CE 335: THIN PLATES AND SHELLS (3-0-0:3)

Introduction

History of Plate theory development, General behaviour of Plates, The fundamentals of small deflection Plate bending theory- Strain curvature relations, Stresses- stress resultants and stress couples, The governing equations for deflections of plates in Cartesian Coordinates, Boundary conditions.

Bending and Buckling of Plates

The elementary cases of plate bending, Navier's method (Double series solution), rectangular plates subjected to concentrated lateral forces, Levy's solution, continuous plates, plates on an elastic foundation, plates with variable stiffness, rectangular plates under combined lateral and direct loads, bending of plates with small initial curvature, thermal stresses in plates, effect of transverse shear deformation on bending of elastic plates, large deflection theory of thin plates, buckling of rectangular plates.

Plate Bending by Approximate and Numerical Methods

Introduction, finite difference method (FDM), Galerkin Method, Ritz Method, finite element method (FEM).

Shells as Engineering Structures

Brief outline of the linear shell theories, load-carrying mechanism of shells, geometry of middle surface, the general linear theory of shells, the membrane theory of shells, thermal stresses in thin shells, geometrically nonlinear shell theory, finite element representation of shells, buckling of shells.

Text Books

1. S. P. Timoshenko and S. W. Krieger, "Theory of Plates and Shells", McGraw-Hill.
2. E. Ventsel and T. Krauthammer, "Thin Plates and Shells", Marcel Dekker Inc.,

References

1. R. Szilard, "Theory and Analysis of Plates – Classical Numerical Methods", Prentice Hall Inc,.
2. P. L. Gould, "Analysis of Shells and Plates", Springer-Verlag.
3. A. C. Ugural, "Stresses in Plates and Shells", McGraw-Hill.