THEORY OF STRUCTURAL STABILITY

I Semester: ST								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
BSTC05	**Elective**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	0	0	3	30	70	100
Contact Classes: 45	**Total Tutorials: Nil**	**Total Practical Classes: Nil**				**Total Classes: 45**		

I. COURSE OVERVIEW:

Structural stability of the building is the condition of safely transferring the load on the building (Self weight of the building and Live load on the building like human loads, furniture load etc.). Failure occurs because of loads acting on the structure. A structure which will not topple over easily when acted upon by a load is said to be stable. This is very important because when the tilting force is removed, gravity pulls the structure back to its original position.

II. COURSE OBJECTIVES:

The student will try to learn:

I. The fundamentals of stability of columns and frames for designing efficient structures.
II. The Assessment of buckling of thin walled bars and lateral buckling of beams, rectangular plates
III. The concept of stability criteria for analyzing discrete and continuous systems.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:		
CO 1	Analyze the buckling of columns, beam-columns and find critical loads using energy methods.	Analyze
CO 2	Analyze the buckling of columns, beam-columns and find critical loads non-energy methods.	Analyze
CO 3	Analyze the lateral buckling of beams by energy and non-energy methods.	Analyze
CO 4	Analyze the buckling of rectangular plates and for various boundary conditions.	Analyze
CO 5	Find critical compressive loads for various boundary conditions.	Create
CO 6	Analyze the buckling of axially loaded cylindrical shells.	Analyze

IV. SYLLABUS:

MODULE-I: CRITERIA FOR DESIGN OF STRUCTURES (09)

Stability, Strength, and Stiffness, Classical Concept ofStability of Discrete and Continuous Systems, Linear and nonlinear behavior.

MODULE-II: STABILITY OF COLUMNS (09)

Axial and Flexural Buckling, Lateral Bracing of Columns, Combined Axial, Flexural and Torsion Buckling.

MODULE-III: STABILITY OF FRAMES (09)

Introduction, modes of buckling, Member Buckling versus Global Buckling,critical load using various methods

Differential equation buckling, Relative slenderness, Slenderness Ratio of Frame Members.

MODULE-IV: STABILITY OF BEAMS (09)
Lateral torsion buckling, Stability of Plates: axial flexural buckling, shear flexural buckling, buckling under combined loads.

MODULE-V: STABILITY OF PLATES (09)
Axial flexural buckling, shear flexural buckling, buckling under combined Loads. Introduction to Inelastic Buckling and Dynamic Stability.

V.TEXT BOOKS:

1. Timoshenko and Gere , "Theory of elastic stability", Tata McGraw Hill,1981.
2. Alexander Chajes, "Principles of Structural Stability Theory", Prentice Hall, New Jersey, 1992.

VI.REFERENCE BOOKS:

1. Iyengar, N. G. R, "Structural Stability of columns and plates", Eastern west press Pvt. Ltd, 1996
2. Bleich F. Bucking, "Strength of Metal Structures", Tata McGraw Hill, New York, 2001.

VII. WEB REFERENCES:

1. http://nptel.ac.in/courses/105106116/10

VIII. E-TEXT BOOKS:

1. https://www.colorado.edu/engineering/CAS/courses.d/Structures.d/IAST.Lect23.d/IAST.Lect23.Slides.pdf