COURSE DESCRIPTION

Approval: 24th Senate Meeting

Course Number: CE-612
Course Name: Theory of Plates and Shells
Credits: 3-0-0-3
Prerequisites: Theory of Elasticity, Advance Solid Mechanics (CE 557, ME 606)

Intended for: M.Tech./M.S./Ph.D./ B. Tech (3rd and 4th Year)
Distribution: Elective
Semester: Odd/Even

1. Preamble: This course is an advanced course in theory of elasticity and is equally important for the postgraduate students in Civil, Mechanical and Aerospace engineering as well as for practicing engineers to understand the behavior of thin/thick curved structural members under applied loads. The course starts with the introduction to the plate bending theory, assumptions and its applications to the different fields of engineering. Later on, the concept of curvature is introduced to study the behavior of shells.

2. **Modules with Quantitative hours:**

   1. Introduction to classical plate theory and governing equations, stress resultants, boundary conditions. (6 hours)
   2. Solution of bending of rectangular plates using Navier and Levy methods. (4 hours)
   3. Bending of circular plates. (4hours)
   4. Vibration and buckling of rectangular and circular plates. (4hours)
   5. Introduction to surfaces, Strain displacement relations in curvilinear coordinates, Classification of shells. (6hours)
   6. Membrane theory of shells and governing equations, stress resultants, boundary conditions. (6 hours)
   7. Analysis of axisymmetric shells. (4 hours)
   8. Bending, buckling and vibration of circular cylindrical shells. (8 hours)

3. **Textbooks:**
   - **a.** S.P. Timoshenko and S. Woinwosky-Kriegger, "Theory of Plates and Shells", 2nd Ed., McGraw Hill, Singapore (2010).
   - **b.** W. Soedel, "Vibrations of Shells and Plates", Marcel Dekker, New York (2004).
   - **c.** D.O. Brush and B.O. Almorth, "Buckling of Bars, Plates and Shells", McGraw Hill, New York (1975).

4. **References:**
   - **1)** H. Kraus, "Thin Elastic Shells", John Wiley and Son, New York (1967).
   - **2)** E. Ventsel and T. Krauthammer, "Thin Plates and Shells Theory, Analysis, and Applications" Marcel Dekker, Inc, New York, Basel (2001).
   - **3)** K. Chandrashekhara, "Theory of Plates" Universities Press (India) (2001).
   - **4)** J.N. Reddy, Theory and Analysis of Elastic Plates and Shells. Taylor & Francis Inc, CRC Press Inc (2006).

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5. Similarity Contents Declaration with Existing Courses:

Sr. No.	Course code	Similarity Contents	Approx.% of Contents
NIL			

6. Justification for new course proposal if cumulative similarity contents is >30%
N.A.