HOMEWORK 2

Solve any four of the following problems.
Please remember to write the number of problems you solved.
Homework assignments are to be submitted in class due 6 April, 2011.
You may discuss the problems with your classmates, but you are responsible for your own works.

Dr. Mehmet Çevik
e-mail: m.cevik@bayar.edu.tr
website: http://kisi.deu.edu.tr/mehmet.cevik/

1. An axial force of 60 kN is applied to the assembly shown by means of rigid end plates. Determine (a) the normal stress in the brass shell, (b) the corresponding deformation of the assembly.

2. An axial centric force of \( P = 450 \) kN is applied to the composite block shown by means of a rigid end plate. Knowing that \( h = 10 \) mm, determine the normal stress in (a) the brass core, (b) the aluminum plates.
3. Three steel rods \((E = 200\text{GPa})\) supports 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. Determine (a) the change in length of rod \(EF\), (b) the stress in each rod.

4. The concrete post \((E_c = 25\text{GPa} \text{ and } \alpha_c = 9.9 \times 10^{-6}/^\circ\text{C})\) is reinforced with six steel bars, each of 22-mm diameter \((E_s = 200\text{GPa} \text{ and } \alpha_s = 11.7 \times 10^{-6}/^\circ\text{C})\). Determine the normal stress induced in the steel and in the concrete by a temperature rise of 35°C.

5. Knowing that a 0.5-mm gap exists when the temperature is 20°C, determine (a) the temperature at which the normal stress in the aluminum bar will be equal to 90MPa, (b) the corresponding exact length of the aluminum bar.

6. A 2-m length of an aluminum pipe of 240-mm outer diameter and 10-mm wall thickness is used as a short column and carries a centric axial load of 640 kN. Knowing that \(E = 73\text{GPa} \text{ and } \nu = 0.33\), determine (a) the change in length of the pipe, (b) the change in its outer diameter, (c) the change in its wall thickness.