BASICS OF CIVIL ENGINEERING
CE-101

L: 2 T: 1 P: 0 Cr: 3

On completion of the course, the students will be able to:
1. Determine the engineering properties of the materials and solids.
2. Analyze the internal forces for statistically determinate and compound members.
3. Apply the concept of compound stresses for axial, flexure, shear and torsion.
4. Apply the concept of principal strain and strain tensor for the analysis of different structural members.
5. Apply the concepts of shear force, bending moment, axial force for statically determinate beams.

SYLLABUS

Unit-I :Stresses & Strains:
Introduction, normal stress & strain, shear stress & strain, relationship between stress and strain, Uniaxial tension test: Stress-Strain diagrams for different materials, Mechanical properties of materials: isotropy, homogeneity, continuity, elasticity, brittleness, yielding, plasticity, work hardening, ductility, hardness, toughness, creep, relaxation, fatigue; Uniaxial deformations: Saint Venant's principle, principle of superposition, free body diagrams, bars of uniform cross sections.

Unit-II : Uniaxial Deformations:
Bars of variable cross sections, compound/ composite bars, temperature stresses.

Unit-III : Analysis of Stresses:
Tensor notations, equilibrium equations, transformation of stresses, invariants of stress tensor, plane stress condition, principal stresses, maximum shear stress and their planes, Mohr's circle.

Unit-IV : Analysis of Strains:
Transformation of strains, invariants of stain tensor, plane strain condition, principal strains, maximum shear strain and their planes; Strain Rosettes; Stress –Strain relationship, generalized Hooke's law, relation between elastic constants.

Unit-V : Structures and Their Forms:
Loads, idealization of structures, supports and connections, elastic and linear behaviour of structures, determinate and indeterminate structures, SF & BM: relation between B.M., S.F. and loads, S.F. & B.M. diagrams in statically determinate simply supported (without overhang) and cantilever beams subjected to concentrated loads and UDL

Text Books
1. Engineering Mechanics of Solids By E.P. Popov, Pearson Education.
2. Solid Mechanics by S.M.A. Kazimi, Tata McGRAW HILL.
3. Mechanic of Materials by R.C. Hibbeler, Pearsons Education

Reference Books
1. Mechanics of Materials by Beer & Jonhson, Dewolf, McGRAW HILL.
2. Strength of Materials by S. Timoshenko, CBS Publisher
3. Strength of Materials by R. K. Rajput, S Chand