MCTA 2332 MECHANISM AND MACHINE DESIGN

ASSIGNMENT 6

This assignment is a group work with 2 students per group.
Please scan your solution and upload on Microsoft Teams.
Submission due date and time: 4/6/2024, 11.59pm.

QUESTION 1

a) Define the following terms in mechanism and machine design
   i. Normal stress
   ii. Shear stress
   iii. Torsion
   iv. Bending stress
   v. Strength

b) The aluminium rod and steel rod in **Fig. 1** are spaced 100 cm apart and fastened to a horizontal beam that carries a 70 kg load. Assume that the beam is weightless and rigid.
   i. Calculate the normal stress in each rod if the diameter of the steel rod is 4 cm and the diameter of the aluminium rod is 5 cm.
   ii. Calculate the shear stress at Pin A and Pin B if Pin A is subjected to single shear and Pin B is under double shear. The radius of both pins are 0.5 cm.

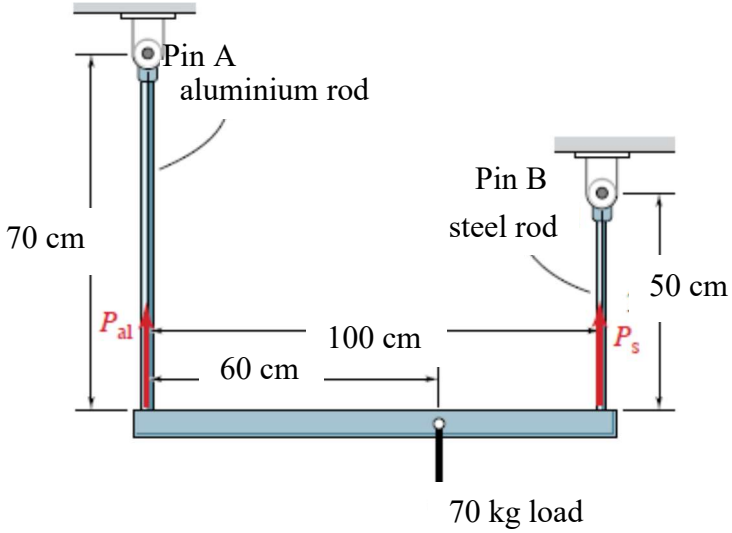

Fig. 1

c) Draw the Mohr Circle for the element that has $\sigma_x = 15$ MPa, $\sigma_y = -5$MPa, $\tau_{xy} = -20$MPa, on the provided graph paper with a proper scaling. Determine the principal stresses and draw the stress elements.

d) The aluminium bar shown in **Fig. 2** is subjected to a normal force of 20 kN. Calculate the actual normal stress at the notch and at the hole if the thickness of the bar is 3 cm.

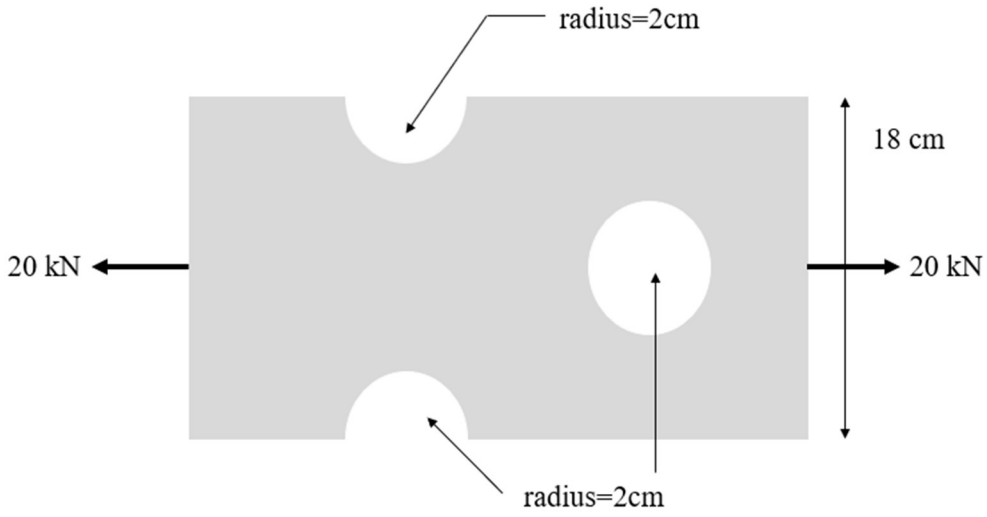

Fig. 2