Course Code	Course Title	L	T	P	C
17CE006	THEORY OF PLATES AND SHELLS	3	1	0	4

Course Objectives:
1. To introduce the concept of plate theory.
2. To study the behaviour and analysis of thin plates.
3. To study the behaviour and analysis of rectangular plates and circular plates.
4. To present the foundations of the classical theory of shells based on the Kirchhoff-Love assumptions.
5. To study the classification of shell surfaces

Course Outcomes:
At the end of the course student will be able
1. To assess the strength of plate panels under point, linearly varying and uniformly distributed loads.
2. To analyse plates under different boundary conditions by various classical methods and approximate methods.
3. To be familiar with classification of shells and classical shell theories and apply them in engineering design
4. To be exposed to singly curved shells, doubly curved shells and cylindrical shells.

ACTIVITIES:
1. Determination of maximum deflection in plates with different boundary conditions by using classical method and approximate methods
2. Create the rectangular and circular plate by using Ansys
3. Create a typical dome element by using any finite element software
4. Analysis of plate With/Without Central Hole

SKILLS
1. Ability to analyze the plate with different boundary conditions.
2. Ability to understand the basis of finite element software.

UNIT-I: Introduction To Plate Theory
Thin Plates with small deflection. Laterally loaded thin plates, governing differential equation, various boundary conditions

UNIT-II: Rectangular Plates
Rectangular plates. Simply supported rectangular plates, Navier solution and Levy's method, Rectangular plates with various edge conditions, plates on elastic foundation.

UNIT-III: Symmetrical Bending Of Circular Plates
Differential equation for symmetrical bending of laterally loaded circular plates - Simply supported edges - Clamped edges - Circular plate with a circular hole at the center - Circular plate concentrically loaded.

UNIT-IV: Introduction To Shells
Structural behaviour of shells - classification of shells - translational and rotational shells - ruled surfaces - Gaussian curvature - synclastic and anticlastic surfaces. Principal curvatures and lines of curvature

UNIT-V: Cylindrical Shells
Membrane theory of cylindrical shells; Bending theory of cylindrical shells loaded Symmetrically –Approximate solution by Schorer's method, Beam method of analysis

TEXT BOOKS :
1. S.P.Timoshenko and S.Woinowsky-Krieger, "Theory of plates and shells" McGraw-Hill, 1959.
2. A.C.Ugural, "Stresses in Plates and Shells", McGraw-Hill, 1999.
3. Chandrashekahara, K., "Theory of Plates", University Press (India) Ltd., Hyderabad, 2001.

REFERENCE BOOKS:
1. T.K.Varadan and K.Bhaskar , "Analysis of plates", Narosa Publishing House, 1999.
2. Flugge. "Stresses in Shells" , Blaisdell Publishing Co, 1966
3. G.S.Ramaswamy, "Design and construction of concrete shell roofs", CBS Publishers& Distributors,1986.
4. Szilard.R, "Theory and Analysis of Plates – classical and numerical methods", Prentice Hall Inc., 2004
5. Reddy J N, "Theory and Analysis of Elastic Plates and Shells", McGraw Hill Book company, 2006.