Name _____

1.11 Bar (1) in Fig. P1-11 has a cross-sectional area of 0.75 in.^{2}. If the stress in bar (1) must be limited to 30 ksi, determine the maximum load P that may be supported by the structure.

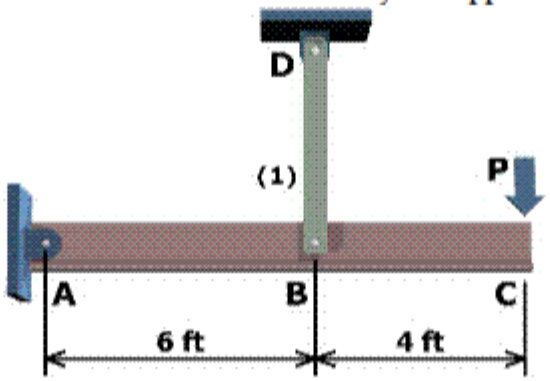


Fig. P1-11

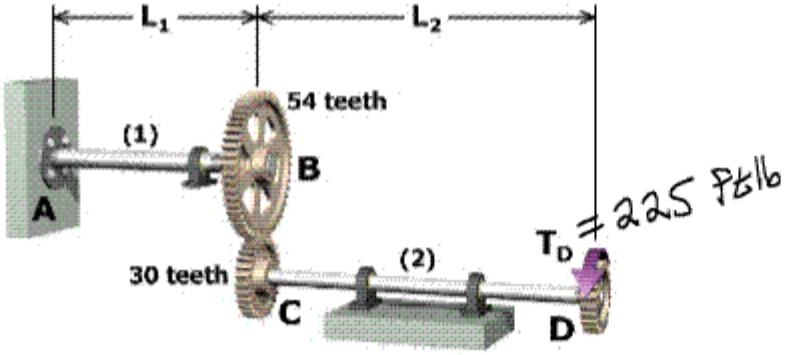
6.39 Two solid 1.75-in.-diameter steel shafts are connected by the gears shown in Fig P6-39. The shaft lengths are $L_1 = 6$ ft and $L_2 = 10$ ft. Assume that the shear modulus of both shafts is $G = 12{,}000$ ksi and that the bearings shown allow free rotation of the shafts. If the torque applied at gear D is $T_D = 225$ lb-ft:

(a) Determine the internal torques T_1 and T_2 in the two shafts.

(b) Determine the angles of twist ϕ_1 and ϕ_2.

(c) Determine the rotation angles ϕ_B and ϕ_C of gears B and C.

(d) Determine the rotation angle of gear D.



10.33 The simply supported beam shown in Fig. P10-33 consists of a W 24×94 structural steel wide flange shape (E = 29,000 ksi; I = 2,700 in.4). For the loading shown, determine the beam deflection at point C.

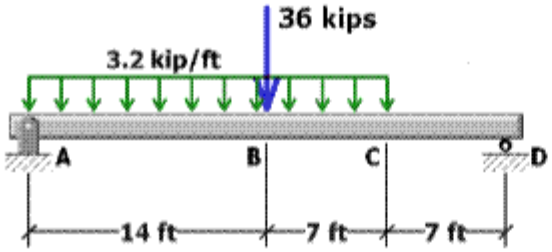


Fig. P10-33

12.33 Consider a point in a structural member that is subjected to plane stress. Normal and shear stresses acting on horizontal and vertical planes at the point are shown.

(a) Determine the principal stresses and the maximum in-plane shear stress acting at the point.

(b) Show these stresses on an appropriate sketch (e.g., see Fig 12-16 or Fig 12-17).

(c) Compute the absolute maximum shear stress at the point.

