

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

類組：D37

科目名稱：材料力學

科目代碼：D3793

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※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%)

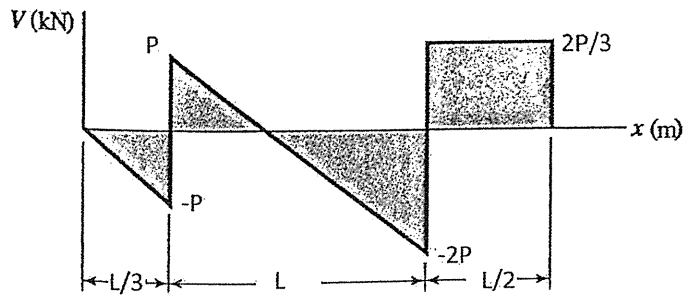


Fig.1

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%)

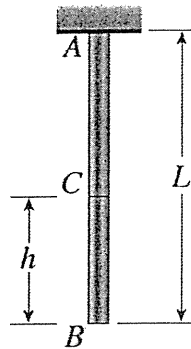


Fig.2

3. A composite bar of square cross section with dimensions $2b \times 2b$ 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%)

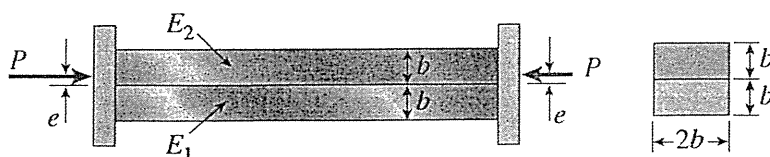


Fig. 3

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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%)

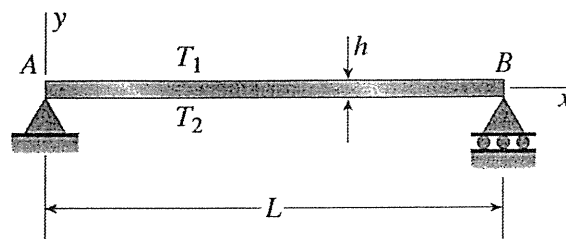


Fig.4

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%)

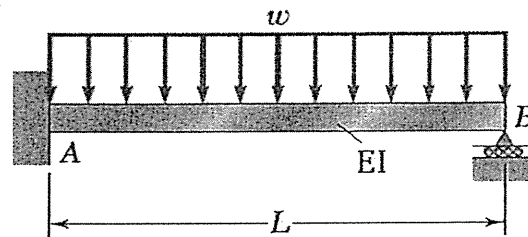


Fig. 5