臺灣綜合大學系統107學年度學士班轉學生聯合招生考試試題

科目名稱	材料力學	類組代碼	D09
		科目碼	D0993

※本項考試依簡章規定各考科均「不可以」使用計算機　　本科試題共計 2 頁

1. The compound beam *ABCDE* shown in the Figure 1 consists of two beams (*AD* and *DE*) joined by a hinged connection at *D*. The hinge can transmit a shear force but not a bending moment. The loads on the beam consist of a 4-kN force and a 2-kN force at the end of a bracket attached at point *B* and a 2-kN force at the midpoint of beam *DE*. Find reactions at supports *A*, C and *E*. (20%)

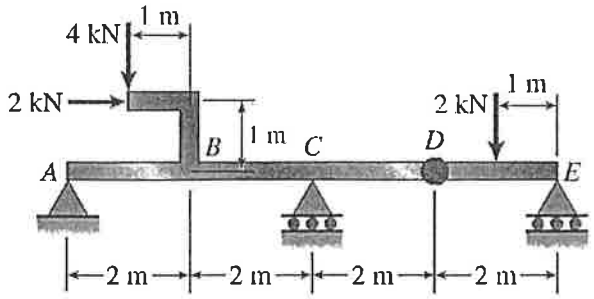

Figure 1

2. The structure shown in the Figure 2 consists of a horizontal rigid bar *ABCD* supported by two steel wires, one of length *L* at point *B* and the other of length *L*/2 at point *C*. Both wires have same cross-sectional area *A* and are made of elastic-perfect-plastic (EPP) material with yield stress σ_y and modulus of elasticity modulus *E*. A vertical load *P* acts at end *D* of the bar. Determine the ultimate load P_u and the corresponding ultimate displacement δ_u at point *D*. (20%)

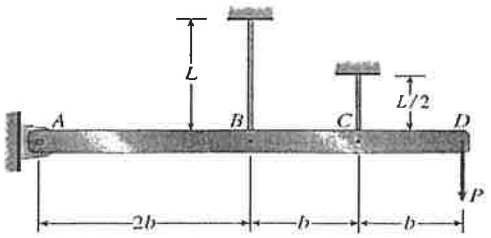

Figure 2

3. An overhanging beam *ABC* rests on a hinge support at *A* and a spring support at *B*, as shown in the Figure 3. A concentrated load *P* acts at the end *C* of the overhang. Span *AB* has length *L*, the overhang has length *L* / 2, and the spring has stiffness *k*. The origin of coordinates is at the left-hand end of the beam, and beam has constant flexural rigidity *EI*. Determine the downward displacement δ_c of the end *C* of the overhang. (20%)

　背面有題，請繼續作答。

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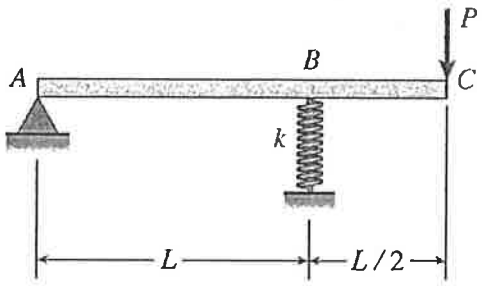

Figure 3

4. Determine the effective length L_e and buckling load P_{cr} for an ideal column with ends fixed against rotation (see Figure 4) by solving the differential equation of the deflection curve. It is using the assumptions of ideal, slender, prismatic, linearly elastic column (Euler buckling). Buckling occurs in the plane of the figure unless stated otherwise. (20%)

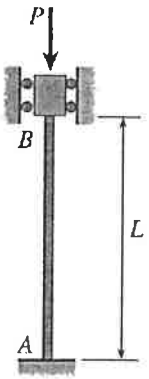

Figure 4

5. Please draw the principal-stress trajectories for a simply-supported beam (see Figure 5) of rectangular cross section with uniform distributed load along the whole length. Use solid lines to represent tensile principal stresses and dashed lines to represent compressive principal stresses. (20%)

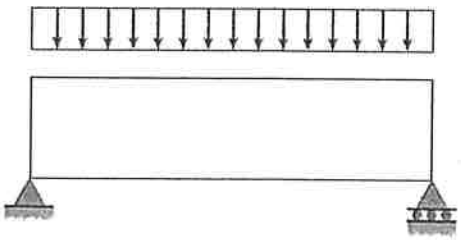

Figure 5