

國立臺灣科技大學

九十二學年度碩士班招生考試試題

系所組別：機械工程系碩士班乙組

科目：材料力學

總分 100 分

Solve the following four problems. Each problem is worth 25%.

1. On the free surface of an Aluminum ( $E = 70\text{GPa}$  and  $\nu = 0.33$ ) machine part, the strain gage rosette  $(0-45-90)^\circ$  were used to get

$$\epsilon_0 = 600\mu, \quad \epsilon_{45} = 450\mu, \quad \epsilon_{90} = 300\mu$$

Determine

- The principal strains and the maximum shearing strain at the point.
- The principal stresses and the maximum shearing stress at the point.

2. Bar AD in the figure is considered rigid and is loaded by 100N. Bar BE is made of Steel ( $E=210\text{GPa}$ , cross-sectional area  $100\text{mm}^2$ ), and bar CF is made of Aluminum ( $E=70\text{GPa}$ , cross-sectional area  $200\text{mm}^2$ ). Determine the stresses in bars steel and aluminum respectively.

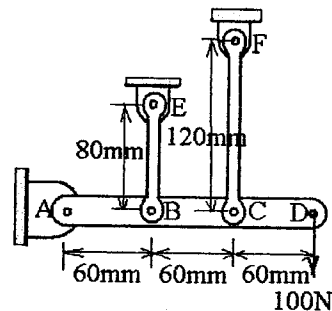


Figure for problem 2

3. A beam is loaded by uniform load  $50\text{N/m}$  and supported as shown in figure. Determine all of the reactions. Given that:  $E = 70\text{GPa}$ ,  $I = 2.4\text{cm}^4$ .

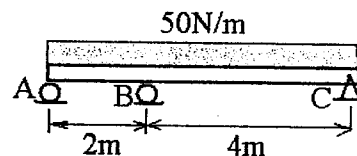


Figure for problem 3

4. The member shown in figure has a 6 by 10-cm rectangular cross section and is loaded 50N in a plane of symmetry. Determine the principal and maximum shearing stresses at point A.

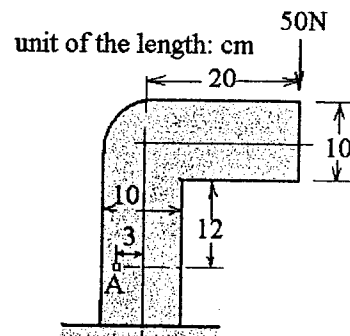


Figure for problem 4

