AMTE-8 SOLID MECHANICS

UNIT-1 STRESS, STRAIN AND DEFORMATION OF SOLIDS

1.1 Rigid bodies and deformable solids
1.2 Forces on solids and supports
1.3 Equilibrium and stability
1.4 Strength and stiffness- tension, compression and shear stresses
1.5 Hooke's law and simple problems- compound bars- thermal stresses- elastic constants and Poisson's ratio.

UNIT-2 TRANSVERSE LOADING ON BEAMS

2.1 Beams- support conditions- types of Beams
2.2 Transverse loading on beams- shear force and bending moment in beams
2.3 Analysis of cantilevers, simply- supported beams and over hanging beams
2.4 Relationships between loading, S.F. and B.M.
2.5 In beams and their applications- S.F.& B.M. diagrams.

UNIT-3 DEFLECTIONS OF BEAMS

3.1 Double integration method
3.2 Macaulay's method
3.3 Area
3.4 Moment theorems for computation of slopes and deflections in beams.

UNIT-4 STRESSES IN BEAMS

4.1 Theory of simple bending- assumptions and derivation of bending equation (M/I = F/Y =E/R)
4.2 Analysis of stresses in beams- loads carrying capacity of beams
4.3 Proportioning beam sections- leaf springs- flitched beams
4.4 Shear stress distribution in beams
4.5 Determination of shear stress in flanged beams.

UNIT-5 TORSION AND COLUMNS

5.1 Torsion of circular shafts- derivation of torsion equation ($T/J = fs/R = C\theta/L$)- stress and deformation in circular and hollow shafts- stresses and deformation in circular and hollow shafts- stepped shafts- shafts fixed at both ends
5.2 Stresses in helical springs- deflection of springs- spring constant.
5.3 Axially loaded short columns- columns of unsymmetrical sections- Euler's theory of long columns- critical loads for prismatic columns with different end conditions- effect of eccentricity.

References Books

1 Elangovan, A., Thinma Visai Iyal (Mechanics of Solids in Tamil), Anna University, Madras, 1995.