國立中央大學107學年度碩士班考試入學試題

所別： 機械工程學系 碩士班 固力與設計組(一般生)
機械工程學系光機電工程 碩士班 光機組(一般生)

科目： 材料力學

本科考試可使用計算器，廠牌、功能不拘 ＊請在答案卷(卡)內作答

1. As shown in **Figure 1**, a 30 in.-long cylindrical rod of cross-sectional area A_r = 0.075 in^2 is placed inside a tube of the same length and of cross-sectional area A_t = 0.100 in^2. The end of the rod and tube are attached to a rigid support on one side, and to a rigid plate on the other. The rod and tube are both assumed to be elastoplastic, with moduli of elasticity $E_r = 30\times10^6$ psi and $E_t = 15\times10^6$ psi, and yield strengths σ_{ry} = 36 ksi and σ_{ty} = 45 ksi. (a) Draw the load-deflection diagram of the rod-tube assembly when a load P is applied to the plate. (b) If the load P is increased from zero to 5.7 kips and decreased back to zero, determine the maximum elongation of the assembly and the permanent deformation after the load has been removed. **(25%)**

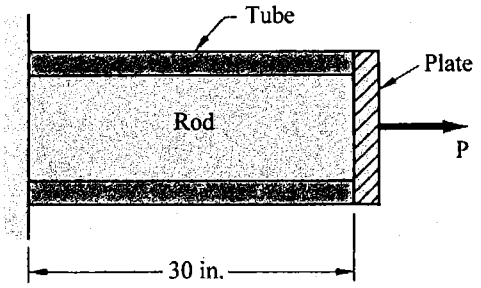

Figure 1

2. For the overhanging beam shown in the **Figure 2** supporting the 100-kg mass, determine the shear force and bending moment diagram for the member ABC. **(25%)**

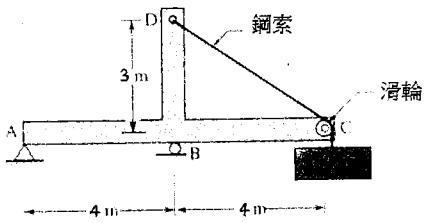

Figure 2

參考用

注意:背面有試題

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所別： 機械工程學系 碩士班 固力與設計組(一般生)　　共 2 頁 第 2 頁

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3. As shown in **Figure 3**, the tapered beam has a roller support at A and a fixed support at B. The beam is subjected to a uniform line load of intensity w as shown. The moment of inertia of the cross sections varies linearly from zero at A to I_B at B. The beam has a Young's modulus of E. Determine (i) the support reactions at A and B **(20%)**; (ii) the vertical displacement at midsection $x = L$ **(5%)**.

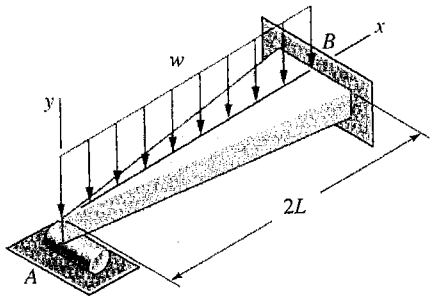

Figure 3

4. The cantilever solid rod is subjected to the loadings shown in **Figure 4**. Using Mohr's circle, determine (i) the principal stresses at point A **(20%)**; (ii) the maximum in-plane shear stress at point A **(5%)**. Here, the point A is on the cross section of the rod at the fixed end.

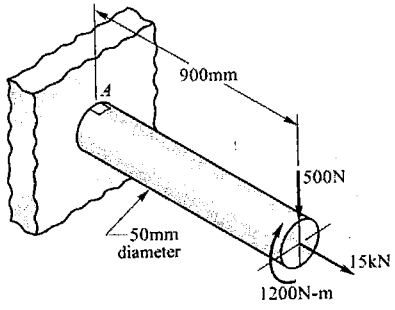

Figure 4

參考用

注意:背面有試題