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Unit 13 - Week 11

Course outline

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How to access the portal

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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

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

week 9: Stresses and deflection in beams not loaded about principal axis

Week 10: Stresses and displacement

Assignment 11

The due date for submitting this assignment has passed. **Due on 2018-04-11, 23:59 IST.**

Submitted assignment

A sewage pipe of 0.5 m internal diameter and thickness 0.05 m is buried under ground. For the material that the pipe is made of its Young's modulus is 20GPa and Poisson's ratio is 0.2. The center of the pipe is at a depth of 5 m. Assuming that the soil pressure is uniformly distributed on the external surface of the cylinder corresponding to the soil pressure at the center of the pipe and the inner surface to be traction free and that the density of the soil is $17\text{kN}/\text{m}^3$. Taking the pipe to be thick walled find the following:

1) Magnitude of the hoop stress at the inner surface = _____ MPa

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Range) 0.55,0.57

10 points

2) Magnitude of the hoop stress at the outer surface = _____ MPa

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Range) 0.46,0.48

10 points

3) Magnitude of the axial stress = _____ MPa

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Range) 0.1,0.12

10 points

A long thin-walled circular tube with average diameter 1 m and wall-thickness 5 cm is subjected to an internal pressure 10 MPa acting radially outwards and an external pressure 5 MPa acting radially inwards. The ends of the tube are closed. Suppose that the external pressure does not contribute to the axial stress of the tube, find the following:

4) Magnitude of the hoop stress = _____ MPa

due to torsion or
inflation

Week 11

- Quiz :
Assignment 11
- Example problems :
Thick walled cylindrical vessel
- Thin walled pressure vessels
- General Principals
- Different failure modes
- Tresca Condition
- vonMises condition
- Maximum normal stress or rankine condition
- Mohr - Columb condition
- Drucker-Prager Condition
- Week 11 Feedback :
Mechanics Of Materials
- Solution for assignment -11

Week 12 -
Buckling of columns

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VIDEOS

Notes

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Numeric) 50

10 points

5) Magnitude of the axial stress = _____ MPa

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Numeric) 50

10 points

6) Maximum shear stress in the tube = _____ MPa

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Numeric) 25

10 points

A plate is subjected to a plane state of stress where:

$$\sigma_{xx} = 300 \text{ MPa}, \quad \sigma_{xy} = 70 \text{ MPa}, \quad \sigma_{yy} = -40 \text{ MPa}$$

If the yield stress from uniaxial extension test on this plate is, $\sigma_y = 350 \text{ MPa}$ determine the following:

7) Will the plate fail according to Tresca criteria?

10 points

- Yes
- No

No, the answer is incorrect.

Score: 0

Accepted Answers:

Yes

10 points

8) Will the plate fail according to von Mises criteria?

- Yes
- No

No, the answer is incorrect.

Score: 0

Accepted Answers:

No

20 points

9) The stress at a point in a brittle material is:

$$\sigma = \begin{pmatrix} 90 & 0 & 0 \\ 0 & -20 & 20 \\ 0 & 20 & -80 \end{pmatrix} \text{ MPa}$$

If the ultimate stress that this material can withstand in uniaxial test is 100 MPa in tension and 90 MPa in compression, will there be failure at this point according to maximum normal stress or Rankine criteria.

- Yes
- No

No, the answer is incorrect.

Score: 0

Accepted Answers:

No

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