

八十五學年度國立台灣工業技術學院研究所碩士班招生考試

所別：機械工程技術研究所

組別：固力與設計組、製造組

科目：材料力學

1. A round shaft of elastic modulus G is fixed to rigid walls at both ends, as illustrated in Fig. 1. The left segment of the bar has a polar moment of inertia J_a ; the polar moment of inertia of the right part is J_b . Determine the reactions resulting from the application of a torque T at the point of discontinuity of the section. Use $J_a = 1.5 \pi \text{ in.}^4$, $J_b = 0.5 \pi \text{ in.}^4$, and $T = 12 \text{ kip.in.}$ (25%)

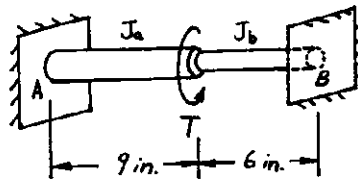
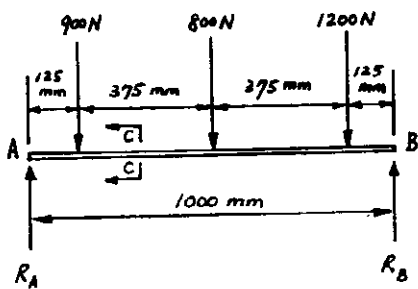
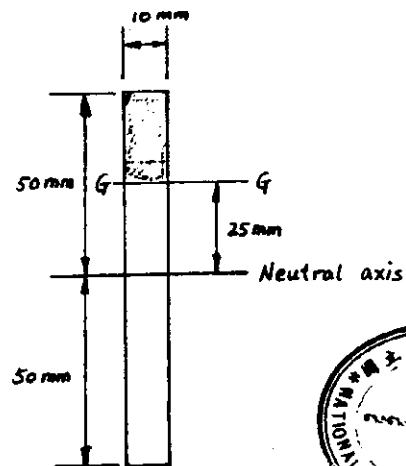


Fig. 1.

2. An aluminum bar 10 mm in width and 100 mm in depth is placed on a simple span of 1000 mm and is located as shown in Fig. 2. (a) Compute the maximum shear stress and maximum bending stress developed in the bar. (b) Compute the horizontal shear stress on plane G-G, 25 mm above (or below) the neutral axis at the location of maximum shear. Neglect the weight of the bar. (25%)



(a) Load diagram



(b) Section C-C

Fig. 2.



(命題田林)

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3. For the continuous beam shown in Fig. 3, calculate the moments at the supports. Neglect the weight of the beam. (25%)

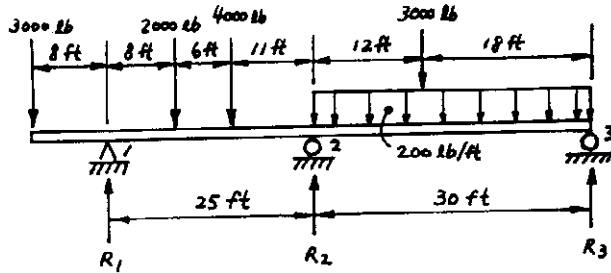


Fig. 3.

4. A solid circular shaft of 2 in.-diameter is fixed to the wall at the right end and subjected to a downward transverse force $P=100$ lb and a torque $T=1000$ lb·in. as shown in Fig. 4. Determine the combined shear stress at A-A, 50 in. from the free end due to P and T . (25%)

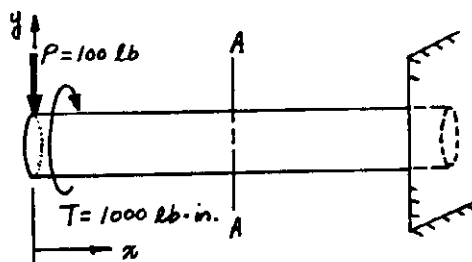


Fig. 4.

