



Question One: (15 Marks)

As in Fig. 1, a hole is to be punched out of a plate having a shearing strength of 40 ksi. The compressive stress in the punch is limited to 50 ksi. (a) Compute the maximum thickness of plate in which a hole 2.5 inches in diameter can be punched. (b) If the plate is 0.25 inch thick, determine the diameter of the smallest hole that can be punched.

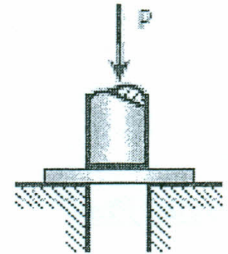


Fig. 1

Question Two: (15 Marks)

The strength of longitudinal joint in Fig. 2 is 33 kips/ft, whereas for the girth is 16 kips/ft. Calculate the maximum diameter of the cylinder tank if the internal pressure is 150 psi.

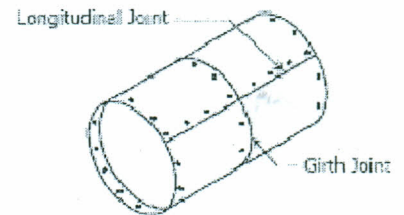


Fig. 2

Question Three: (20 Marks)

A single horizontal force P of 150 lb magnitude is applied to end D of lever ABD which shown in Fig. 3. Determine (a) the normal and shearing stresses on an element at point H having sides parallel to the x and y axes, (b) the principal planes and principal stresses at the point H .

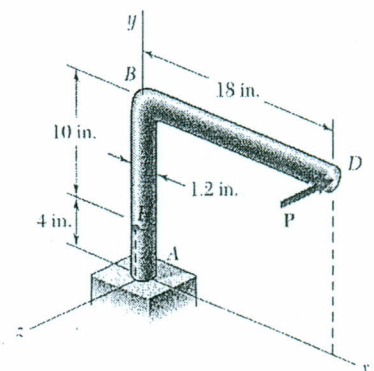
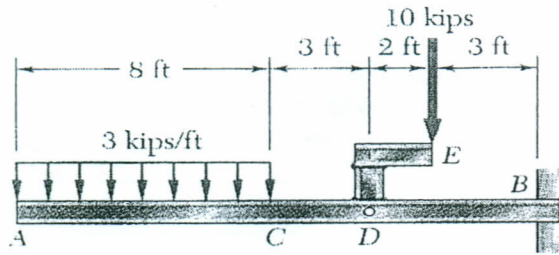


Fig. 3

Question Four: (20 Marks)



Draw the shear and bending-moment diagrams for the beam and the given loading shown in Fig. 4

Fig. 4

Question Five: (20 Marks)

The grain of a wooden member forms an angle of 15° with the vertical. For the state of stress shown in Fig. 5, determine (a) the in-plane shearing stress parallel to the grain, (b) the normal stress perpendicular to the grain. (Use Mohr's Circle)

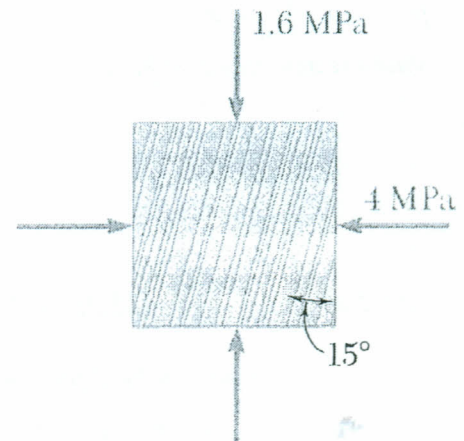


Fig. 5