

國立臺灣海洋大學 101 學年度研究所碩士班暨碩士在職專班入學考試試題

考試科目：材料力學

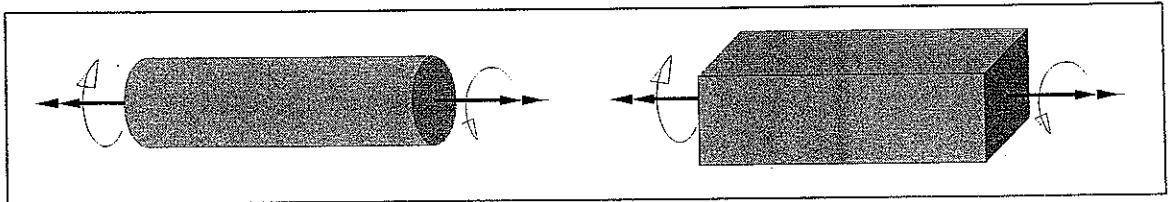
系所名稱：機械與機電工程學系碩士班微系統A組(聯) 、

機械與機電工程學系碩士班固力組(聯)

1. 答案以橫式由左至右書寫。2. 請依題號順序作答。

Note: 所有問題均須依據學理詳細作答。若需圖形輔助，請清楚繪製。

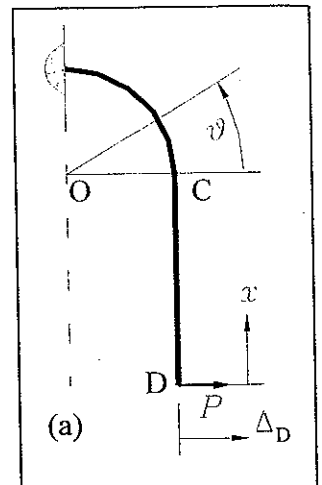
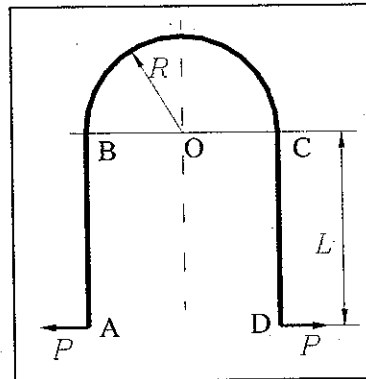
- 1 Suppose you are doing a deformation test of a specimen. The normal strain and shear strain are to be measured. Let the strains be very small ($\leq 1 \times 10^{-3}$). Please explain how do you measure the normal strain, and how do you measure the shear strain? (15pts)
- 2 What is the "pure bending" of beams and its implications? Give three examples of beams under pure bending. (10pts)
- 3 Is the torsion theory for a circular shaft applicable to rectangular bars? Explain why. (10pts)



- 4 (a) Derive the governing differential equation in term of deflection (v) for the buckling of a column under axially compressive force P . The bending rigidity of the column is EI . (b) Solve the equation and find the buckling load and buckling shape for a simply supported column with length L . (20pts)

- 5 Determine the increase in the distance (Δ_{AD}) between points A and D due to the loadings (see figure). All cross sections have the same bending rigidity EI . (20pts)

Hint: Due to the symmetry of the system, only a half of the structure (shown in Fig.(a)) needs to be considered. Let the displacement of D be Δ_D , then $\Delta_{AD} = 2\Delta_D$.



- 6 Consider a prismatic beam as shown in the figures. Find the reactions at supports. (25pts)

