國立臺北科技大學 107 學年度碩士班招生考試

系所組別：1203 製造科技研究所

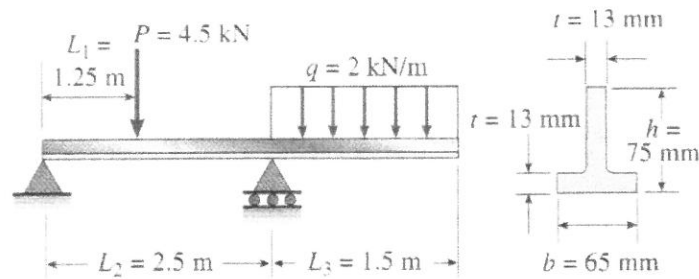第一節　材料力學　試題　（選考）

第一頁　共一頁

注意事項：

1. 本試題共四題，每題 25 分，共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

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1. A beam of T-section is supported and loaded as shown in the figure. The cross section has width b = 65 mm, height h = 75 mm, and thickness t = 13 mm. (a) Draw the shear and bending-moment diagrams. (10 分) (b) Determine the maximum tensile and compressive stresses in the beam. (15 分)

2. Lateral bracing for an elevated pedestrian walkway is shown is the figure (left). The thickness of the clevis plate t_c = 16 mm and the thickness of the gusset plate t_g = 20 mm [see figure (right)]. The maximum force in the diagonal bracing is expected to be F =190 kN. If the allowable shear stress in the pin is 90 MPa and the allowable bearing stress between the pin and both the clevis and gusset plates is 150 MPa. What is the minimum required diameter d_{min} of the pin ? (25 分)
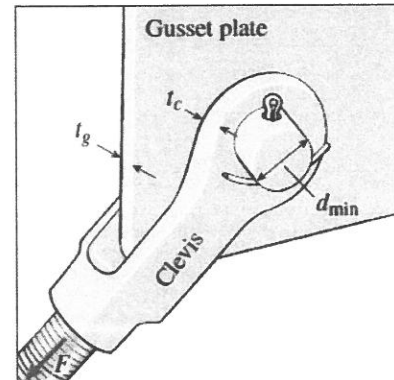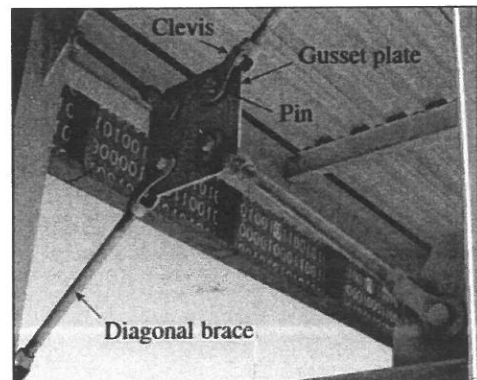
3. An aluminum pole for a street light weights 4600 N and supports an arm that weights 660 N (see figure). The center of gravity of the arm is 1.2 m from the axis of the pole. A wind force of 300 N also acts in the (- y) direction at 9 m above the base. The outside diameter of the pole (at its base) is 225 m, and its thickness is 18 mm. Determine the maximum tensile and compressive stresses σ_t and σ_c, respectively, in the pole (at its base) due to the weights and the wind force. (25 分)
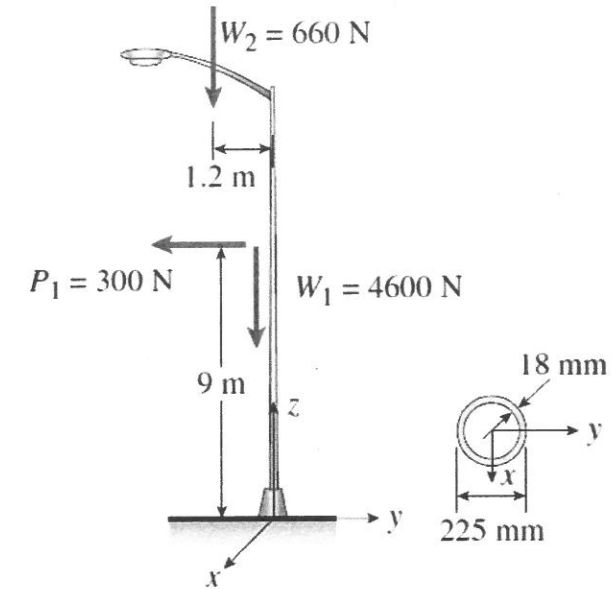
4. A steel beam ABC is simply supported at A and held by a high-strength steel wire at B (see figure). A load P = 1 kN acts at the free end C. The wire has axial rigidity EA = 1335 kN, and the beam has flexural rigidity EI = 86 kN·m² What is the deflection δ_C of point C due to the load P ? (25 分)