

國立臺北科技大學九十五學年度碩士班招生考試

系所組別：3110 土木與防災研究所甲組

第一節 材料力學 試題

填准考證號碼

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第一頁 共二頁

注意事項：

1. 本試題共五題，配分共 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。

1. Fig. 1 shows a taper axial member with the varied square cross section. The width of the section varies from 40mm (left fixed end) to 80mm (right fixed end). Determine the maximum normal stress of the member when an increasing temperature $\Delta T = 10^{\circ}C$ distributed uniformly along the member is considered. The Young's modulus $E = 2.1 \times 10^4 \text{ kgf/mm}^2$ and the coefficient of thermal expansion $\alpha = 1.12 \times 10^{-5}$ (20%)

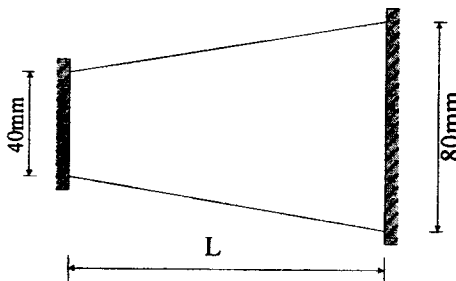


Figure 1

2. A concentrated load $P = 18kN$ is applied at the mid-span of a simply supported beam with the span of 3m. The angle section is used and P is applied at the central line of the vertical leg of the angle shown as Fig. 2. Find the maximum tensile stress and the maximum compressive stress, respectively, induced by the bending moment. (20%)

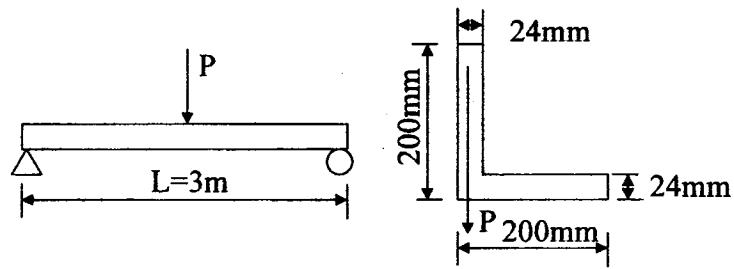


Figure 2

3. Determine the ratio of (P/Q) such that no vertical displacement at the point D of the beam structure shown in Fig. 3 will be found. (20%)

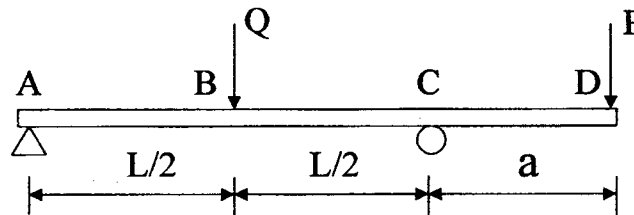


Figure 3

4. Fig. 4 shows an element subjected to the plane stress. Determine (a) the principal stresses and the principal plane, (b) the stresses on the plane with the inclined angle of 45° (counterclockwise), (c) the maximum shear stress. (20%)

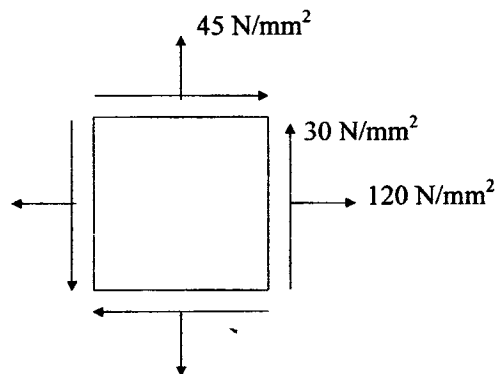


Figure 4

注意：背面尚有試題

5. In Fig. 5, the section property EA of member AB is identical to that of member BC . Assuming that the structure collapses caused by the buckling of the member, determine the value of θ that a maximum value of P can be obtained. (20%) ($0 < \theta < \pi/2$)

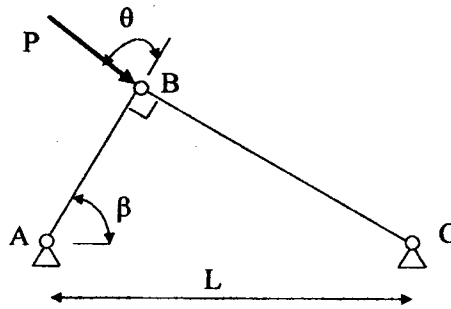


Figure 5