Assignment 6

The due date for submitting this assignment has passed. **Due on 2018-03-07, 23:59 IST.**

Submitted assignment

1) The specimen shown is made from a 20 mm diameter cylindrical steel rod with two 40 mm outer diameter sleeves bonded to the rod as shown in figure. Knowing that $E = 200 \text{ GPa}$, determine

If the total deformation of the specimen is 0.1 mm, the applied load, $P = \ldots \text{ kN}$

**Hint**

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Range) 27.8, 28

2) Based on the data given in question 1, answer this question

The elongation of the central portion, BC under this load $P$ is __________ mm

**Hint**

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Range) 0.077, 0.079
3) The 1.8 m concrete post having a square cross section with side 200 mm is reinforced with six steel bars each of 20 mm diameter. The post is placed between two thick rigid plates and a 500 kN axial centric compressive force is applied on the rigid plates. Knowing that Young’s modulus of steel, \(E_s = 200\) GPa and that of concrete, \(E_c = 30\) GPa, determine the stresses in the

Steel reinforcement _________ MPa

No, the answer is incorrect.
Score: 0
Accepted Answers: 
(Type: Range) 65.7,65.9

4) Based on the data given in question 3, answer this question

Concrete is _________ MPa

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 9.8,10

5) A rod consisting of two cylindrical portions AB of diameter 60 mm and BC of diameter 40 mm is restrained at both the ends as shown in figure. The portion AB is made of brass (\(E_b = 105\) GPa, coefficient of thermal expansion, \(\alpha_b = 20.9*10^{-6}/^{\circ}\text{C}\)) and portion BC is made of aluminum (\(E_a = 72\) GPa, \(\alpha_a = 23.9*10^{-6}/^{\circ}\text{C}\)). If the initially unstressed rod is subjected to a temperature raise of 40\(^{\circ}\text{C}\), determine

The displacement of point B is ____________ mm

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.45,0.47
6) Based on the data given in the question 5, answer this question

The stresses induced in portions AB is __________ MPa

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) -39.2,-39

7) Based on the data given in the question 5, answer this question

The stresses induced in portion BC is ________ MPa

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) -88,-87.8

8) A circle of diameter \( d = 200 \) mm is scribed on an unstressed aluminum plate of thickness 20 mm as shown in figure. Later forces are applied on the plate to induce a normal stresses \( \sigma_1 = 70 \) MPa and \( \sigma_2 = 140 \) MPa as shown in the figure. Assuming that for aluminum, \( E = 70 \) GPa and Poisson's ratio, \( \nu = 0.3 \), determine the change in

\[
\begin{align*}
\sigma_1 & \quad \text{(tension)} \\
\sigma_2 & \quad \text{(compression)}
\end{align*}
\]

The change in length of diameter along the direction in which \( \sigma_1 \) stress is acting

\[\times 10^{-3} \text{ mm}\]

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 80

9) Based on the data given in the question 8, answer this question

The change in length of diameter along the direction in which \( \sigma_2 \) stress is acting

\[\times 10^{-3} \text{ mm}\]
10) An aluminum plate ($E = 70 \text{ GPa}, \nu = 0.3$) is subjected to a centric axial load that causes a normal stress, $\sigma$. Knowing that, before loading, a line of slope 2:1 is scribed on the plate as shown in figure, the slope of the line when $\sigma = 140 \text{ MPa}$ is $\frac{\text{ _________}}{1}$. 

Hint: No, the answer is incorrect. 
Score: 0 
Accepted Answers: 
(Type: Numeric) 340 

10 points