

5. COURSE SYLLABUS:-

II Year - II Semester

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STRUCTURAL ANALYSIS – I

Course Learning Objectives:

- ❖ 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.
- ❖ To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions
- ❖ The procedure for development of slope deflection equations and to solve application to continuous beams with and without settlement of supports.
- ❖ The concepts of moving loads and influence lines are imparted for assessment of maximum SF and BM at a given section when loads of varying spans rolling loads of Pratt and Warren trusses.

Course Outcomes:

Upon successful completion of this course the student will be able to,

- ❖ Distinguish between the determinate and indeterminate structures.
- ❖ Identify the behavior of structures due to the expected loads, including the moving loads, acting on the structure.
- ❖ Estimate the bending moment and shear forces in beams for different fixity conditions.
- ❖ Analyze the continuous beams using various methods -, three moment method, slope
- ❖ Deflection method, energy theorems. Draw the influence line diagrams for various types of moving loads on beams/bridges.
- ❖ Analyze the loads in Pratt and Warren trusses when loads of different types and spans are passing over the truss.

Syllabus:

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

UNIT – II 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

and 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 – III Continuous Beams: Introduction-Clapeyron's theorem of three moments- Analysis of continuous 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.

UNIT-IV Slope-Deflection Method: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports.

UNIT – V Energy Theorems: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's first theorem- Deflections of simple beams and pin jointed trusses.

UNIT – VI Moving Loads And Influence Lines: Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load, U. D load longer than the span, U. D load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length.

INFLUENCE LINES: Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a sections, single point load, U.D. load longer than the span, U.D. load shorter than the span- Influence lines for forces in members of Pratt and Warren trusses.

Text Books:

1. Basic Structural Analysis, 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, V. N. Vazirani and M. M. Ratwani, Khanna Publishers, New Delhi

References:

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

