

I YEAR M. TECH (MACHINE DESIGN) SECOND SEMESTER

17MEMD2T5B

THEORY OF PLATES AND SHELLS

Credits 4

Lecture: 4 periods/week

Internal assessment: 40 marks

Tutorial: - -

Semester end examination: 60 marks

COURSE OBJECTIVES:

- To impart Knowledge on the analysis of different types of plates and shells under different boundary conditions.
- To impart knowledge on the behavior of plates and shell elements, their places of utility and of course the design procedure of such elements in practical applications.
- To provide a knowledge of the fundamentals of theory of shells and folded plates

COURSE OUTCOME:

On completion of this course, students are able to

1. Understand the Simple bending of Plates and Different Boundary Conditions for plates.
2. Analyze circular plates subjected to different kinds of loads.
3. Understand the concept of Material Orthotropy, Structural Orthotropy and Plates on elastic foundation
4. Design various types of shells structures and folded pipes.

UNIT-I

Simple bending of Plates, Assumptions in thin plate theory, Different relationships, Different Boundary Conditions for plates, Plates subjected to lateral loads, Navier's method for simply supported plates, Levy's method for general plates, Example problems with different types of loading.

UNIT-II

Circular plates subjected to Axi-symmetrical loads, concentrated load, uniformly distributed load and varying load, Annular circular plate with end moments, Rayleigh-Ritz method, Application to different problems, Finite difference method, Finite element methodology for plates.

UNIT-III

Orthotropic Plates, Bending of anisotropic plates with emphasis on orthotropic plates, Material Orthotropy, Structural Orthotropy, Plates on elastic foundation.

UNIT-IV

Shells- Classification of shells - Membrane and bending theory for singly curved and doubly curved shells - Various approximations -Analysis of folded plates.

Learning Resources

Text book:

1. Theory and Analysis of Plates by Rudolph Szilard, Prentice Hall, New Jersey 1986.
2. Theory of Plates and Shells by Timoshenko S.P and Woinowsky Krieger, McGraw Hill, 1984.
3. Design and Construction of Concrete Shell Roofs by G. S. Ramaswamy, CBS Publishers. 2005.

References:

1. Theory and Analysis of Elastic Plates and Shells by J N Reddy, CRC Press, 2007.
2. Theory of Plates by K Chandra Shekhara, University Press, Hyderabad, 2001.