COURSE CONTENT

STRUCTURAL STABILITY								
I Semester: SE								
CourseCode	**Category**	**Hours/ Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
2512043	**PE-I**	3	0	0	3	40	60	100
Contact Classes:45	**Tutorial Classes:Nil**	**Practical Classes:Nil**				**TotalClasses:45**		
Prerequisites: RCC Design and Analysis								

Course Overview:

Structural Stability is a course that focuses on the behavior of structures under compressive loads, studying concepts such as buckling, critical load, and stability of columns, beams, and frames, along with analytical methods to determine safe load-carrying capacity, helping students understand and prevent structural failure in engineering applications.

Course Objectives:

1. To understand stability, strength, and stiffness concepts and the linear–nonlinear behavior of structural systems.
2. To analyze column stability under axial, flexural, and torsional buckling conditions.
3. To distinguish between member and global buckling and evaluate frame stability using slenderness criteria.
4. To evaluate lateral–torsional buckling in beams and various buckling modes in plates under different loads.
5. To understand the fundamentals of inelastic buckling and dynamic stability of structures.

Course Outcomes: After completion of the course, students will be able to

1. Explain the criteria for structural design including stability, strength, and stiffness, and differentiate between linear and nonlinear behavior in discrete and continuous systems.
2. Demonstrate the stability behavior of columns under axial, flexural, and torsional buckling with and without lateral bracing.
3. Investigate the global and local stability of frame structures by examining slenderness ratios and buckling interactions.
4. Assess the susceptibility of beams and plates to different buckling modes under axial, shear, and combined loads.
5. Illustrate the concepts of inelastic and dynamic buckling through examples of structural behavior beyond the elastic limit.

SYLLABUS:

UNIT–I
Criteria for Design of Structures: Stability, Strength, and Stiffness, Classical Concept of Stability of Discrete and Continuous Systems, Linear and nonlinear behavior.

UNIT–II
Stability of Columns: Axial and Flexural Buckling, Lateral Bracing of Columns, Combined Axial, Flexural and Torsion Buckling.

UNIT–III
Stability of Frames: Member Buckling versus Global Buckling, Slenderness Ratio of Frame Members.

UNIT–IV
Stability of Beams: lateral torsion buckling.
Stability of Plates: axial flexural buckling, shear flexural buckling, buckling under combined loads.

UNIT–V
Introduction to Inelastic Buckling and Dynamic Stability.

REFERENCE BOOKS:

1. Theoryofelasticstability,TimoshenkoandGere,TataMcGrawHill,1981
2. PrinciplesofStructuralStabilityTheory,AlexanderChajes,PrenticeHall,NewJersey.
3. Structural Stabilityofcolumnsandplates,Iyengar,N.G.R.,EasternwestpressPvt.Ltd.
4. StrengthofMetal Structures, BleichF.Bucking,TataMcGrawHill,NewYork.

ELECTRONICRESOURCES:

1. https://nptel.ac.in/courses/105105217

MATERIALSONLINE:

1. Course template
2. Tutorial question bank
3. Definitions and terminology
4. Assignments
5. Model question paper–I
6. Model question paper–II
7. Lecture notes
8. E-Learning Readiness Videos(ELRV)