Unit 7 - Week 5

Assignment 5

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-10-21, 23:59 IST.

1) For a plane state of stress, the factor of safety calculated using maximum shear stress theory and maximum normal stress theory will be the same if *1 point*

- maximum principal stress is one third of the minimum principal stress
- maximum and minimum principal stress have same magnitude but opposite sign
- both the maximum and minimum principal stress are positive
- both the maximum and minimum principal stress are negative

No, the answer is incorrect.
Score: 0
Accepted Answers:
both the maximum and minimum principal stress are positive
both the maximum and minimum principal stress are negative

2) If the second and third invariants of a deviatoric stress tensor are 63 and 162, respectively then the first invariant of the deviatoric stress tensor is _____

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

1 point

3) The stress state at a point in the principal frame of reference is given below. The second invariant of the deviatoric stress tensor corresponding to the stress state shown below is _____. All the units of the stress are in MPa.

$$\sigma = \begin{bmatrix} 100 & 0 & 0 \\ 0 & 200 & 0 \\ 0 & 0 & 300 \end{bmatrix}$$

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 9900,10100

2 points

4) The tensile yield strength of a materials is 200 MPa. The shear yield strength of the material according to distortion energy theory is _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 115,116

1 point

5) The stress state at a point in a ductile material is shown in Figure 1. The yield strength of the material is 500 MPa. The factor of safety based on maximum shear stress theory (rounded off to one decimal place) is _____

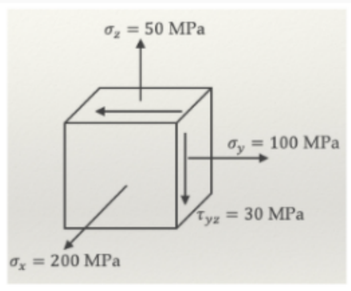

Figure 1: Stress state at a point in a material.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 2.9,3.1

2 points

6) Identify the most appropriate combination from the table given below. *2 points*

Column I	Column II
(I) Equivalent Stress	(1) An ellipse
(II) Strain at point	(2) A hexagon
(III) For a state of plane stress, the failure surface for distortion energy theory is	(3) Principal stresses
(IV) For a state of plane stress, the failure surface for maximum shear stress theory is	(4) A scalar
(V) The eigenvalues of a stress tensor represent	(5) A second-order tensor

- (I) - (5), (II) - (4), (III) - (1), (IV) - (3), (V) - (2)
- (I) - (5), (II) - (1), (III) - (4), (IV) - (2), (V) - (3)
- (I) - (4), (II) - (5), (III) - (1), (IV) - (2), (V) - (3)
- (I) - (3), (II) - (2), (III) - (1), (IV) - (5), (V) - (4)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(I) - (4), (II) - (5), (III) - (1), (IV) - (2), (V) - (3)

7) Two different stress states at a point in a ductile material are given as σ_1 and σ_2 . Which of the following statements is true? *1 point*

$$\sigma_1 = \begin{bmatrix} 12 & 0 & 0 \\ 0 & 13 & 0 \\ 0 & 0 & 14 \end{bmatrix} \quad \sigma_2 = \begin{bmatrix} 17 & 0 & 0 \\ 0 & 18 & 0 \\ 0 & 0 & 19 \end{bmatrix}$$

- σ_1 is close to yielding
- σ_2 is close to yielding
- Both σ_1 and σ_2 are equally probable for yielding
- σ_2 is twice close to yielding compared to σ_1

No, the answer is incorrect.
Score: 0
Accepted Answers:
Both σ_1 and σ_2 are equally probable for yielding

8) A cantilevered beam shown in Figure 2 is to be made of AISI 1006 cold drawn steel with an yield strength of 280 MPa and an elastic modulus of 200 GPa. The rod is subjected to a combined loading as shown in the figure with F = 0.55 kN, P = 8.0 kN and T = 30.0 N·m. The factor of safety for the design based on the distortion energy theory (rounded off to one decimal place) is

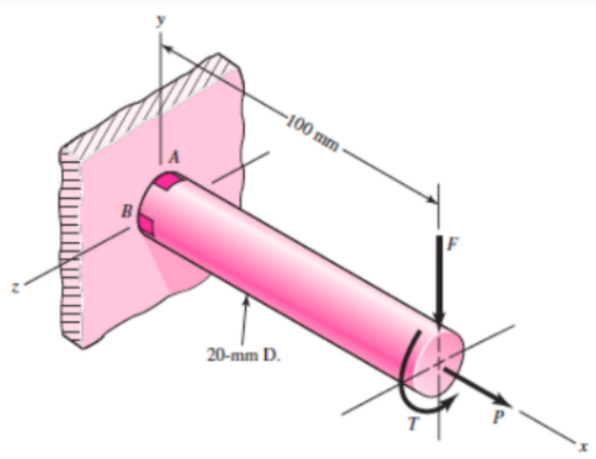

Figure 2: A cantilevered aluminium tube subjected a combined state of loading.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 2.6,2.9

5 points