

Structural Analysis - I (Code No: A40115)

UNIT - I

Analysis of Perfect Frames: Types of frames- Perfect, Imperfect and Redundant pin jointed frames. Analysis of determinate pin jointed frames using method of joints, method of sections and tension co effective method for vertical loads, horizontal loads and inclined loads.

UNIT - II

Energy Theorems: Introduction-Strain energy in linear elastic system, expression of strain energy due axial load, bending moment and shear forces- Castiglione's first theorem - Unit Load Method. Deflections of simple beams and pin - jointed plain tresses. Deflections of statically determinate bent frames.

Three Hinged Arches: Introduction - Types of arches - comparison between three hinged arches and two hinged arches. Linear Arch. Eddy's theorem. Analysis three hinged arches. Normal Thrust and radial shear in an arch. Geometrical properties of parabolic and circular arch. Three Hinged circular arch at Different levels. Absolute maximum bending moment diagram for a three hinged arch.

UNIT - III

Propped Cantilever and Fixed beams: Analysis of Propped Cantilever and Fixed beams, including the beams with varying moments of inertia, subjected to uniformly distributed 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 for Propped cantilever and Fixed beams; effect of sinking of support, effect of rotation of a support.

UNIT - IV

Slope - Deflection Method and Moment Distribution Method: Introduction - Continuous beams. Clapeyron's theorem of three moments- Analysis of continuous beams with constant variable moments of inertia with one or both ends fixed- continuous beams with overhang. Effects of sinking of supports. Derivation of slope- Deflection Equation, Application to continuous beams with and without settlement of supports. Analysis of continuous beams with and without settlement of supports using Moment Distribution Method. Shear force and bending moment diagrams, Elastic curve.

UNIT - V

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. 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 section- Point load, UDL longer than the span, UDL shorter than the span- influence line for forces in members of Pratt and Warren trusses.