## ME 676 Theory of Plates and Shells (3-0-0-6)

## **Pre-requisite:** Solid Mechanics I

Energy principles and variational methods; Theory of plates: Kinematics of plates, Variational formulations of plate problems, Governing equations, boundary conditions and initial conditions, Thermal stresses in plates; Bending of simply supported rectangular plates: Navier's solutions, Levy's solutions; Bending of rectangular plates with various edge conditions; Bending of circular plates; Bending of plates of various shapes; Plates on elastic foundations; Buckling of plates; Post buckling behavior of plates; Vibration of plates; Introduction to the nonlinear analysis of plates; Theories of shells: Kinematics of shells, Approximate theories of shells (Donnel's theory, Love's theory, Sander's theory etc.), Analytical solutions of singly-curve and doubly-curve shells, Thermal stresses in shells; The membrane theory of shells; The moment theory of shells; Buckling of shells; Vibration of shells; Introduction to the nonlinear analysis of shells.

## Textbooks:

- [1] S. Timoshenko and S. K. Woinowsky, "Theory of Plates and Shells", McGraw-Hill International, 2007
- [2] J. N. Reddy, "Theory and Analysis of Elastic Plates and Shells", CRC Press, 2006.

## References:

- [1] E. Ventsel and T. Krauthammer, "Thin Plates and Shells", Marcel Dekker, Inc., 2001.
- [2] A. Ugural, "Stresses in Plates and Shells", McGraw Hill, 1999.
- [3] P. L. Gould, "Analysis of Shells and Plates", Springer-Verlag, 1988.
- [4] C. L.Dym., "Introduction to the Theory of Shells", Hempshire Publishing Corp., 1990.