Arab Academy for Science, Technology & Maritime Transport.
College of Engineering & Technology,
Mechanical Engineering Department.

Stress analysis (ME 276)
Sheet No. 4.

(1) Determine the state of stress at point *A* on the cross section of the pipe at section ***a-a*** shown in Figure 1.

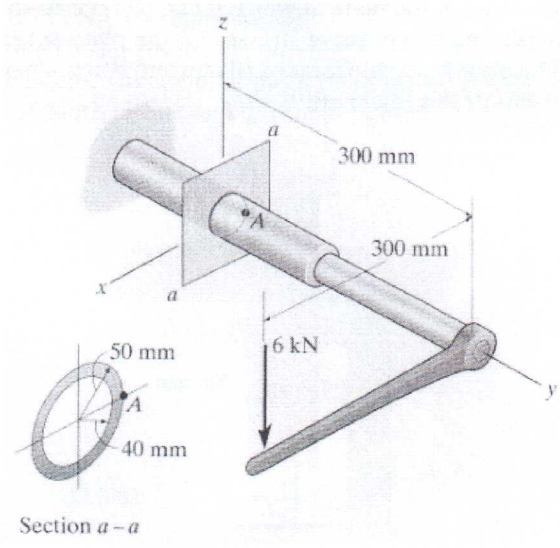

Figure 1.

(2) Determine the state of stress at point *A* on the cross section of the pipe assembly at section ***a-a*** shown in Figure 2.

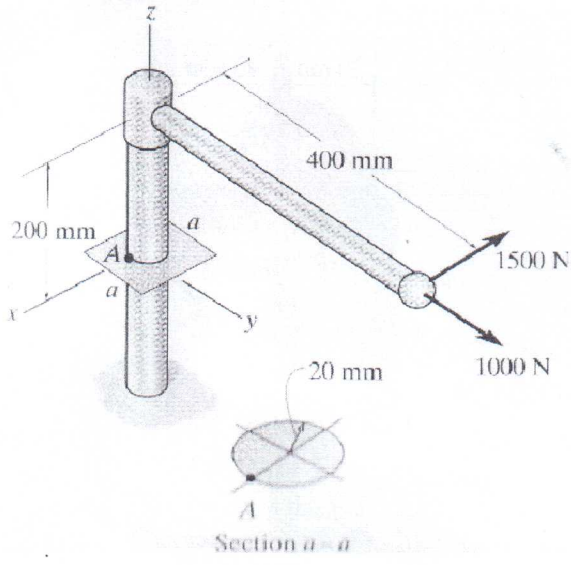

Figure 2.

(3) The joint, shown in Figure 3, is subjected to forces $\boldsymbol{P}$ = 1 KN and $\boldsymbol{F}$ = 0.75 KN. Determine the state of stress at points $\boldsymbol{A}$ and $\boldsymbol{B}$. The member has a rectangular cross-sectional area of width 18 mm and thickness 12 mm.

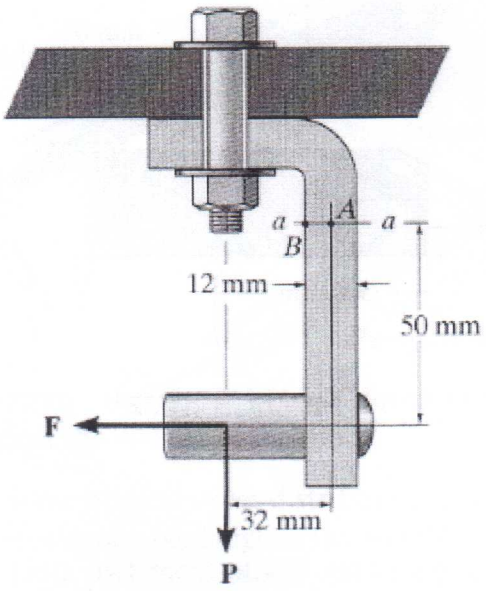

Figure 3.

(4) The bar, shown in Figure 4, has a diameter of 80 mm. Determine the stress components that act at points $\boldsymbol{A}$ and $\boldsymbol{B}$.

