

1. (30pts) Please define the following terms :

- (a) stress concentration factor,
- (b) modulus of rigidity,
- (c) proportional limit,
- (d) Saint-Venant's principle,
- (e) dilatation of material,
- (f) plastic section modulus,
- (g) shear flow,
- (h) maximum-shearing-stress criterion,
- (i) strain rosette,
- (j) isotropic material.

2. (25pts) The normal stress-strain diagram for a brass bar of 20×60 mm rectangular cross section can be approximated as shown in Fig. 1. Determine the moment required to cause a maximum normal stress in the bar of 125 MPa. What is corresponding curvature? The residual stresses and the permanent curvature after the moment is removed.

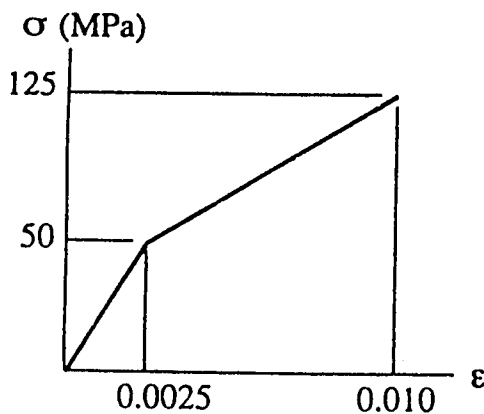


Fig. 1

3. (20pts) The compressed-air vessel AB has an outside diameter of 462 mm and a uniform wall thickness of 6 mm (shown in Fig. 2). Knowing that the gage pressure inside the vessel is 120 kPa, determine the principal stresses and maximum shearing stress at (a) point K, (b) point L.

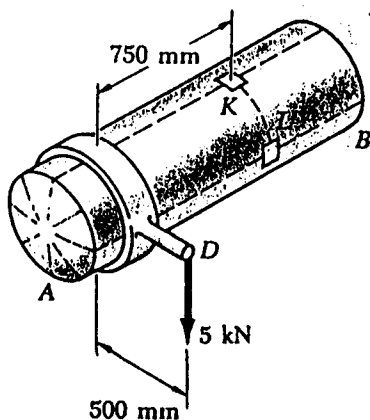


Fig. 2

4. (25pts) For the beam shown in Fig. 3, determine (a) the equation of the elastic curve, (b) the maximum deflection of the beam. Also draw the shear and moment diagrams.

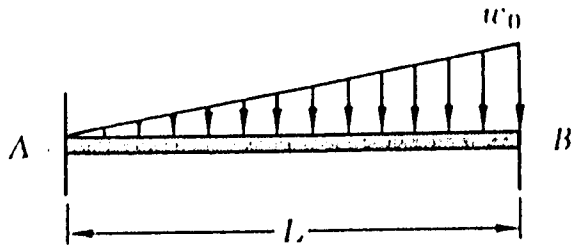


Fig. 3