國立嘉義大學 100 學年度

土木與水資源工程學系碩士班(甲組)招生考試試題

科目：工程力學

說明：1. 如有條件不足，請自行假設。
　　2. 僅可使用試務單位提供之計算機。

1. Determine the vertical displacement δ_B at joint B of the truss shown in Fig.1. Note that the only load acting on the truss is a vertical load P at joint B. Assume that both members of the truss have the same axial rigidity EA. (20%)

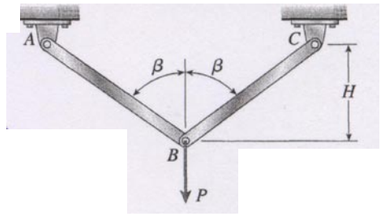

Fig. 1

2. An element in plane stress is subjected to the stresses σ_x=1000 MPa, σ_y=500 MPa, and τ_{xy} = 400 MPa as shown in Fig.2. (20%)
   (1) Determine the stresses on an element inclined at an angle θ =45°.
   (2) Determine the principal stresses and angle.

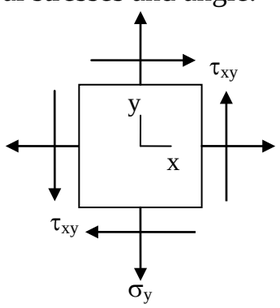

Fig. 2

3. Draw the shear force and bending moment diagrams for Fig. 3 with L=6m and q=2 N/m. (20%)

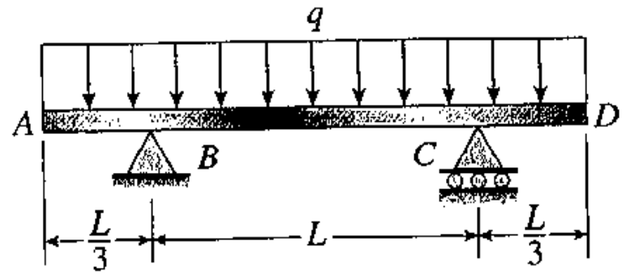

Fig. 3

4. Determine the maximum tensile and compressive stresses in the T-section beam as shown in Fig. 4. (20%)

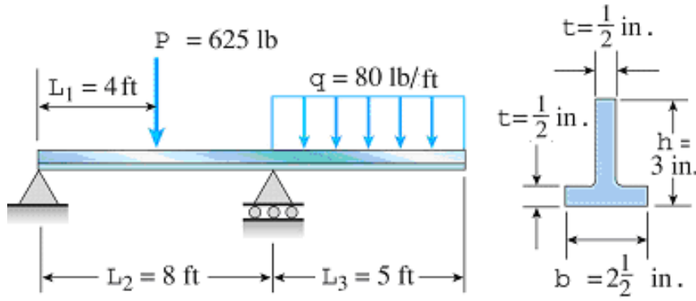

Fig. 4

5. A railroad tie (or sleeper) is subjected to two rail loads, P = 175 kN, acting as shown in Fig. 5. The reaction of a ballast is assumed to be uniformly distributed over the length of the tie, which has cross-sectional dimensions b = 300 mm and h = 250 mm. Calculate the maximum bending stress σ_{max} in the tie due to the loads P, assuming the distance L = 1500 mm and the overhang length a = 500 mm. (20%)

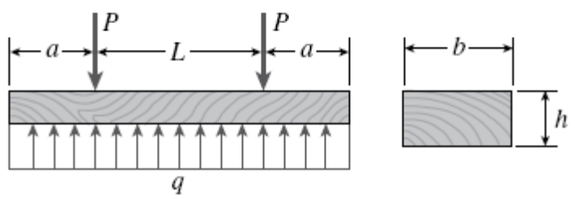

Fig. 5