國立屏東科技大學 九十八 學年度　碩士班暨碩士在職專班　招生考試

材料力學 試題

Problem # 01 A tensile test is conducted on an unknown material and the stress-strain curve is shown in Figures 1 and 2. The test specimen after failure is shown in Figure 3. Try to answer the following questions:

(a) Please explain the physical meaning of the curve based on the specific regions I, II, III and the specific points A, B, C shown in Figures 1 and 2. (15%)

(b) Determine the modulus of elasticity and the yielding stress of 0.002 offset based on the curve shown in Figure 2(Please explain how you find the value). (10%)

(c) Explain the failure phenomenon of the specimen shown in Figure 3. (10%)

(d) What kind of this material is ? (5%)

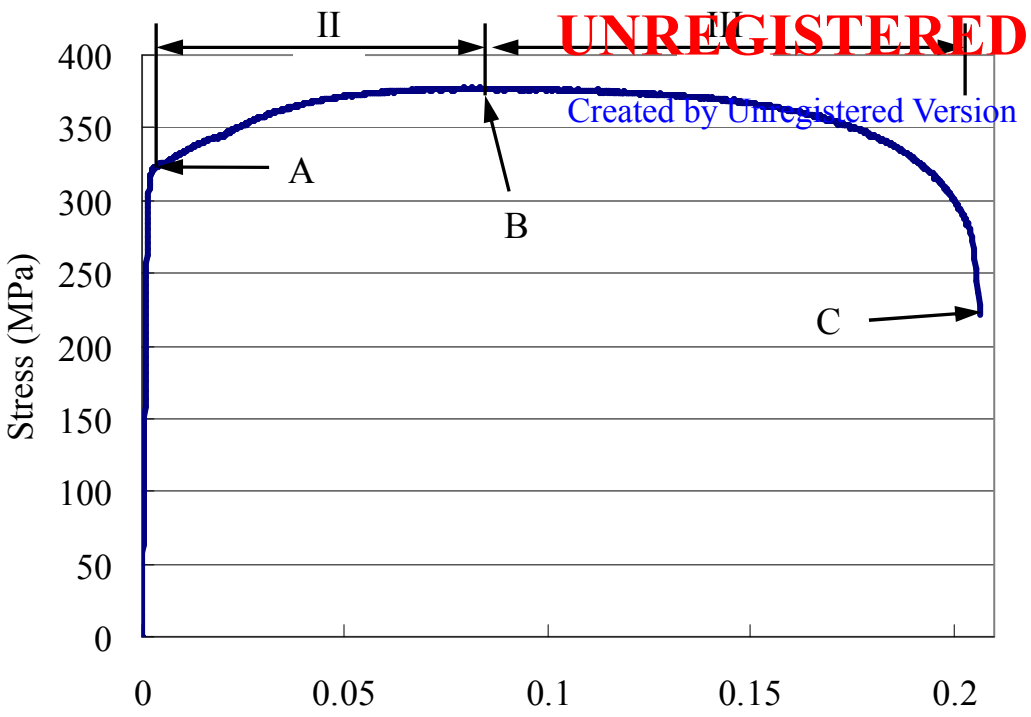

Figure 1

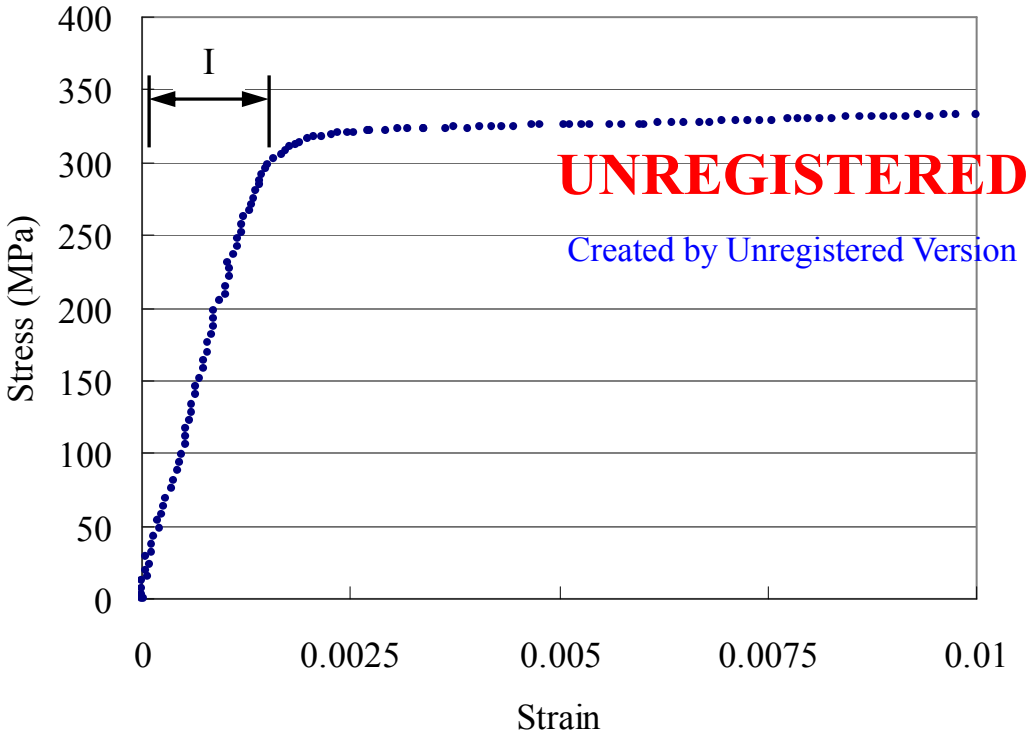

Figure 2

Figure 3

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Problem # 02 An anti-roll bar of the automotive is simplified to a circular tube simply supported by the joints as shown in Figure 4. It has the outer diameter 26 mm, and the thickness t = 3 mm. The vertical load P = 500 N and the torque T = 500 N-m are applied to the ends of the tube, try to answer the following questions:

(a) Draw the shear force and bending moment diagrams along the tube. (10%)

(b) Determine the maximum bending stress of the tube and also specify the location. (10%)

(c) Determine the maximum shear stress of the tube due to the torque. (10%)

(d) Draw the stress states and Mohr's circle at the top surface of point A, and find the principle stresses and maximum shear stress in the Mohr's circle. (20%)

(e) Determine the lateral deflection of the tube at the mid-point C, if the modulus of elasticity is given as E = 200 GPa. (10%)

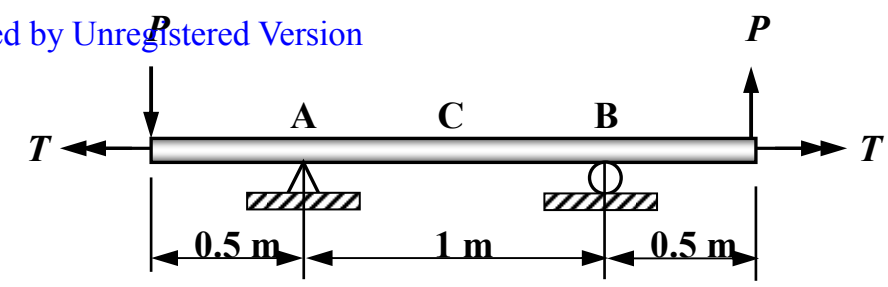

Figure 4