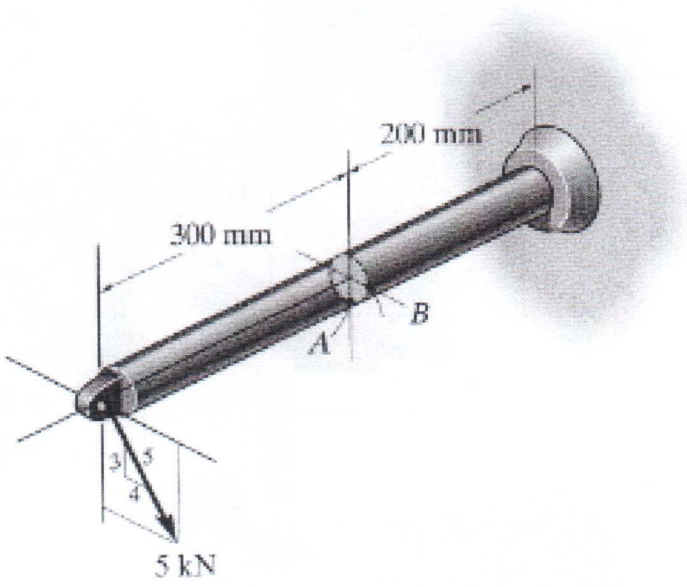

Figure 4.

(5) The bar shown in Figure 5 has a diameter of 40 mm. If it is subjected to the two force components at its end as shown, determine the state of stress at points $\boldsymbol{A}$ and $\boldsymbol{B}$.

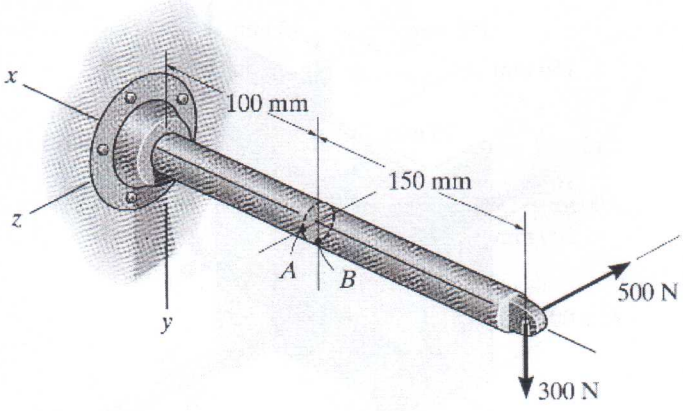

Figure 5.

(6) The 50 mm diameter rod, shown in Figure 6, is subjected to the loads shown. Determine the state of stress at points ***A*** and ***B***.

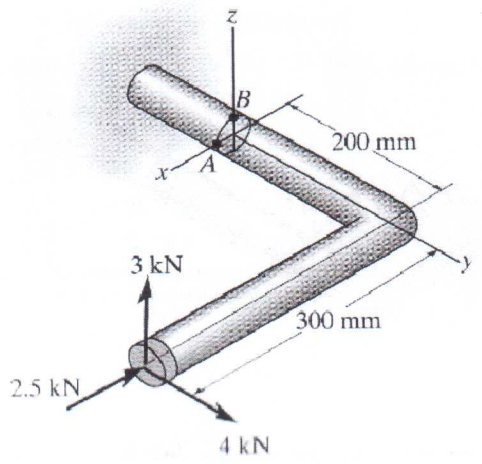

Figure 6.

(7) The uniform sign, shown in Figure 7, has a weight of 7.5 KN and is supported by the pipe ***AB***, which has an inner radius of 68 mm and outer radius of 75 mm. If the face of the sign is subjected to a uniform wind pressure of ***P*** = 8 KN/m2, determine the state of stress at points ***C, D, E*** and ***F***. Neglect the thickness of the sign and assume that it is supported along the outside edge of the pipe.

