

# 國立臺北科技大學九十七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

填准考證號碼

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第一頁 共一頁

### 注意事項：

1. 本試題共 4 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。

1. A uniform rigid bar AB of length  $L$  is suspended in a horizontal position under its own weight by two vertical wires attached to its ends (figure 1). Both wires are made of the same material and have the same cross-sectional area, but the lengths are  $L_1$  and  $L_2$ . Derive a formula for the distance  $x$  (from end  $A$ ) to the point on the bar where a vertical load  $P$  should be applied if the bar is to remain horizontal. (25%)
2. During a static test of an airplane wing, the strain gage readings from a  $45^\circ$  rosette (figure 2) are  $\varepsilon_A$ ,  $\varepsilon_B$  and  $\varepsilon_C$  respectively. Derive the formulas of the principal strains and maximum shear strains. (25%)

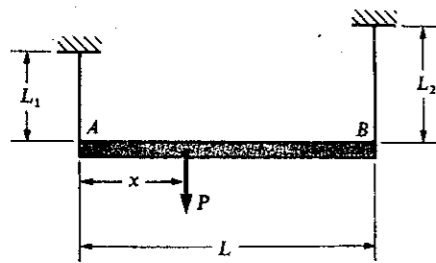


Figure 1

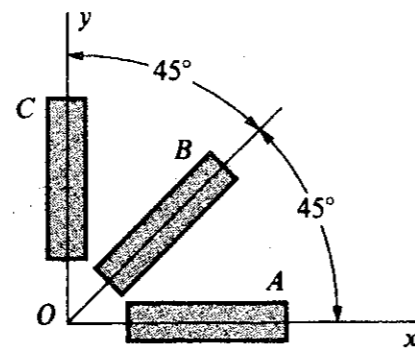


Figure 2

3. Two cantilever beams AB and CD are supported as shown in figure 3. A roller fits snugly between the two beams at point  $D$ . The upper beam has flexural rigidity  $EI_1$  and the lower beam has flexural rigidity  $EI_2$ . Find the force  $F$  transmitted between the beams at  $D$ . (25%)
4. The plane frame ABC shown in figure 4 has a fixed support at point  $A$  and carries a vertical load  $P$  at the free end  $C$ . The members AB and BC are joined rigidly at  $B$ , and both members of the frame have constant flexural rigidity  $EI$ . Determine the horizontal deflection  $\delta_h$ , and the angle of rotation  $\theta$  at point  $C$ . (25%)

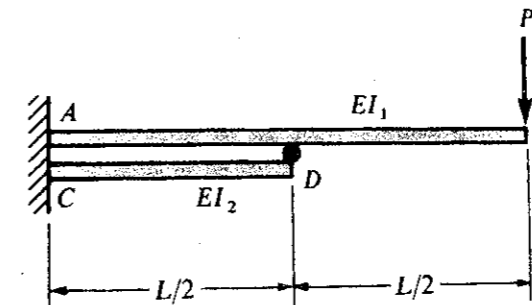


Figure 3

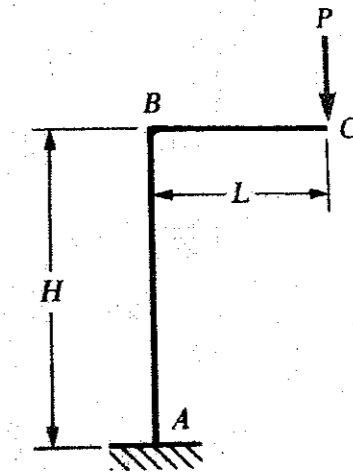


Figure 4