



### SM-II TUTORIAL SHEET-I

1. A piece of material is subjected to two mutually perpendicular stresses as follows:
  - a) Tensile stresses of 100 MPa and 60 MPa
  - b) Tensile stress of 100 MPa and compressive stress of 60 MPa
  - c) Compressive stress of 100 MPa and tensile stress of 60 MPa
  - d) Compressive stresses of 100 MPa and 60 MPaDetermine the normal and tangential stresses on a plane inclined at 30 degrees to plane of 100 MPa stress. And also find the resultant and inclination?
2. The stresses on two perpendicular planes through a point in a body are 160 MPa and 100 MPa both are compression along with shear stress of 80 MPa. Determine
  - a) The normal and tangential stresses on plane inclined at 30 degrees to the plane of 160 MPa stress. Find also the resultant stress and its direction
  - b) The normal stress on a plane 90 degrees to the inclined plane mentioned in (a)
  - c) Show the results diagrammatically.
3. The stresses on two perpendicular planes through a point in a body are 30 MPa and 15 MPa both are tensile along with the shear stress of 25 MPa. Find
  - a) The magnitude and direction of principal stresses
  - b) The plane of maximum shear stress
  - c) The normal and tangential stress on the plane of maximum shear stress.
4. Show that in a direct stress system, the maximum shear stress in a body is half the magnitude of the applied stress?
5. Deduce the expression for the stresses on an inclined plane in a body subjected to bi-axial stress condition?
6. Derive expression for principal stresses for a body subjected to direct and shear stresses?