

國立臺北科技大學

九十三年度製造科技研究所入學考試

材料力學試題

填准考證號碼

第一頁 共二頁

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注意事項：

1. 本試題共 5 題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在答案卷之答案欄內，否則不予計分。

1. (20%) The three suspender bars are made of the same material and have equal cross-sectional areas A . Determine the force in each bar if the rigid beam ACE is subjected to the uniform distributed loading w (as shown in Fig. 1.)

2. (20%) A bracket $ABCD$ having a hollow circular cross section consists of a vertical arm AB , a horizontal arm BC parallel to the x axis, and a horizontal arm CD parallel to the z axis (as Figure 2. shown). The arms BC and CD have lengths $b_1 = 4$ ft and $b_2 = 3$ ft, respectively. The outer and inner diameters of the bracket are $d_2 = 8.0$ in. and $d_1 = 7.0$ in. A vertical load $P = 2.00$ kips acts at point D . Determine the maximum tensile, compressive, and shear stresses in the bracket.

3. (20%) A gear-shaft system consists of identical steel shafts having diameter d , as shown in Fig.3., where A is fixed against rotation. The diameters of gears B and C are 250 and 100 mm, respectively. A torsional moment $T = 1000$ N.m is applied at D . Assuming no slippage of the gears, determine the required diameter of the shafts if the allowable shear stress is 60 MPa and if the rotation of the cross-section D is not to exceed 1.5 degree.

4. (20%) The beam AB, consisting of a cast-iron plate of uniform thickness b and length L , is to support the load shown. (a) Knowing that the beam is to be of constant strength, express h in terms of x , L , and h_0 . (b) Determine the maximum allowable load if $L = 36\text{in.}$, $h_0 = 12\text{ in.}$, $b = 1.25\text{ in.}$, and $\sigma_{\text{all}} = 36\text{ ksi}$. (Fig. 4.)

5. (20%) For the loading shown in Fig. 5., knowing that beams AC and BD have the same flexural rigidity, determine (a) the reactions, (b) the deflection at C. ($EI = 1.2(10)^5\text{ lb-in.}^2$)

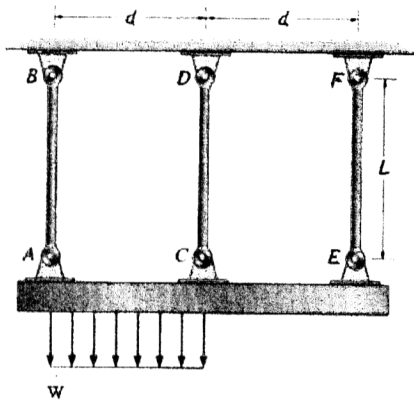


Fig. 1.

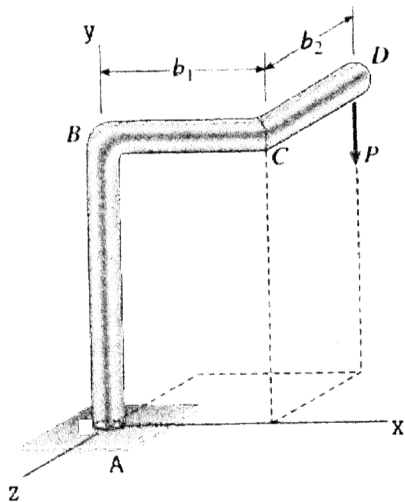


Fig. 2.

注意：背面尚有試題

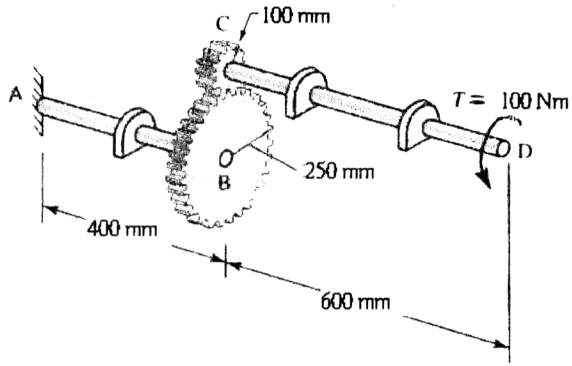


Fig. 3.

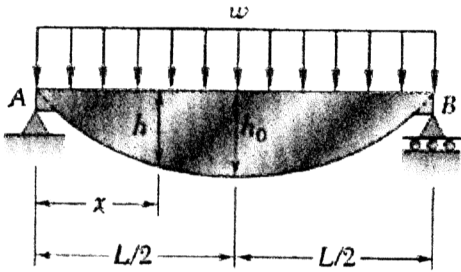


Fig. 4.

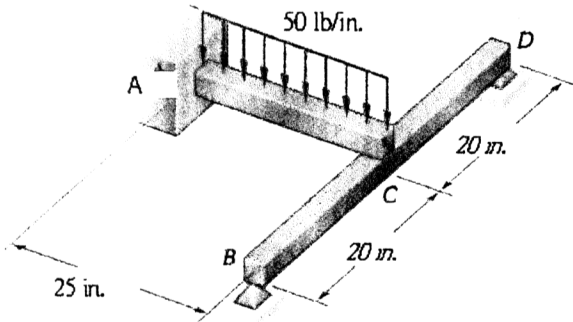


Fig. 5