2.12 A square aluminum bar should not stretch more than 1.4 mm when it is subjected to a tensile load. Knowing that $E = 70$ GPa and that the allowable tensile strength is 120 MPa, determine (*a*) the maximum allowable length of the pipe, (*b*) the required dimensions of the cross section if the tensile load is 28 kN.

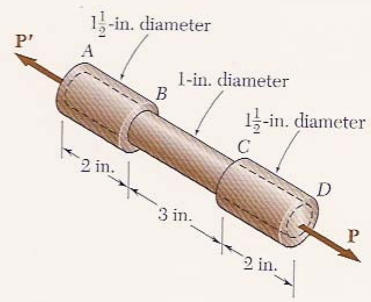

Fig. P2.16

2.16 The specimen shown is made from a 1-in.-diameter cylindrical steel rod with two 1.5-in.-outer-diameter sleeves bonded to the rod as shown. Knowing that $E = 29 \times 10^6$ psi, determine (*a*) the load **P** so that the total deformation is 0.002 in., (*b*) the corresponding deformation of the central portion *BC*.

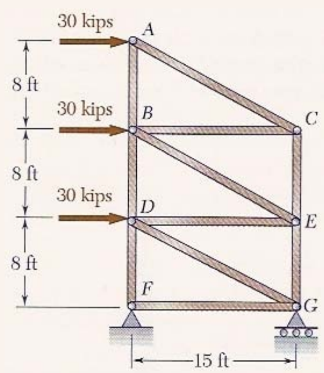

Fig. *P2.22*

2.22 For the steel truss ($E = 29 \times 10^6$ psi) and loading shown, determine the deformations of the members *BD* and *DE*, knowing that their cross-sectional areas are 2 in^2 and 3 in^2, respectively.

2.39 Three steel rods ($E = 200$ GPa) support a 36-kN load **P.** Each of the rods *AB* and *CD* has a 200-mm^2 cross-sectional area and rod *EF* has a 625-mm^2 cross-sectional area. Neglecting the deformation of rod *BED*, determine (*a*) the change in length of rod *EF*, (*b*) the stress in each rod.

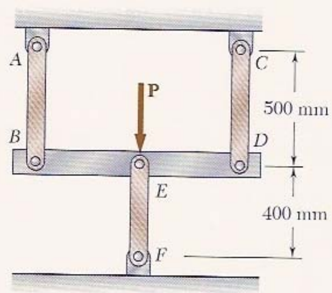

Fig. P2.39

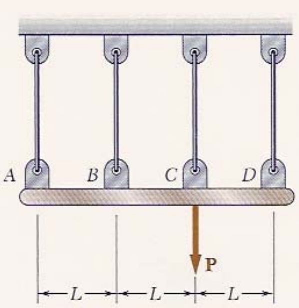

Fig. P2.46

2.46 The rigid bar *ABCD* is suspended from four identical wires. Determine the tension in each wire caused by the load **P** shown.

2.60 At room temperature (20°C) a 0.5-mm gap exists between the ends of the rods shown. At a later time when the temperature has reached 140°C, determine (*a*) the normal stress in the aluminum rod, (*b*) the change in length of the aluminum rod.

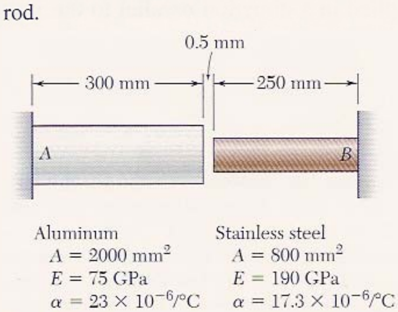

Fig. *P2.60*