TUTORIAL QUESTION No. 2

Q1. Figure 1 shows a composite rod fixed at both ends (A and E) and loaded as shown. Using the given dimensions and loadings, determine the following:

a. The reaction at the fixed supports (A and E)
b. The deformation at the interface between steel and brass (Point C)

Take E for steel as 200 GPa and E for brass as 105 GPa. All dimensions are in mm.

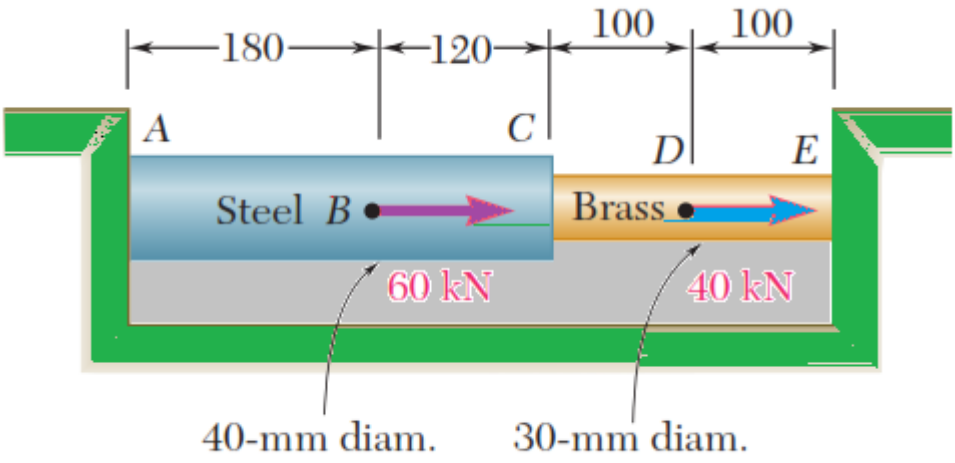
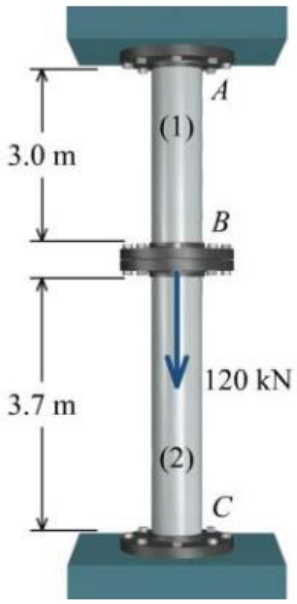


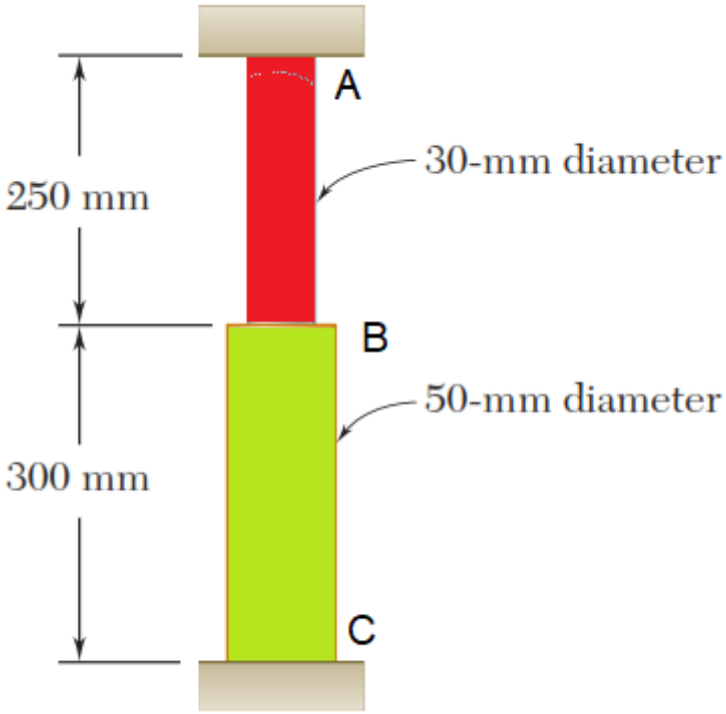
Figure 1

Q2: Two identical steel pipes 1 and 2 having a diameter of 1.37 mm each and separated by flange B, are fixed to rigid supports as shown below. A point load of 120 kN is applied at B: Find the following:

a. The normal stresses in both pipes
b. The deflection at B.



Q3: A composite cylindrical rod, AB and BC of steel and brass, respectively, are fixed at both ends. Assuming the rod is initially unstressed, determine the compressive force induced in ABC when there is a temperature rise of 50 degrees.



Take E for steel as 200GPa, coefficient of expansion for steel as 11×10^{-7}/°C and E for brass as 105GPa, while its thermal expansion coefficient as 20×10^{-6}/°C