

(CE516) STABILITY OF STRUCTURES

Objective of the Course:

The students will be able to evaluate and compare modern techniques and methods in structural stability. The students will become familiar with calculation and experimental methods for defining critical external loads of sleek construction elements and constructions where unstable situations appear, which makes the construction unstable and results in inward or outward flexing.

UNIT-I

Buckling of columns

Introduction – concepts of stability – methods of Neutral Equilibrium– Euler column – Eigen value problem – Axially loaded column – Eccentrically loaded column.

UNIT-II

Energy principle

Raleigh Ritz method – Galerkin method – Numerical methods (New mark's difference and matrix methods).

UNIT-III

Beams and Beam columns

introduction – lateral buckling of beams – beam column with concentrated and distributed loads – effect of axial load on bending stiffness.

UNIT-IV

Buckling of frames

Introduction – modes of buckling – critical load using various methods –Neutral equilibrium – slope deflection equations, matrix method.

UNIT-V

Buckling of plates

Differential equation of plate bucklings – critical load on plates for various boundary conditions – Energy method – Finite difference method.

TEXT BOOKS:

1. Alexandar Chajes, Principles of Structural Stability Theory, Prentice Hall, New Jersey, 1980.
2. "Theory of Elastic Stability" by Timoshenko and Gere.

REFERENCE BOOKS:

1. Background to buckling by Allen and Bulson, McGraw-Hill, 1980.
2. Elastic stability of structural elements by N.G.R.Iyengar, Macmillan India Ltd., 2007