Gautam Buddha University; Greater Noida

School of Engineering (Mechanical Engineering)

Degree	Course Name	Course Code	Marks:100
M. Tech. in Design Engg.	Theory of Plates and Shells	MED 514	SM+MT+ET 25+25+50
Semester	**Credits**	**L-T-P**	**Exam.**
II	3	3-0-0	3 Hours

Unit-I

Basic Concept: Simple bending of plates; Assumptions in thin plate theory; Different boundary conditions for plates; Plates subjected to lateral loads; Classical small-deflection theory of thin plates. **(08 Hours)**

Unit-II

Plate Equation: In cartesian coordinate system; Boundary conditions of Kirchhoff's plate theory; Refined theories for moderately thick plates.

(04 Hours)

Unit-III

Three-Dimensional Elasticity Equations: Thick plates; Membranes; Rigorous solution of circular plates subjected to rotationally symmetric loading; Solutions of membrane problems. **(05 Hours)**

Unit-IV

Solution Methods: Exact and series solutions of governing differential equations; Rigorous solution of plate equation; Solutions by double trigonometric series (Navier's approach); Solutions by single trigonometric series (Levy's method); Further examples of series solutions extensions of Navier's and Levy's methods; Series solutions of moderately thick plates. **(10 Hours)**

Unit-V

Energy and Variational Methods: Solution of lateral deflections; Introduction and basic concepts; Ritz's method; Galerkin's method and its variant by vlasov; Further variational and energy procedures; Techniques to improve energy solutions; Application of energy methods to moderately thick plates; Rayleigh-Ritz methods.   **(10 Hours)**

Unit-VI

Specific Problems: Application to different problems; Shells; Classification of shells; Membrane and bending theory for singly curved and doubly curved shells; Various approximations.   **(08 Hours)**

Recommended Books:

1. Theory and Analysis of Plates; Rudolph Szilard; Prentice Hall; New Jersey; 1986.
2. Theory of Plates and Shells; Timoshenko; Stephen P.; and S. Woinowsky-Krieger; 2nd ed. New York; NY: McGraw Hill; 1984.
3. Theory and Analysis of Elastic Plates and Shells; J. N. Reddy; CRC; 2nd Edition; December 2006.
4. Analysis of Shells and Plates; P.L. Gould; Prentice Hall; 1999.
5. Theory of Plates; K. Chandrashekhara; Universities Press (India) Limited; Hyderabad; India; 2001.