

國立臺北科技大學九十八學年度碩士班招生考試

系所組別：1202 製造科技研究所不分組

第二節 材料力學 (選考) 試題

第一頁 共一頁

注意事項：

1. 本試題共五題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

一、(20%) The design of the gear-and-shaft system shown (Fig.A) requires that steel shafts of the same diameter be used for both **AB** and **CD**. It is further required that $\tau_{\max} \leq 70$ MPa and that the angle ϕ_D through which the end **D** of shaft **CD** rotates not exceed 1.7 degree. Knowing that $G = 77$ GPa, determine the required diameter of the shafts.

二、(20%) A beam having the cross section shown (Fig. B) is subjected to a couple M_0 that acts in a vertical plane. Determine the largest permissible value of the moment M_0 of the couple if the maximum stress in the beam is not to exceed 14 ksi. Given: $I_y = I_z = 11.3$ in⁴, $A = 4.75$ in², the min radius of gyration $k_{\min} = 0.983$ in.

三、(20%) Find the deflection at the end **A** for the beam and loading shown (Fig. C). Given: $E = 200$ GPa, $I = 1.6 \times 10^6$ mm⁴.

四、(20%) For the post and loading shown (Fig. D), determine the principal stresses, principal planes, and maximum shearing stress at **K**.

五、(20%) For the loading shown (Fig.E) $P = 10$ kips, and knowing the beams **AB** and **DE** have the same flexural rigidity EI , determine the deflection at **C** and the reaction at **E**.

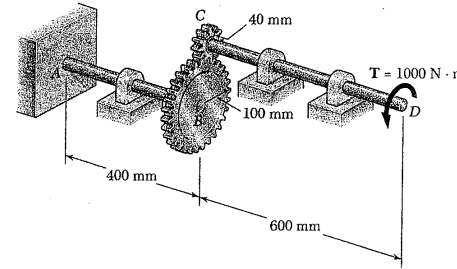


Fig.A

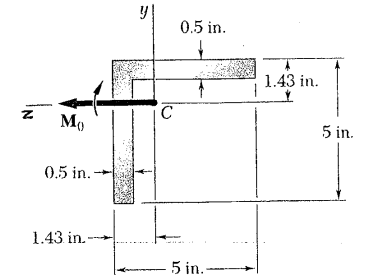


Fig.B

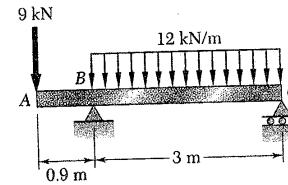


Fig.C

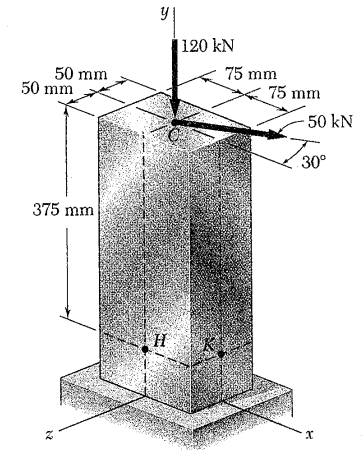


Fig.D

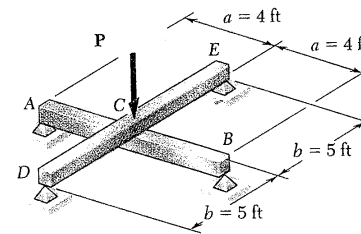


Fig.E