

UNIVERSITY OF REGINA
FACULTY OF ENGINEERING



ENIN 241 - Mechanics of Deformable Solids

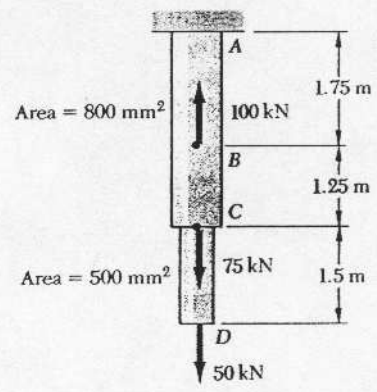
FINAL EXAM

Time: 3 hours
Date: April 19, 1995

Total Marks: 100
Instructor: Dr. S. Gong

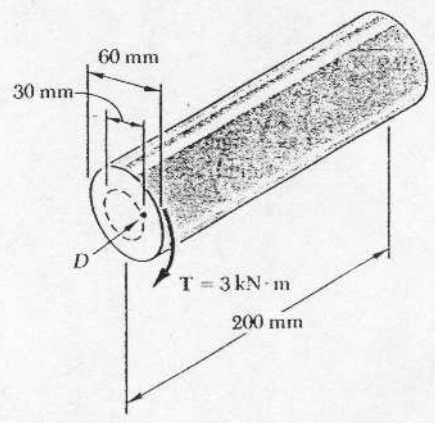
✓ Problem 1 (15 Marks)

The rod ABCD is made of an aluminum alloy for which $E=70$ Gpa. For the loading shown, and neglecting the weight of the rod, determine the deflection (a) of point B, (b) of point D.



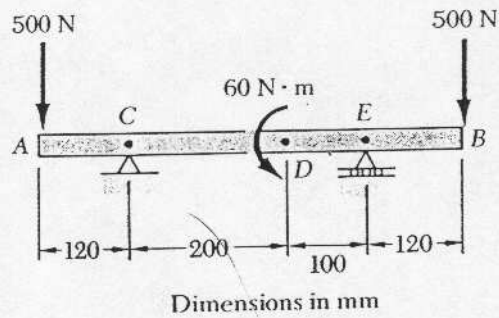
Problem 2 (15 Marks)

✓ A torque $T=3$ kN.m is applied to the solid bronze cylinder shown. Determine (a) the maximum shearing stress and (b) the shearing stress at point D which lies on a 15-mm-radius circle shown on the end of the cylinder.



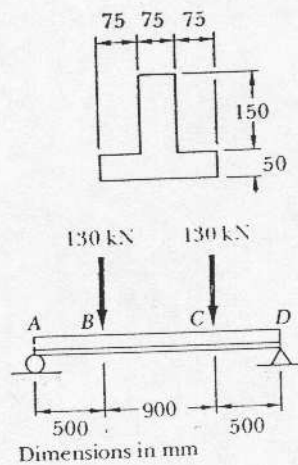
Problem 3 (15 Marks)

For the beam and loading shown, construct shear and moment diagrams and determine the maximum absolute value (a) of the shear, (b) of the bending moment.



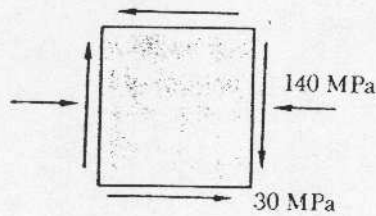
Problem 4 (20 Marks)

Two vertical forces are applied to a beam of the cross section shown. Determine the maximum tensile and compressive stresses in portion BC of the beam.



Problem 5 (20 Marks)

For the state of plane stress shown, use the stress-transformation equations to determine the equivalent state of stress if the element is oriented counterclockwise through 20° . Also, determine the principal stresses and the maximum in-plane shear stress and the orientation of the element upon which they act. Represent your results on Mohr's circle.



Problem 6 (15 Marks)

For the prismatic beam and loading shown, use the method of discontinuity functions to determine the reaction at the roller support. Draw shear and moment diagrams. EI is constant.

