II Year-II Semester
(20CE4006) Structural Analysis I

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

Pre- Requisites: Fundamentals of Engineering Mechanics

Course 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
- Impart concepts for determination of Forces in members of plane pin-jointed perfect trusses by different methods

UNIT-I: Shear Force & Bending Moment:
Definition of beams – 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, uniformly distributed loads, 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.,/ Zxcvbnm

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, Uniformly distributed loads, Uniformly varying loads Mohr's theorems – Moment area method – application to simple cases

UNIT-III: Propped Cantilevers &Fixed Beams
Introduction to statically indeterminate beams -Analysis of propped cantilevers-shear force and Bending moment diagrams-Deflection of propped cantilevers.

Fixed Beams:
Fixed 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-IV: 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-V: Analysis of Pin-Jointed Plane Frames:
Determination of Forces in members of plane pin-jointed perfect trusses by (i) method of joints and (ii) method of sections. Analysis of various types of cantilever and simply supported trusses by method of joints, method of sections.

Course Outcomes:

S.No	COURSE OUTCOMES	BTL
1	Draw the diagrams indicating the variation of the key performance features like bending moment and shear forces.	L4
2	Find the deflections across the length of the beams using various methods	L4
3	To calculate the fixed end moments of fixed beams.	L4
4	Analyze the continuous beams using three moment theorem.	L4
5	Analyze the pin jointed frames.	L4

Correlation of COs with POs& PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	-	1	-	-	-	-	-	-	-	2	2	-	2
2	3	3	-	2	-	-	-	-	-	-	-	2	3	-	2
3	3	3	-	2	-	-	-	-	-	-	-	2	3	-	2
4	3	3	-	2	-	-	-	-	-	-	-	2	3	-	2
5	3	3	-	2	-	-	-	-	-	-	-	2	2	-	2

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

Reference Books:

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 StructuresbyP. N. Chandramouli,Yesdee Publishing Pvt Limited, Chennai