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Courses » **Mechanics Of Materials** Announcements **Course** Ask a Question Progress Mentor

Unit 8 - Week 6-Displacement due to uniaxial loading, temperature and bending

Course outline

Week 0

How to access the portal

Week 1

Week 2

Week 3

Week 4-Concept of strain

Week 5- Constitutive relation, strain energy and potential

Week 6- Displacement due to uniaxial loading, temperature and bending

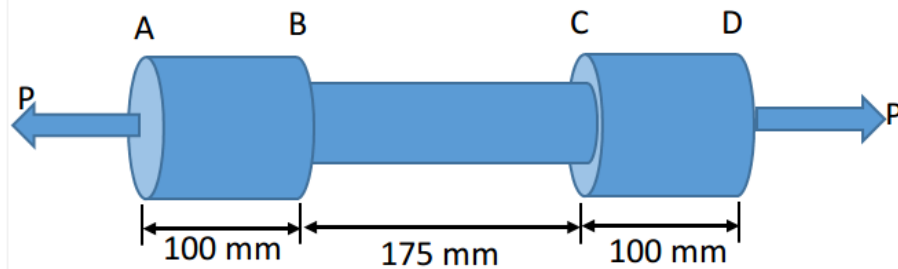
- Stepped shaft subjected to axial force
- Inhomogeneous bar subjected to axial force
- Stepped shaft subjected to raise in temperature
- Traction in member subjected to bending
- Governing equilibrium equations

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 $E = 200$ GPa, determine



If the total deformation of the specimen is 0.1 mm, the applied load, $P =$ _____ kN

Hint

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Range) 27.8,28

10 points

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

10 points

- Displacement field
- Bending equation
- Radius of curvature
- Quiz : Assignment 6
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- Solution for assignment - 6

Week 7 -Stresses and deflection in homogeneous beams loaded about one principal axis

Week 8 - Stresses and deflection in beams loaded about one principal axis

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Week 10: Stresses and displacement due to torsion or inflation

Week 11

Week 12 - Buckling of columns

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Notes

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 in 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

Hint

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Range) 65.7,65.9

10 points

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

Concrete is _____ MPa

Hint

No, the answer is incorrect.

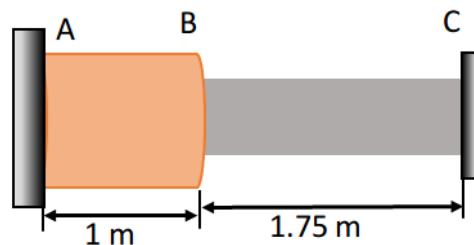
Score: 0

Accepted Answers:

(Type: Range) 9.8,10

10 points

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, $\alpha_b = 20.9 \times 10^{-6}/^\circ\text{C}$) and portion BC is made of aluminum ($E_a = 72$ GPa, $\alpha_a = 23.9 \times 10^{-6}/^\circ\text{C}$). If the initially unstressed rod is subjected to a temperature raise of 40°C , determine



The displacement of point B is _____ mm

Hint

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Range) 0.45,0.47

10 points

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

10 points

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

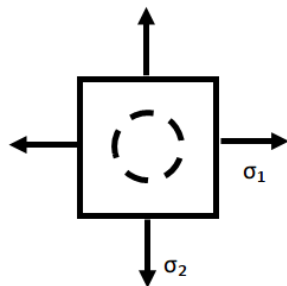
Accepted Answers:

(Type: Range) -88,-87.8

10 points

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



The change in length of diameter along the direction in which σ_1 stress is acting _____ $\times 10^{-3}$ mm

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Numeric) 80

10 points

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

The change in length of diameter along the direction in which σ_2 stress is acting _____ $\times 10^{-3}$ mm

No, the answer is incorrect.

Score: 0

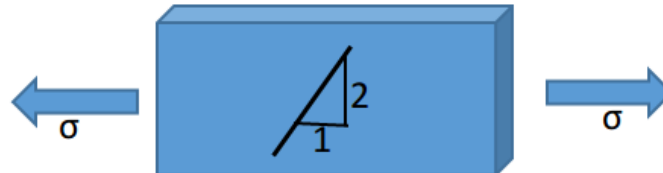
Accepted Answers:

(Type: Numeric) 340

10 points

10)

An aluminum plate ($E = 70 \text{ GPa}$, $\nu = 0.3$) is subjected to a centric axial load that causes a normal stress, σ . 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 _____ : 1



Hint

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Range) 1.994,1.996

10 points

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