AMIE05 STRENGTH OF MATERIALS

UNIT-1 STRESS, STRAIN AND DEFORMATION OF SOLIDS

1.1 Rigid bodies and deformable solids
1.2 Tension, Compression and Shear Stresses
1.3 Deformation of simple and compound bars
1.4 Thermal stresses- Elastic constants-
1.5 Volumetric strains
1.6 Stresses on inclined planes- principal stresses and principal plane, Mohr's circle of stress.

UNIT-2 TRANSVERSE LOADING ON BEAMS AND STRESSES IN BEAM

1.1 Beams- types' transverse loading on beams
1.2 Shear force and bending moment in beams
1.3 Cantilevers- Simply supported beams and over- hanging beams.
1.4 Theory of simple bending- bending stress distribution
1.5 Load carrying capacity-
1.6 Proportioning of sections- Flitched beams- Shear stress distribution.

UNIT-3 TORSION

3.1 Torsion formulation stresses and deformation in circular and hollows shafts- Stepped shafts
3.2 Deflection in shafts fixed at the both ends- Stresses in helical springs
3.3 Deflection of helical springs, carriage springs.

UNIT-4 DEFLECTION OF BEAMS

4.1 Double Integration method
4.2 Macaulay's method
4.3 Area moment method for computation of slopes and deflections in beams
4.4 Conjugate beam and strain energy
4.5 Maxwell's reciprocal theorems.

UNIT-5 THIN CYLINDERS, SPHERES AND THICK CYLINDERS

5.1 Stresses in thin cylindrical shell due to internal pressure circumferential and longitudinal stresses and deformation in thin and thick cylinders
5.2 Spherical shells subjected to internal pressure
5.3 Deformation in spherical shells
5.4 Lame's theorem.

References Books:

1. Egor. P.Popov "Engineering Mechanics of Solids" Prentice Hall of India, New Delhi, 2001
2. Subramanian R., "Strength of Materials", Oxford University Press, Oxford Higher Education Series, 2007.
3. Hibbeler, R.C., "Mechanics of Materials", Pearson Education, Low Price Edition, 2007