Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NCED502	Theory of Plates and Shells	3	0	0	3

Course Objective

The course aims to explore the behavior of plates and shells for different loading and boundary conditions.

Learning Outcomes

Upon successful completion of this course, the students should be able to:

- Development of computer program for analyzing plates and shells subjected to different loading and boundary conditions

Unit No	Topics to be Covered	Contact Hours	Learning Outcome
1.	Classification of plates, Internal forces in various types of plate elements, state of stress in elastic bodies, strain and displacement relation.	6L	Concept of plate and understanding different force and moment resultants in a plate element.
2.	Small deflection theory of thin rectangular plates, Derivation of governing differential equation for thin plates, Plates with different boundary conditions, Circular plates, Plates with other geometric shapes, Plates on elastic foundations.	6L	Derivation of governing equation and application to plates of various shapes
3	Navier's solution, Application to different cases of boundary conditions, Levy's solution for various boundary conditions and subjected to different loadings like uniform and hydrostatic pressure.	9L	Analytical method for solving plate problems with different boundary conditions
4	Equilibrium method and energy method for stability analysis of plates, Free vibration analysis of plates.	6L	Stability and dynamic analysis of plates.
5.	Introduction to different shell theories, membrane theory of cylindrical shells, Bending theory of cylindrical shells	9L	Modelling of a shell by using different shell theories
6.	Introduction to basic computer programming blocks for analytical methods of plate and shell problems.	6L	Development of basic computer programs.
	Total Contact Hours	**42 L**	

Text Books:

1. Szilard, R. (2004) Theories and applications of plate analysis: classical, numerical and engineering methods. John Wiley & Sons.
2. Krauss H. (1967) Thin Elastic Shells: An Introduction to the Theoretical Foundations and the Analysis of Their Static and Dynamic Behavior. John Wiley & Sons.

Reference Books:

1. Timoshenko, S. P., and Woinowsky-Krieger, S. (2017). Theory of plates and shells. McGraw-hill.
2. Reddy J. N. (2006) Theory and Analysis of Elastic Plates and Shells. CRC Press.
3. Ugural A. C. (2017) Plates And Shells Theory And Analysis 4Ed. CRC Press.