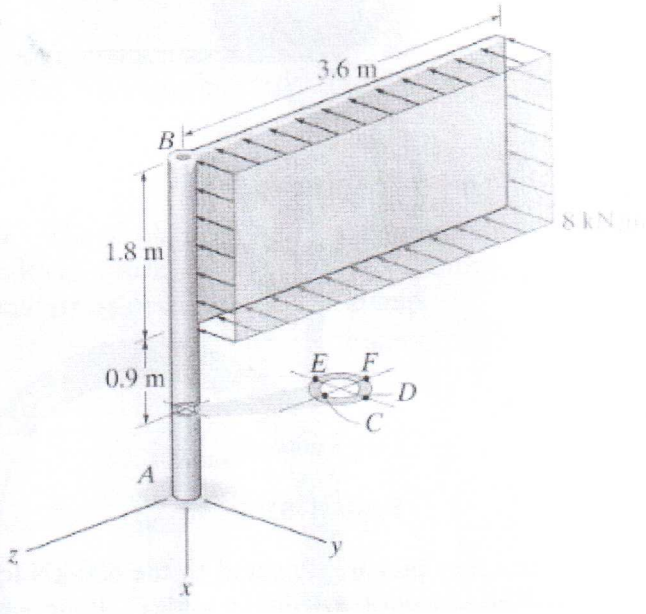

Figure 7.

(8) Determine the state of stress at points ***A*** and ***B*** on the cross section of the pipe at section ***a-a*** as shown in Figure 8.

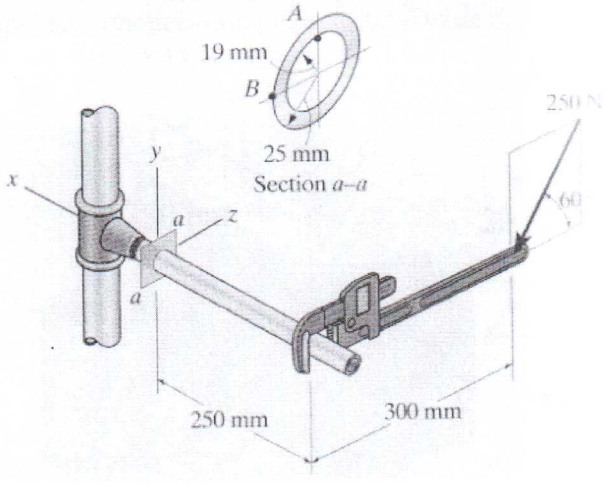

Figure 8.

(9) The bent rod, shown in Figure 9, has a diameter of 20 mm and is subjected to the force of 400 N. Determine the principal stresses and the maximum shear stress that is developed at point ***A***.

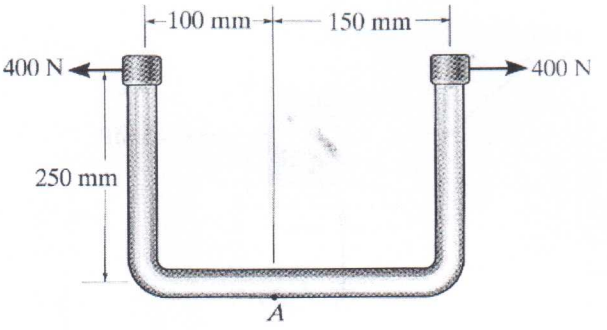

Figure 9.

(10) The bracket, shown in Figure 10, is subjected to the force of 15 KN. Determine the principal stress and maximum shear stress at points ***A*** and ***B*** on the cross section at section ***a-a***.

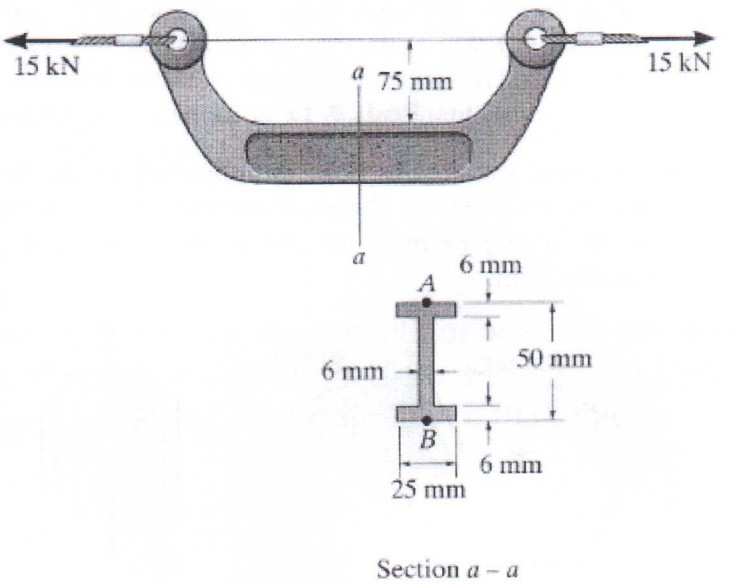

Figure 10.

