Course Type	Course Code	Name of Course	L	T	P	Credit
DC	NCEC522	Theory of Elastic Stability	3	1	0	4

Course Objective

- The primary focus of this course is to understand the concept and importance of stability along with derivation of governing equations and analysis of stability behaviour of different structural elements.

Learning Outcomes

After studying this course, students should be able to:

•Understand the importance of stability behaviour in design of modern light weight structures.

•Derive the governing equations for different structures.

•Analyse the stability characteristics of different structural elements under both static and dynamic loadings.

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
1	Introduction to Variational Calculus and Fundamental Principles of Stability, Mechanical Models of Stability.	8L+2T	Concept of stability analyses. Different methods of stability analysis.
2	Elastic Stability of Column and Beam-Column, Energy Criterion and Energy Based Method.	10L+3T	Derivation of GDE for stability analysis of continuous system. Energy based methods.
3	Lateral Buckling of Beams, Combined Bending and Torsion, Torsional Buckling and Flexural-Torsional Buckling of Thin-Walled Open Sections.	10L+3T	Concept of uniform and non-uniform torsion. Modelling and solution methods for flexural-torsional buckling of different open sections
4	Elastic Stability of Frames, Rings, Curved Beams and Arches.	5L+2T	Derivation of GDE and stability analysis of curved beams and arches
5	Buckling and Post-Buckling of Plates and Shells Parametric Resonance, Mathieu Equations, Dynamic Stability of Simply Supported Column.	7L+2T	Modelling and solution methods for plates and shells. Concept of stability analysis under periodic loadings.
6	Numerical Modelling and Analysis using ABAQUS/ANSYS: Column and Plate	2L+2T	Introduction to ABAQUS/ANSYS for stability analysis of column and plate.
	Total Contact Hours	**42L+14T**	

Text Books:
1. Simitses, G.J and Hodges, D.H. (2006). Fundamental of Structural Stability, Elsevier.

References:
2. Timoshenko, S.P. and Gere, J.M. (2012). Theory of Elastic Stability, 2nd Edition, McGraw Hill.
3. Bazant, Z.P. and Cedolin, L. (2010). Stability of Structures, World Scientific.