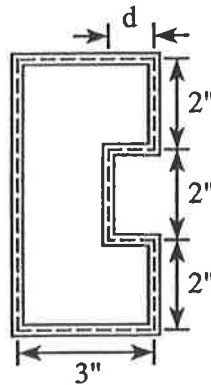


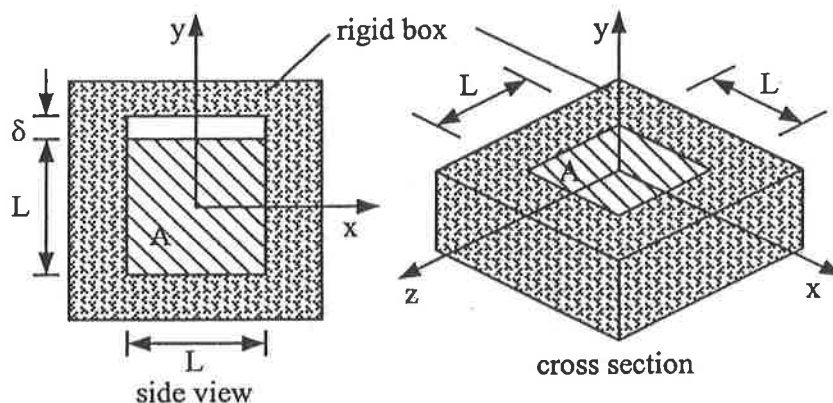
## 臺灣綜合大學系統 105 學年度學士班轉學生聯合招生考試試題

科目名稱	材料力學	類組代碼	D09
		科目碼	D0993
※本項考試依簡章規定各考科均「不可以」使用計算機		本試題共計	2 頁

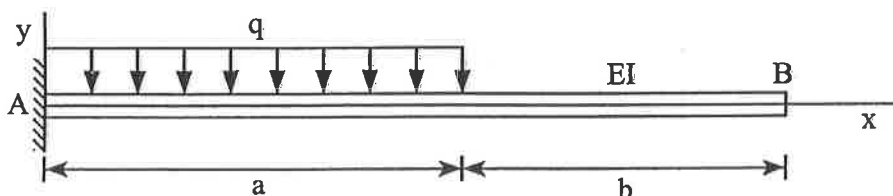
1. A hollow tube of length  $L = 4$  ft and thickness  $t = 0.1$  in. is subjected to a torque  $T = 2400$  lb-in. If  $G = 30$  Msi and the shear stress in the tube cannot exceed 750 psi, determine: (i) the largest distance  $d$ , and (ii) the associated angle of twist  $\phi$  of the tube. (20%)



2. A material A (modulus of elasticity  $E$ , Poisson's ratio  $\nu$ , thermal expansion coefficient  $\alpha$ ) of initial dimensions  $L \times L \times L$  is confined in a rigid box of inner dimensions  $L \times (L + \delta) \times L$ . If the temperature of the material is increased by  $\Delta T$  and  $\alpha \Delta T L < \delta$ , calculate  $\sigma_x$ ,  $\sigma_y$ ,  $\sigma_z$ ,  $\epsilon_x$ ,  $\epsilon_y$ ,  $\epsilon_z$  and absolute maximum shear stress  $\tau_{\max}$  in the material. Assume there is no friction between the material and the rigid box. (20%)



3. Use the moment differential equation  $EI(x)v(x)'' = M(x)$  to obtain the equations of the deflection curve for a cantilever beam AB carrying a uniform load of intensity  $q$  over part of the span ( $a + b = L$ ). Also, determine the deflection  $\delta_B$  at the end of the beam. (20%)

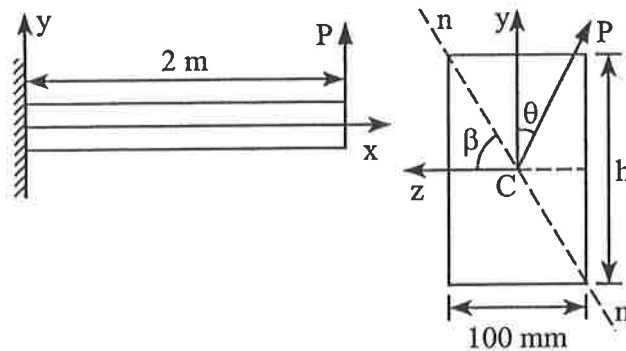


背面有題，請繼續作答。

臺灣綜合大學系統 105 學年度學士班轉學生聯合招生考試試題

科目名稱	材料力學	類組代碼	D09
		科目碼	D0993
※本項考試依簡章規定各考科均「不可以」使用計算機		本試題共計	2 頁

4. A cantilever beam supports an inclined load  $P$  at its free end. It is known that the neutral axis  $n-n$  lie along a diagonal of the cross section and the load  $P$  is perpendicular to the neutral axis. (i) Determine the height  $h$  of the beam. (ii) If the maximum normal stress in the beam cannot exceed 8 MPa, find the largest load of  $P$  that can be applied to the beam. (20%)



5. What are the critical buckling loads  $P_{cr}$  for the following columns. Assume all columns have the same  $EI$ . (20%) (You are not supposed to carry out a lot of calculations)