(11) For the cantilever shown in Figure 11, determine the principal stress developed at point ***A*** on the cross section at section ***a-a***.

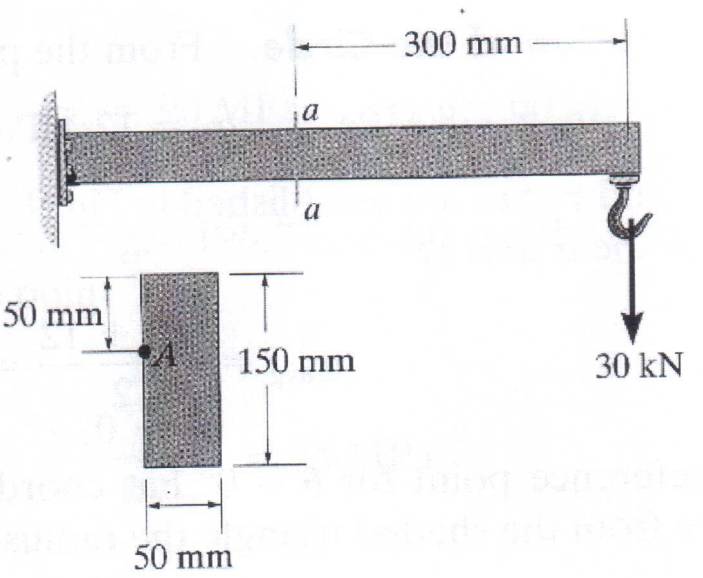

Figure 11.

(12) The steel pipe, shown in Figure 12, has an inner diameter of 68 mm and an outer diameter of 75 mm. If it is fixed at ***C*** and subjected to the horizontal 100 N force acting on the handle of the pipe wrench at its end, determine the principal stresses in the pipe at points ***A*** and ***B***, which are located on the surface of the pipe.

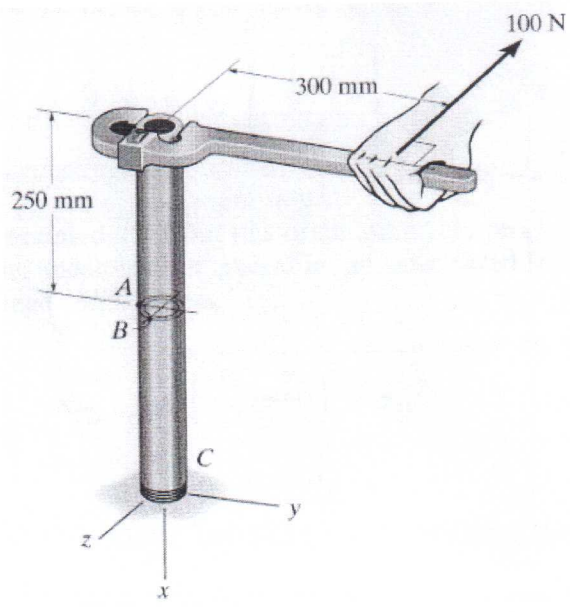

Figure 12.

(13) The offset link, shown in Figure 13, has a width of $w = 200$ mm and a thickness of 40 mm. If the allowable normal stress is $\sigma_{all} = 75$ MPa, determine the maximum load ***P*** that can be applied to the cables.

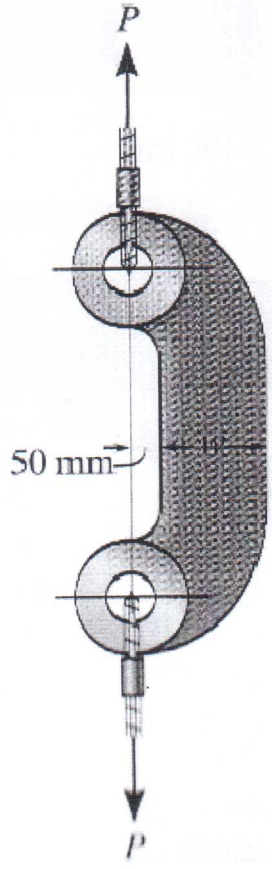

Figure 13.

