

Course Contents:

Results from differential geometry: curves in 3D space - parameterized equation for curves, arc length as a parameter; surfaces - parametric description, curvilinear co-ordinates, first and second fundamental forms, principal curvature co-ordinates, derivatives of unit vectors, equations of Gauss and Codazzi; Membrane theory of shells: equilibrium equations, applications to shells of revolution under axisymmetric loads, applications to cylindrical shells under asymmetric loads, strain-displacement relations, application in calculation of displacements; Bending theory of shells: kinematic assumptions and strain displacement relations, stress measures and equilibrium equations, constitutive relations, cylindrical shell under axi-symmetric loads, bending of cylindrical shells; Bending theory of flat plates: thin plates, Kirchhoff theory - strain displacement relations, stresses and stress resultants, constitutive equations, equilibrium equations, boundary conditions, derivation of theory from principle of virtual work, rectangular plates-solution by double Fourier series, circular plates, edge effects, anisotropic and layered plates, thick plates-Reissner-Mindlin-Naghadi type theories, moderate deflection analysis and buckling of plates.