Name _____

1.5 Two solid cylindrical rods (1) and (2) are joined together at flange B and loaded as shown in Fig. P1-5. The diameter of rod (1) is 1.25 in. and the diameter of rod (2) is 2.00 in. Determine the normal stresses in rods (1) and (2).

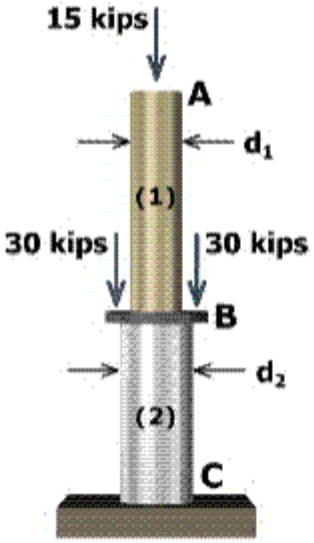

Fig. P1-5/6

6.30 In the gear system shown in Fig. P6-30, the motor applies a 160 lb-ft torque to the gear at A. A torque of $T_C = 250$ lb-ft is removed from the shaft at gear C, and the remaining torque is removed at gear D. Segments (1) and (2) are solid 1.5-in.-diameter steel [$G = 12{,}000$ ksi] shafts, and the bearings shown allow free rotation of the shaft.

(a) Determine the shear stress in segments (1) and (2) of the shaft.

(b) Determine the rotation angle of gear D relative to gear B.

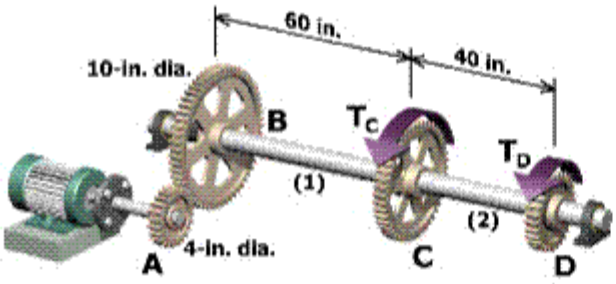

Fig. P6-30/31

10.37 The cantilever supported beam shown in Fig. P10-37 consists of a rectangular structural steel tube shape (E = 29,000 ksi; I = 476 in.4). For the loading shown, determine

(a) The beam deflection at point B.

(b) The beam deflection at point C.

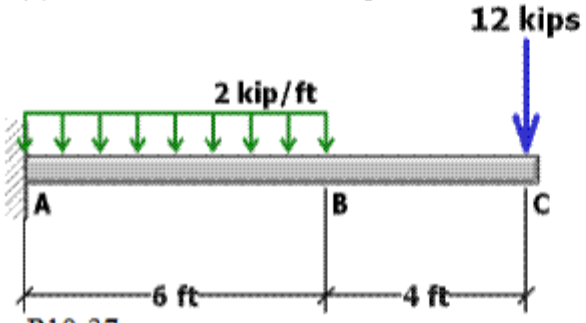

Fig. P10-37

12.27 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).

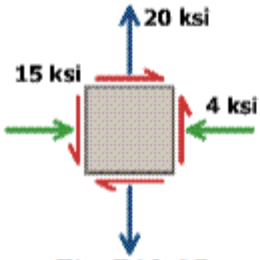

Fig. P12-27

13.47 The strain rosette shown in the figure was used to obtain normal strain data at a point on the free surface of a machine part. $\varepsilon_a = 380\mu$, $\varepsilon_b = 590\mu$, $\varepsilon_c = -295\mu$, and Poisson's Ratio $\nu = 0.12$ Determine:

(a)The strain components ε_x, ε_y, and γ_{xy} at the point.

(b)The principal strains and the maximum in-plane shear strain at the point.

(c)Draw a sketch showing the angle θ_p, the principal strain deformations, and the maximum in-plane shear strain distortions.

(d)Determine the magnitude of the absolute maximum shear strain.

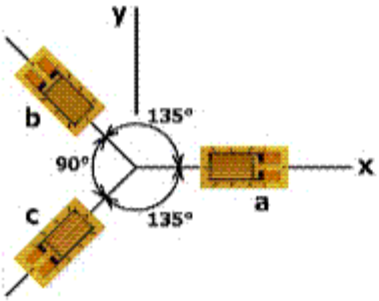

Fig. P13-47

14.10 The pressure tank in Fig. P14-10 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. For a gage pressure of 1.5 MPa, determine (a) the normal stress perpendicular to the weld and (b) the shear stress parallel to the weld.

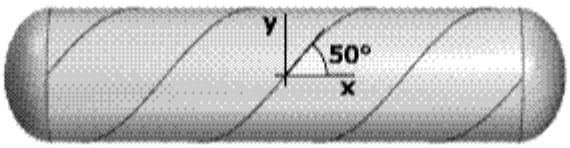

Fig. P14-10/11

15.17 A tee-shaped flexural member (Fig. P15-17b) is subjected to an internal axial force of P = 1,000 lb, an internal shear force of V = 600 lb, and an internal bending moment of M = 1,500 lb-ft, as shown in Fig. P15-17a. Determine the principal stresses and the maximum shear stress acting at point H, which is located 1.5 in. below the top surface of the tee shape. ~~Show these stresses on an appropriate sketch.~~

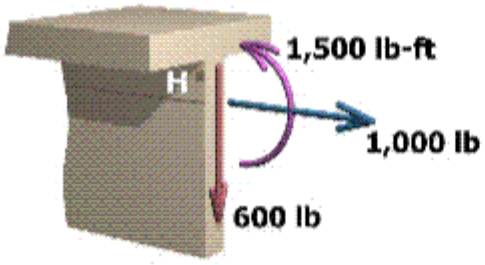

Fig. P15-17a

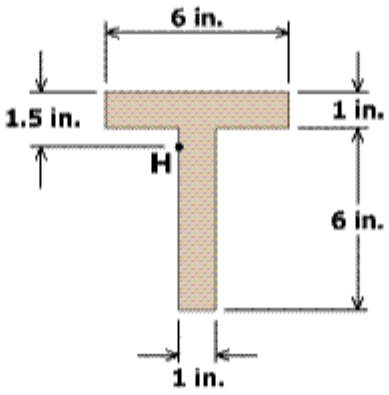

Fig. P15-17b

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.~~

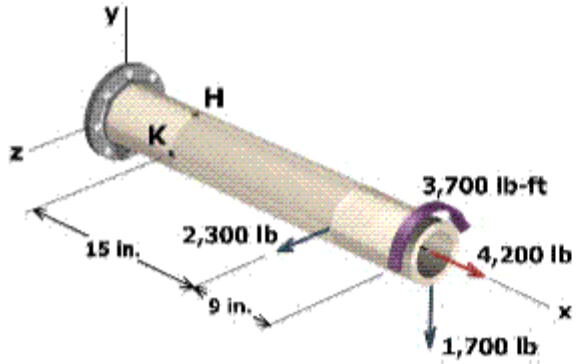

Fig. P15-45