2/4 B.Tech. FOURTH SEMESTER

CE4T6　　　　　　　　**STRUCTUAL ANALYSIS – I**　　　　　　**Credits: 3**

Lecture: 3 periods/week　　　　　　　　　　**Internal assessment: 30 marks**
Tutorial: 1 period /week　　　　　　　　　　**Semester end examination: 70 marks**

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Pre-requisites:　　　　Mechanics of Solids-I, Mechanics of Solids-II

Learning objectives:

- To get practice in doing the analysis of propped cantilever, fixed and cantilever beams. Knowing the application of slope deflection method for various beams.
- To draw Influence Line Diagrams (ILDs) and to know the application of ILDs for the analysis of simply supported girders.
- To understand the analysis of trusses and Castiglione's theorems

Course outcomes:

At the end of course the student will be able to:

1. Analyse the trusses by method of joints and method of sections
2. Draw ILD for all components, calculate Max. SF and BM at a given section, Equivalent UDL and focal length
3. Determine the horizontal thrust, max. bending moment, normal thrust and radial shear for a 3 hinged arch
4. Calculate the shear forces, bending moments and deflections in a propped cantilever beam and a fixed beam.
5. Analyse the continuous beam by using clapayron's theorem of three moments with or without sinking of supports

UNIT – I

ANALYSIS OF PIN-JOINTED PLANE FRAMES:
Determination of Forces in members of pin-jointed trusses by (i) method of joints and (ii) method of sections. Analysis of various types of cantilever and simply – supported trusses.

UNIT – II

INFLUENCE LINES AND MOVING LOADS:
Definition of influence line for reactions, SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a section, single point load, U.D.L longer than the span, U.D.L shorter than the span.
Maximum SF and BM at a given section and absolute maximum S.F. and absolute maximum B.M due to single concentrated load, U.D L longer than the span, U.D L shorter than the span, two point loads with fixed distance between them and several point loads Influence Lines for axial force in the members of determinate Pin – Jointed Truss

UNIT – III

THREE HINGED ARCHES:
Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature.
CABLES:

Analysis of cables under concentrated loads, analysis of cables under uniformly distributed loads, anchorage of suspension cables

UNIT – IV

PROPPED CANTILEVERS:

Introduction to Indeterminate structures, Analysis of propped cantilevers-shear force and Bending moment diagrams

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, effect of sinking of support, effect of rotation of a support.

UNIT-V

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.

Learning resources

Text Books:

1. Analysis of Structures-Vol I & Vol II by V.N. Vazirani & M.M.Ratwani, Khanna Publications, New Delhi.
2. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi
3. Basic structural Analysis by C.S. Reddy, Tata Mcgrawhill, New Delhi

References:

1. Mechanics of Structures by S.B.Junnarkar, Charotar Publishing House, Anand, Gujrat
2. Theory of Structures by Gupta, Pandit & Gupta; Tat Mc.Graw – Hill Publishing Co.Ltd., New Delhi.
3. Theory of Structures by R.S. Khurmi, S. Chand Publishers
4. Strength of Materials and Mechanics of Structures- by B.C.Punmia, Khanna Publications, New Delhi.

e-learning resources:

http://nptel.ac.in/courses.php

http://jntuk-coeerd.in/