CE5690 - Theory and Design of Plates and Shells

Credit Distribution: C:9 L:3 T:0 P:0 E:0 O:6 TH:0

Course Type: Theory

Description: To have fundamental knowledge in the analysis of plates, folded plates and shells. 2. To design the plates, folded plates and concrete shells

Course Content: Plates: Plate equation in Cartesian and polar co-ordinates for isotropic rectangular and circular plates - Analysis of rectangular and circular plates with different boundary conditions and loadings - Analysis of circular plates with opening. Analysis of plates using Ritz method, Galerkin's method, Kantorovich's method, finite difference method and finite element method. Cylindrical bending of long rectangular plates with different boundary conditions and loadings - Design of plates. Analysis of orthotropic plates - Differential equation - Determination of rigidities - Analysis of rectangular plates. Plates on elastic foundation - Differential equation - Rectangular and continuous plates on elastic foundation. Shells: Classification of shells - Properties of curves - Membrane and bending theory for singly curved and doubly curved shells - Various approximations - Beam theory of cylindrical shells - Lundgren's method. Design of cylindrical shells, Principles of design of Elliptic paraboloids, Hyperbolic paraboloids and Conoids - Prestressing of shells - Practical aspects of shell construction. Folded plates: Various types; Analysis and principles of design

Text Books :

- Timoshenko, S.P. Theory of Plates and Shells, Mc Graw Hill Book Company, New York, USA (1959). 2. Ramaswamy, G.S. Design and Construction of Concrete Shell Roofs, CBS Publishers, India (1986).

Reference Books :

- Rudolph Szilard. Theories and Application of Plate Analysis, John Wiley & Sons, USA (2004). 2. Shames, I.H., and Dym, C.L., Energy and Finite Element Methods in Structural Mechanics, New Age International Publishers, 2003.

Prerequisite: NIL