Unit 8 - Week 6

Assignment 6

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

Due on 2020-10-28, 23:59 IST.

1) The stepped shaft shown in the inset of Figure 1 is subjected to a torque T of magnitude 100 Nm. Assume r = 6 mm, d = 30 mm, and D = 60 mm. The maximum stress developed (rounded off to one decimal place) is _____MPa.

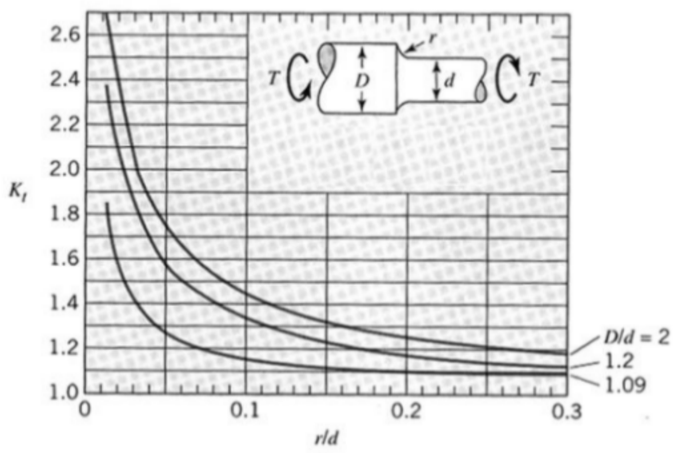

Figure 1: Variation of theoretical stress concentration factor with r/d for a stepped shaft subjected to torsion.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 22.6,24.5

2 points

2) Suppose that a wing component on an aircraft is fabricated from an aluminum alloy that has a plane strain fracture toughness 26 MPa$\sqrt{m}$. It has been determined that fracture results at a stress of 112 MPa when the maximum internal crack length is 8.6 mm. For this same component and alloy, the stress level at which fracture occurs for a critical internal crack length of 6.0 mm (rounded off to nearest integer) is _____ MPa.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 133,135

3 points

3) For an uneven material experiencing plane stress loading, the maximum normal stress theory provides a reasonably accurate prediction for failure of brittle materials when both the principal stresses have the same sign. ***1 point***

- True
- False

No, the answer is incorrect.
Score: 0
Accepted Answers:
True

4) A rod with circular cross-section is subjected to pure torsion about its longitudinal axis until failure. The rod failed at the center along the length and the failure surface is at an angle of ≈ 45° to the axis. Identify the most appropriate statement(s). ***2 points***

- The rod is made of a ductile material
- The rod is made of a brittle material
- Failure is limited by the normal strength of the material.
- Failure is limited by the shear strength of the material.

No, the answer is incorrect.
Score: 0
Accepted Answers:
The rod is made of a brittle material
Failure is limited by the normal strength of the material.

5) In Figure 2, the rod length l = 160 mm and the arm length a = 200 mm. The outside diameter of the rod d= 40 mm. A static load F = 4.5 kN is applied as shown. Assume that the ultimate strength in tension, S_{ut} = 360 MPa and the ultimate strength in compression, S_{uc} = 1.13 GPa. The factor of safety for the bracketed rod based on the modified-Mohr theory (rounded off to two decimal places) is _____

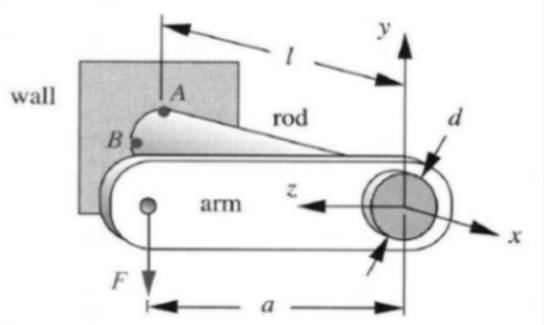

Figure 2:

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 2.38,2.44

5 points

6) An ASTM cast iron has minimum ultimate strengths of 207 MPa in tension and 690 MPa in compression. For the state of stress σ_x = −82 MPa, τ_{xy} = 55 MPa, the factor of safety using the modified-Mohr theory (rounded off to two decimal places) is _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 3.94,3.99

2 points