ENDS 231: Practice Quiz 7

Note: A one page (one sided) crib sheet is allowed during the quiz, along with a silent, non-programmable calculator.

Clearly show your work and answer.

A bar is supported by a pin-type connection at A and a short link pinned at the top and bottom with clevises as shown. A force is applied to the end of the rod, resulting in a vertical reaction at A of 20.8 kN and a tension in the rod of 41.3 kN. Determine:

a) the normal stress in rod BD \( \left[ 1 \frac{kN}{mm^2} = 10^3 MPa \right] \)
b) the shear stress at end A of bar ABC
c) the minimum diameter of the hole required at B with the allowable bearing stress on bar ABC of \( F_p = 330 MPa \)
d) the shear stress in the bolt at B
e) the length change (and direction) of rod BD when the material is high strength low-alloy steel (\( E = 200 \times 10^3 MPa \) and \( \alpha = 11.7 \times 10^{-6} \) mm/mm/°C)
f) the final temperature for the total length change to be 1.55 mm (longer) if the length change due to a force (part e) happens at 35 °C.
g) [some short question from the text material]

Answers—Not provided on actual quiz!

a) 237 MPa   b) 4.0 MPa   c) 8.34 mm
     d) 263 MPa   e) 1.98 mm   f) 13.4 °C