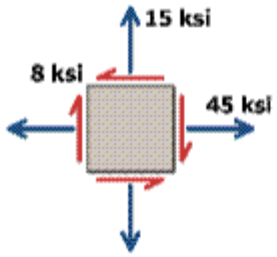


Fig. P12-33

13.58 On the free surface of an aluminum component (E = 70 GPa; $\nu = 0.35$), the strain rosette shown in Fig. P13-58 was used to obtain the following normal strain data: $\varepsilon_a = 980\mu$, $\varepsilon_b = 870\mu$, and $\varepsilon_c = 400\mu$. Determine the normal stress that acts along an axis that is rotated at an angle of $\theta = 20°$ below the positive x axis.

Please notice it asks for stress, not strain.

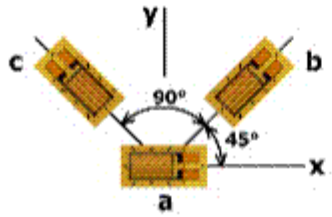
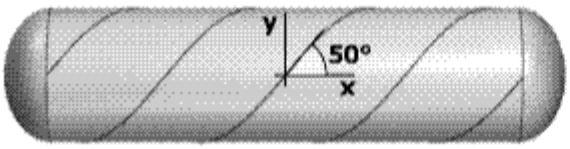


Fig. P13-58

14.11 The pressure tank in Fig. P14-11 is fabricated from spirally-wrapped metal plates that are welded at the seams in the orientation shown. The tank has an inside diameter of 500 mm and a wall thickness of 6 mm. Determine the largest allowable gage pressure if the allowable normal stress perpendicular to the weld is 100 MPa and the allowable shear stress parallel to the weld is 30 MPa.



15.20 A tee-shaped flexural member (Fig. P15-20b) is subjected to an internal axial force of P = 4,000 N, an internal shear force of V = 2,800 N, and an internal bending moment of M = 1,600 N-m, as shown in Fig. P15-20a. Determine the principal stresses and the maximum shear stress acting at point H, which is located 35 mm below the top surface of the tee shape. ~~Show these stresses on an appropriate sketch.~~

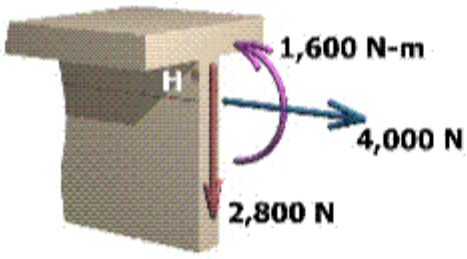


Fig. P15-20a

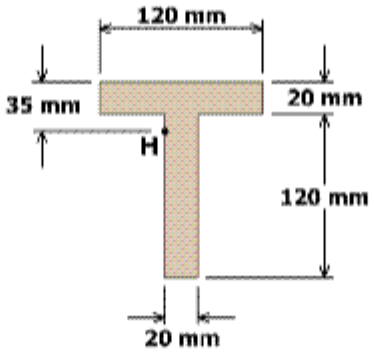


Fig. P15-20b

15.45 A steel pipe with an outside diameter of 4.500 in. and an inside diameter of 4.026 in. supports the loadings shown in Fig. P15-45.

(a) Determine the normal and shear stresses on the top of the pipe at point H.

(b) Determine the principal stresses and maximum in-plane shear stress at point H, and show the orientation of these stresses on an appropriate sketch.

(c) Determine the normal and shear stresses on the side of the pipe at point K.

(d) Determine the principal stresses and maximum in-plane shear stress at point K and show the orientation of these stresses on an appropriate sketch.

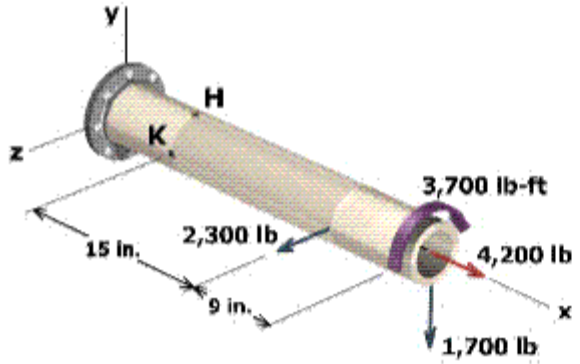


Fig. P15-45