臺灣綜合大學系統108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	D37
		科目碼	D3793

※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. Draw the loads and bending moment diagram that correspond to the given shear force diagram in Fig. 1. Assume that no couple is applied. (20%)

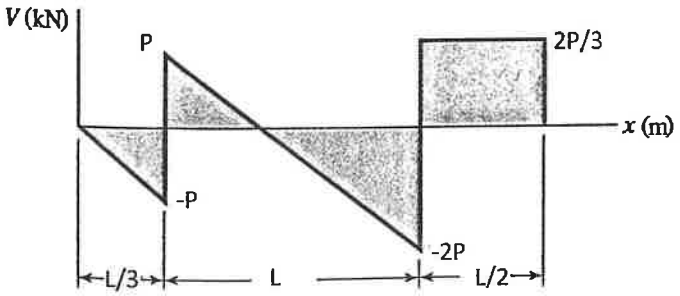

Fig.1

2. A prismatic bar AB of length L, cross-sectional area A, modulus of elasticity E, and total weight W hangs vertically under its own weight (see Fig. 2). (a) Derive a formula for the downward displacement of point C, located at distance h from the lower end of the bar. (b) What is the elongation of the entire bar? (20%)

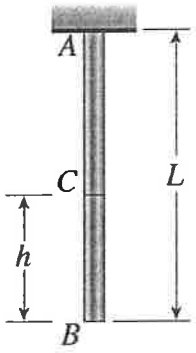

Fig.2

3. A composite bar of square cross section with dimensions 2bx2b is constructed of two different metals having moduli of elasticity E_1 and E_2 (see Fig. 3). The two parts of the bar have the same cross-sectional dimensions. The bar is compressed by forces P acting through rigid end plates. (a) If the line of action of the forces P has an eccentricity e of such magnitude that each part of the bar is stressed uniformly in compression, what is the eccentricity e? Determine the stresses in the two parts of the bar. (b) If the eccentricity e of the forces P is different than the answer in (a), what are the stresses in the two parts of the bar? (20%)

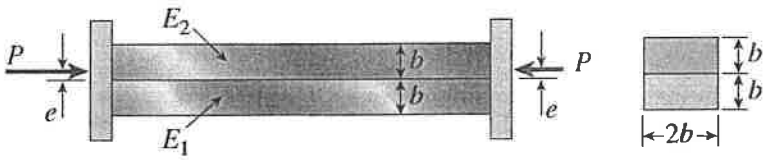

Fig. 3

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4. A simple beam AB of length L , width b and height h undergoes a temperature change such that the bottom of the beam is at temperature T_2 and the top of the beam is at temperature T_1 , where $T_1 < T_2$ (see Fig.4). Determine the equation of the deflection curve of the beam, the angle of rotation and the reaction at the support A. Assume the beam has elastic modulus of E and thermal expansion coefficient of α. (20%)

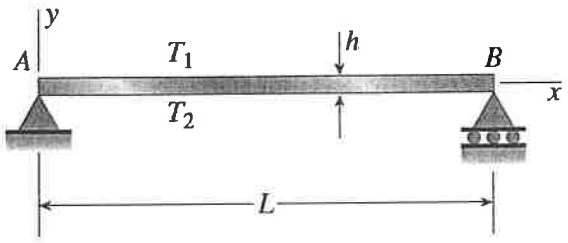

Fig.4

5. For the beam and loading shown, (a) determine the reaction at the roller support B, and (b) find the maximum deflection of the beam. (20%)

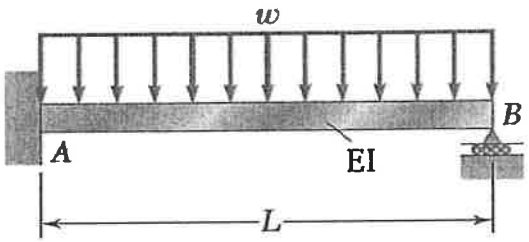

Fig. 5