(14) The wide-flange cantilever shown in Figure 14 is subjected to loading shown. Determine the principal stress at points ***A*** and ***B***. these points are located at the top and bottom of the web, respectively.

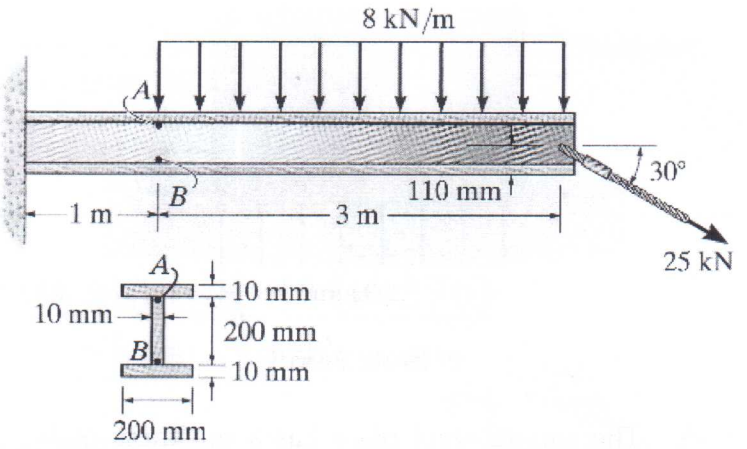

Figure 14.

Although it is not very accurate, use the shear formula to determine the shear stress.

(15) The propeller shaft of the tugboat, shown in Figure 15, is subjected to the compressive force and torque shown. If the shaft has an inner diameter of 100 mm and an outer diameter of 150 mm, determine the principal stress at a point ***A*** located on the outer surface.

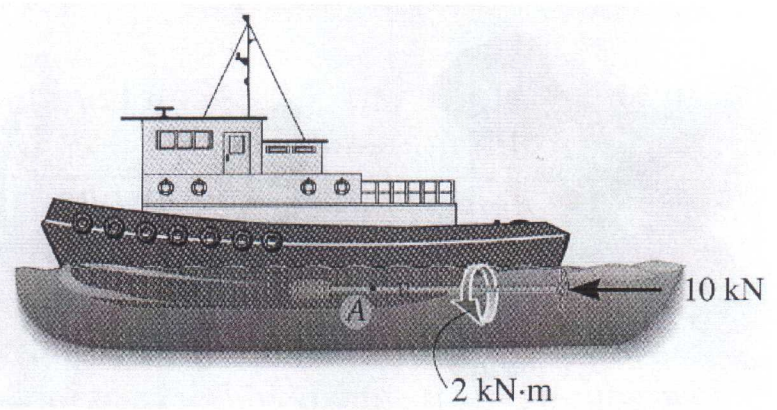

Figure 15.

(16) Determine the state of stress at point ***A*** on the cross section of the shaft at section ***a-a*** shown in Figure 16.

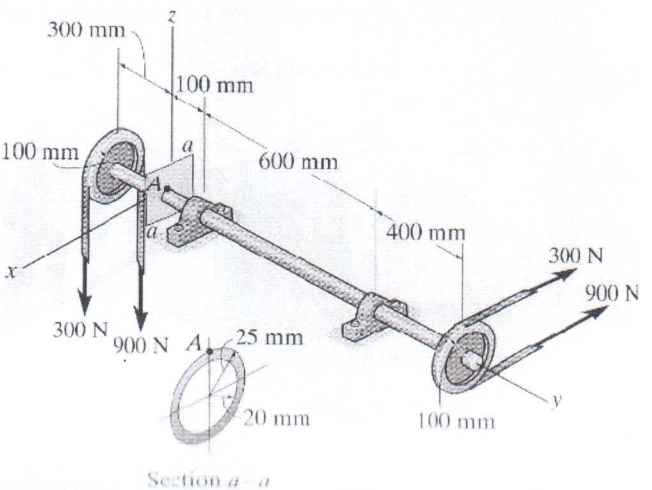

Figure 16.