

**CE444: Advanced topics in mechanics and analysis of skeletal structures**

**3-0-0-0 [9]**

**Course Contents:**

Twisting of thin-walled beams: Saint Venant's theory for torsion of general uniform section, Torsion of thin-walled section, shear flow; Bending of thin-walled beams: Shear stress due to bending, Determination of shear center; Matrix method of linear elastic structural analysis: Force method and displacement methods, Direct stiffness method for rods, beams, trusses and frames. Virtual work principles: Principles of virtual force and displacement, Application of virtual work to formulate element stiffness matrix for rods, beams, and frames. Geometric nonlinear elastic analysis: An introduction to geometric nonlinear analysis, Nonlinear strain displacement relations for 1D elements, Derivation geometric nonlinear stiffness matrix, Elastic critical load analysis; Small deformation inelastic analysis: A brief review of metal plasticity, yield surface, flow rule, A review of plastic analysis of beams, Plastic hinge method for analysis of simple frames.