Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Science and Technology Degree Programme
3rd Year 2nd Semester Examination – August/September 2014

SCT 364-2 Strength of Materials

Number of Questions: Four (04)
Answer all questions
Time allocation: Two (02) Hours
Mark allocation: 100 marks

1.

a. For the steel truss (E = 200 GPa) and loading shown in Figure 1a, determine the deformations of members AB and AD, given that their cross-sectional areas are 2400 $mm^2$ and 1800 $mm^2$, respectively.

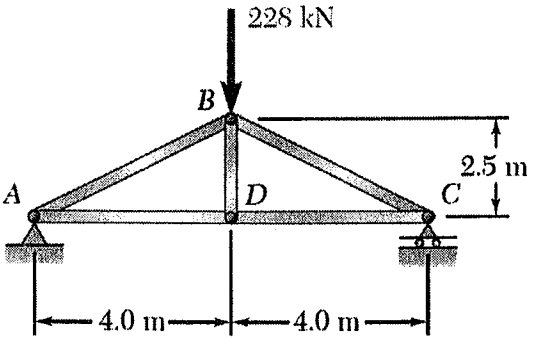


Figure 1a

(10 marks)

b. Two cylindrical rods, one of steel and the other of brass, are joined at C and restrained by rigid supports at A and E. For the loading shown in Figure 1b and given that $E_s$ = 200 GPa and $E_b$ = 105 GPa, determine

i. the reactions at A and E,
ii. the deflection of point C.

Dimensions in mm

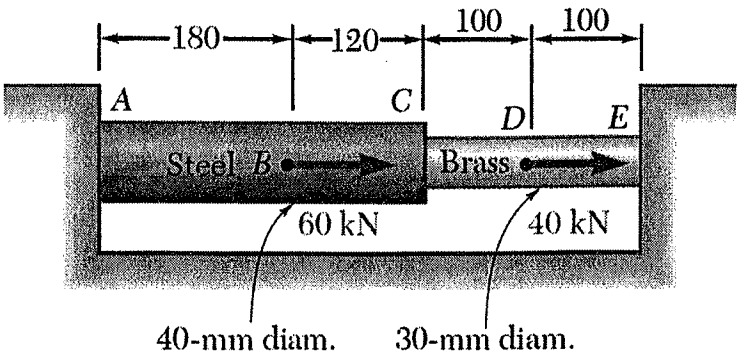


Figure 1b

(15 marks)



28

28

2. The torques shown in Figure 3 are exerted on pulleys A and B. Given that both shafts are solid, determine
   a. the maximum shearing stress in shaft AB,
   b. the maximum shearing stress in shaft BC.
   c. the angle of twist at A.

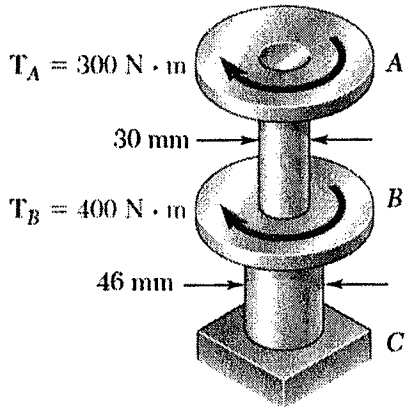


Figure 2

(25 marks)

3. For the given state of stress in Figure 3a and Figure 3b, determine
   a. the orientation of the principle directions,
   b. the maximum shearing stress,
   c. the corresponding principle stresses.

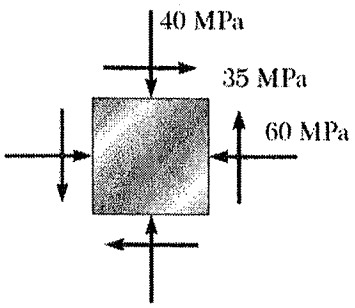


Figure 3a

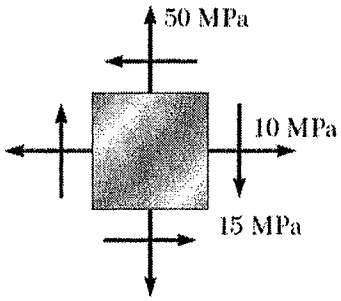


Figure 3b

(25 marks)

4. A timber beam is being designed with supports and loads as shown in Figure 4. Width of the beam is 30 mm and the height is *h*.
   a. Draw the shear force and bending moment diagrams.
   b. If the allowable shear force is 12 MPa, determine the minimum value for *h* of the beam under that shear.

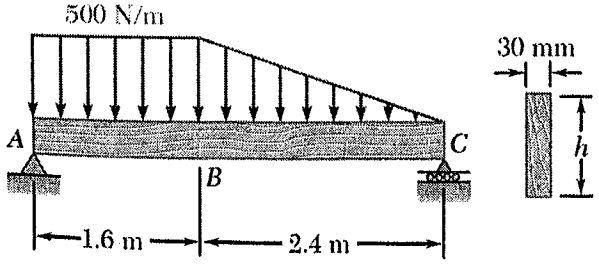


Figure 4

(25 marks)