

八十五學年度材料科學工程研究所(康系(所)) 甲四 組碩士班研究生入學考試

科目 工程力學(Ⅱ) 科號 2402 共 2 頁第 1 頁 *請在試卷【答案卷】內作答
2402

1.

- (a) Describe how circular specimens break under tensile test for (i) ductile and (ii) brittle materials. (5%)
- (b) The rigid bar BDE is supported by two links AB and CD, as shown in Fig. 1. Link AB is made of aluminum ($E=70$ GPa) and has a cross-sectional area of 600 mm^2 ; link CD is made of steel ($E=200$ GPa) and has a cross-sectional area of 800 mm^2 . For the 30 kN force shown, determine the deflection (i) of B, (ii) of D, (iii) of E. (20%)

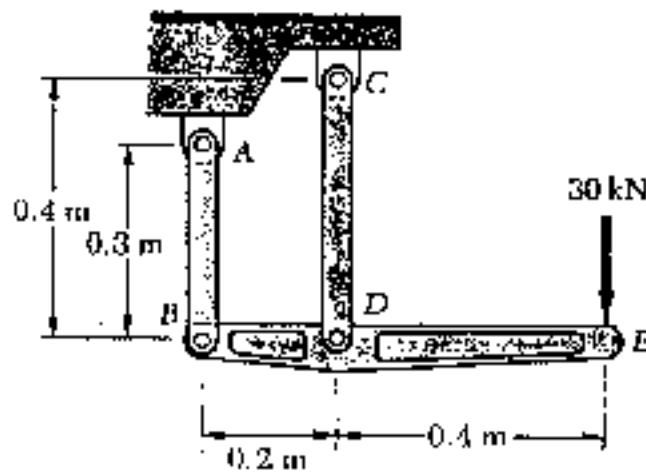


Fig. 1

2. A cantilever beam has a T-shaped cross section and is acted upon in its plane of symmetry by the single force shown in Fig. 2. Determine
- (a) the maximum tensile stress at section n-n;
- (b) the maximum compressive stress in the beam;
- (c) the maximum shearing stress. (25%)

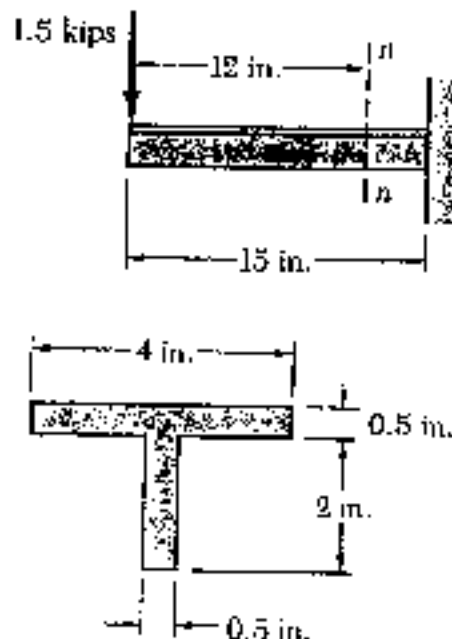


Fig. 2

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3. A solid circular steel ($G=80$ GPa) shaft is fastened securely to a solid circular bronze ($G=40$ GPa) shaft, as shown in Fig. 3. The allowable shearing stress is 70 MPa and the maximum allowable angle of twist in the 3.5-m length is 0.04 rad. Determine: the maximum allowable value of torque T . (25%)

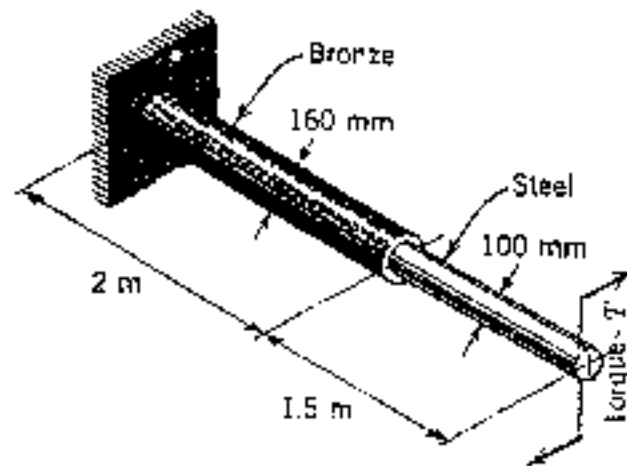


Fig. 3

4. For the beam shown in Fig. 4, by using the energy method (Castigliano's theorem), determine the deflection at the section midway between the supports A and B in terms of P , L , E (Young's modulus), and I (area moment of inertia). (25%)

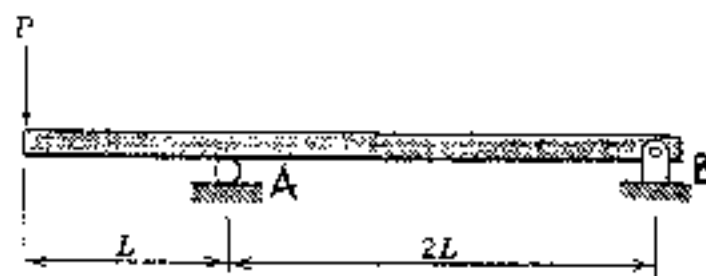


Fig. 4