CE/BOS/CE C201/0513

K L UNIVERSITY
MECHANICS OF MATERIALS (13-CE 201)

Pre – requisite: 13 – ES 106

L	T	P	Cr
3	0	2	4

Competencies

1. Compute shear force and bending moment & sketch SFD and BMD for statically determined structure
2. Compute stresses and principal stresses
3. Analyse the member for torsion
4. Understand and analyze columns and thin pressure vessels

SYLLABUS

Shear Force and Bending Moment: Diagrammatic conventions for supports; Diagrammatic conventions for loading; Classification of beams; Concept of shear force and bending moment; relationship between load, shear force and bending moment, Shear force and bending moment diagrams for statically determinate beams and frames.

Pure Bending and Shearing Stresses of Beams: The flexure formula; Computation of the moment of inertia; Remarks on the flexure formula. The shearing stress formula for beams; Shear stress distribution for various sections; Shear centre**.**

Analysis of Plane Stress: Normal stress, shear stress, state of stress at a point, ultimate strength, allowable stress, factor of safety; normal strain, shear strain, Hooke's law, Poisson's ratio, analysis of axially loaded members. Equations for the transformation of plane stress; Principal Stresses; Principal planes; Maximum shearing stresses; Mohr's circle of stress; Construction of Mohr's circle of stress.

Torsion: torsional deformations of a circular bar, circular bar of elastic materials, stresses and strain in pure shear, relationship between E and G.

Columns: Stability of equilibrium; The Euler's formula for columns with different end restraints; Limitations of the Euler's formulas; Generalized Euler buckling - load formulas; The Secant formula; Rankine's empirical formula.

Thin pressure vessels: Concepts of hoop and longitudinal stresses, Analysis of cylinders and shells.

Text books:

1. Mechanics of materials by J.M. Gere, Thomsombrooks/Cole India edition, Sixth edition, 2006.
2. Strength of Materials by Andrew Pytel & F. L. Singer, Harper Collin Publisher's Pvt. Ltd. New Delhi, Fourth edition.

Reference Books:

1. Strength of Materials Part I & II by S P Timoshenko. CBS Publishers and distributors, New Delhi, 3rd Edition.
2. Mechanics of Materials by Riley, Strurges and Morris, John Wiley and Sons Inc. fifth Edition.

List of experiments

1. Uni-Axial Tension Test On A Specimen of Mild Steel
2. Direct Shear Test on Mild Steel Bar
3. Brinell's Hardness Test
4. Charpy Impact Test
5. Izod Impact Test
6. Torsion Test
7. Test on Spring