



Question One: (15 Marks)

Each of the four vertical links shown in Fig. 1 has an 8×36 mm uniform rectangular cross section and each of the four pins has a 16 mm diameter. Determine the maximum value of the average normal stress in the links connecting (a) points B and D (B) points C and E.

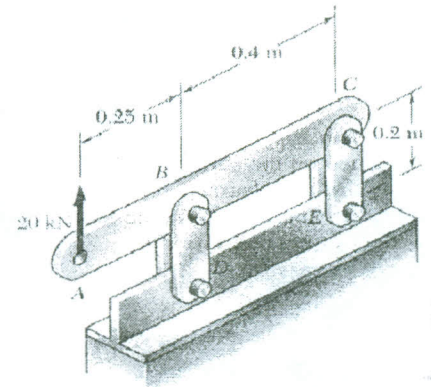


Fig. 1

Question Two: (20 Marks)

Shaft BC is hollow with inner and outer diameters of 90 mm and 120 mm, respectively. Shafts AB and CD are solid of diameter d . For the loading shown in Fig. 2

Determine:

- (a) the minimum and maximum shearing stress in shaft BC,
- (b) the required diameter d of shafts AB and CD if the allowable shearing stress in these shafts is 65 MPa.

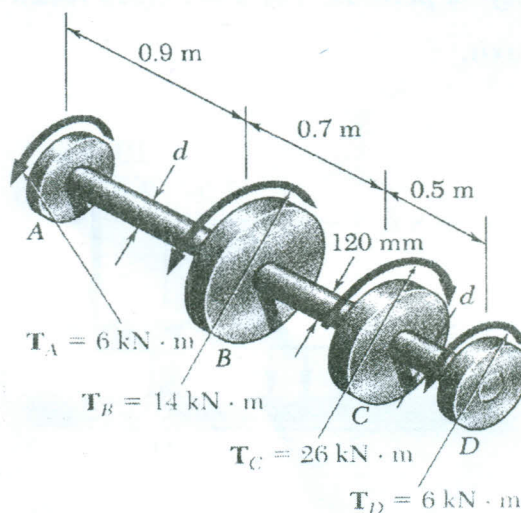


Fig. 2

Question Four:

(20 Marks)

An open-link chain shown in Fig. 3 is obtained by bending low-carbon steel rods into the shape shown. For 160 lb load, determine (a) maximum tensile and compressive stresses, (b) distance between section centroid and neutral axis. Illustrate your answer by drawing stress distributions.

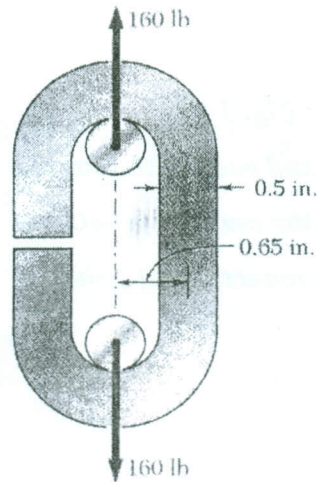


Fig. 3

Question Five:

(20 Marks)

The structure shown in Fig. 4 is constructed of a W10x112 rolled-steel beam. (a) Draw the shear and bending-moment diagrams for the beam and the given loading. (b) determine normal stress in sections just to the right and left of point D. For a W10x112 rolled steel shape, the section modulus equals 126 in^3 about the X-X axis.

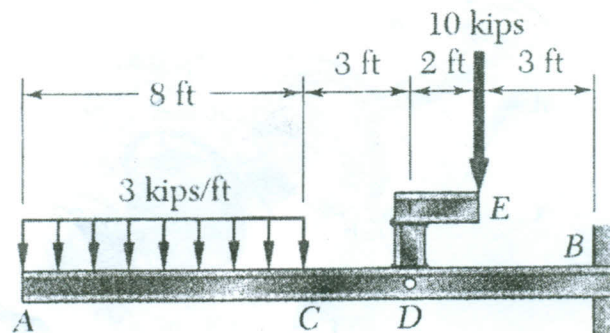


Fig. 4