishing Pvt Limited, Chennai