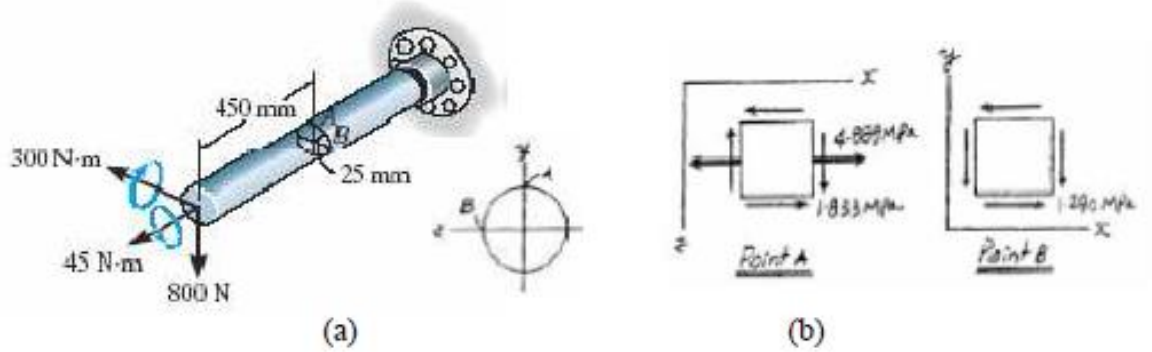# Assignment 8

Question 1

· (a) A cantilevered circular solid shaft. (b) Stress components at point A and B.

Figure (a) shows a solid shaft that is subjected to a torque, bending moment about the z-axis, and vertical force as shown. The state of stress for point A and B is given in Figure (b) as:

- $(\sigma_x)_A = 4.899$ MPa; $\quad (\sigma_z)_A = 0$ MPa $\quad$ and $\quad (\tau_{xz})_A = 1.833$ MPa,
- $(\sigma_x)_B = 0$ MPa: $\quad (\sigma_y)_A = 0$ MPa $\quad$ and $\quad (\tau_{xy})_B = -1.290$ MPa.

a) Evaluate the cross sectional forces and moments acting in the A-B section of the shaft.

b) Use the information from part a) to verify (prove) that the given state of stress for point A and B is correct.

Question 2

A solid rod is fixed at "C" as shown in Figure (a). The solid rod has a radius of 7.5 mm. It is subjected to the force of 800 N at "B" as shown.
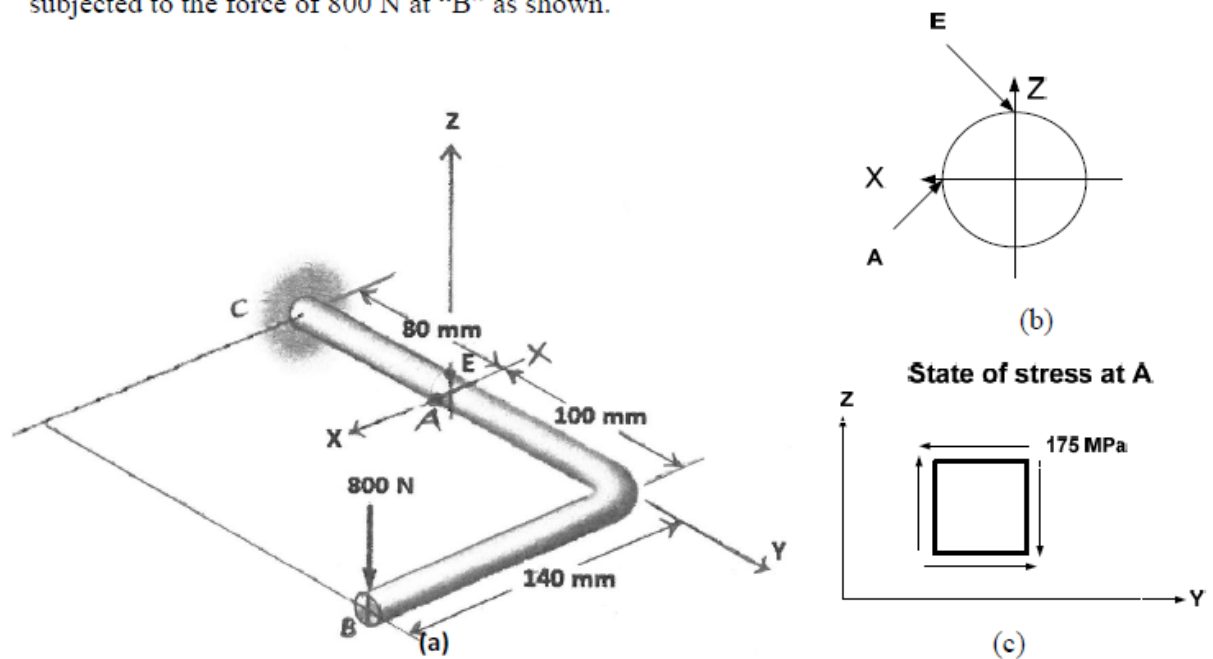

(a) solid rod (b) location of A and E points at section x-x (c) state of stress at A

a) Calculate the forces and moments/torque at a section x-x through A and E points.

b) Calculate the state of stress at point A and point E and prove that state of stress at point A can be given as in Figure (c).
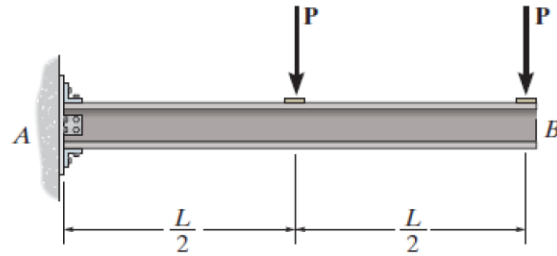
Question 3

Determine the equations of the elastic curve for the beam using the x coordinate. Specify the slope at A and maximum deflection. EI is constant.
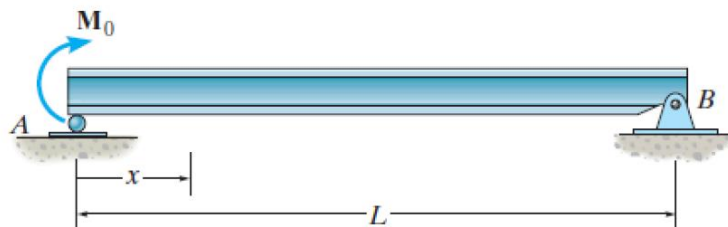
Question 4

Determine the deflection of end B of the cantilever beam. EI is constant.

Question 5

Determine the deflection at C and the slope of the beam at A, B, and C. EI is constant.