CE/BOS/CE204/0412

K L UNIVERSITY

STRENGTH OF MATERIALS (11 – CE 204)

L	T	P	Cr
3	0	2	4

SYLLABUS

Introduction of theory of elasticity: ; Elastic material properties; Stress equation of equilibrium, Strain displacement relations, Compatibility equations, Stress Strain Relations, Hooke's law and tension test, Solution of elasticity equations-stress function approach, Von – mises stresses

Energy methods: Euler's Lagrange's equations; Virtual Work, Shape functions for displacement and solution by energy methods,

Beams: Beam theories, Classical & Finite element methods of one dimensional structures; axial, Torsional and bending elements and stiffness matrices;

Shearing Forces and Bending Moments: Shear force and bending moment, relationship between load, shear force and bending moment, Shear force and bending moment diagrams.

Stresses in Beams: Introduction, Normal strains in beams, normal stresses in beams, cross section shapes of beams, shear stresses in rectangular beams, shear stresses in the webs of beams with flanges.

Deflection of beams: Introduction, Deferential equations of the deflection curve, deflections by integration of the bending moment equation, Moment area method, Macaulay's Method.

Columns: Buckling and Stability, Columns with Pinned ends, Columns with other support conditions, Limitations of Euler's Formula, Rankine's Formula, Columns with eccentric Axial Loads, Secant formula.

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

Thermal Stress: Thermal stresses and strains

Computer aided stress analysis with cases dealt in the class and visualize the stress and strain distribution in the structures

Text Books:

1. Theory of Elasticity – Timoshenko & Goodier
2. Mechanics of Materials – Gere and S.P.Timoshenko

Reference Books:

1. Introduction to Finite Element method – Chandrupatla & Belagundu
2. Theory of Elasticity – Dym & Shames
3. Engineering Mechanics of Solids – E . P. Popov,