AMS13 THEORY OF ELASTICITY AND PLASTICITY

UNIT-1 ELASTICITY

1.1 Two dimensional stress analysis- Plane stress- Plane strain- Equations of compatibility- Stress function- Boundary conditions.

1.2 Problem in Rectangular Coordinates- Solution by polynomials- Saint Venent's principles- Determination of displacement- Simple beam problems.

1.3 Problems in Polar Coordinates- General equations in polar coordinates- Stress distribution symmetrical about axis- Strain components in polar coordinates

1.4 Simple and symmetric problems.

UNIT-2 ANALYSIS OF STRESS AND STRAIN IN THREE DIMENSIONS:

2.1 Principle stresses- Homogeneous deformations- Strain spherical and deviatoric stress- Hydrostatic strain.

2.2 General theorems: Differential equations of equilibrium and compatibility- Displacement- Uniqueness of solution- Reciprocal theorem.

UNIT-3 BENDING OF PRISMATIC BARS

3.1 Stress function- Bending of cantilever beam

3.2 Beam of rectangular cross-section

3.3 Beams of circular cross-section.

UNIT-4 PLASTICITY

4.1 Plastic deformation of metals- Structure of metals- Deformation

4.2 Creep stress relaxation of deformation- Strain rate condition of constant maximum shear stress

4.3 Condition of constant strain energy- Approximate equation of plasticity.

UNIT-5 METHODS OF SOLVING PRACTICAL PROBLEMS

5.1 The characteristic method- Engineering method

5.2 Compression of metal under press- Theoretical and experimental data drawing.

Reference Books:

1. Theory of Elasticity/Timoshenko S.P. and Goodier J.N./Koakusha Publishers
2. An Engineering Theory of Plasticity/E.P. Unksov/Butterworths
3. Applied Elasticity/W.T. Wang/TMH.
4. Theory of Plasticity for Engineers/Hoffman and Sacks/TMH.