

STABILITY OF STRUCTURES (11 – CE 542)

SYLLABUS

L	T	P	Cr
3	0	0	3

Buckling of Columns

Introduction; Methods of finding critical loads; Critical loads for straight columns with different end conditions and loading; Inelastic buckling of axially loaded columns; Energy methods; Prismatic and non-prismatic columns under discrete and distributed loading; General Principles of elastic stability of framed structures.

Buckling of thin walled members of open cross section

Torsion of thin-walled bars; warping; Non-uniform torsion; Torsional buckling under axial loading; Combined bending and torsion buckling.

Lateral Buckling of Beams

Beams under pure bending; Cantilever and simply supported beams of rectangular and I-sections; Beams under transverse loading; Energy methods; Solution of simple problems.

Buckling of Rectangular Plates

Plates simply supported on all edges and subjected to constant compression in one or two directions; Plates simply supported along two opposite sides perpendicular to the direction of compression and having various edge conditions along the other two sides.

Buckling of Shells

Introduction to buckling of axially compressed cylindrical shells.

Mathematical treatment of stability problems

Discrete/Discontinuous systems; Eigen value problem; Converting continuous systems to discrete systems using the finite element method – Buckling of a column with sudden change in cross-section

Text Books:

1. Theory of elastic stability by Timoshenko & Gere, McGraw Hill, 1961.

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