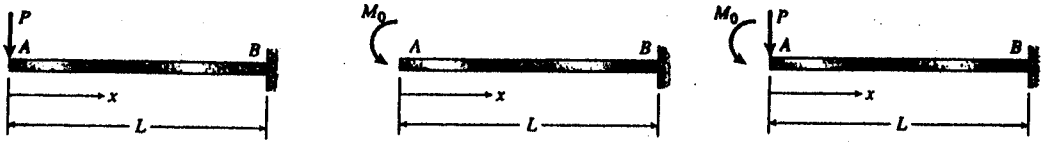
淡江大學九十二學年度碩士班招生考試試題

系別：航空太空工程學系　　科目：材 料 力 學

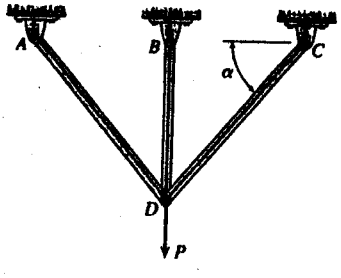
准帶項目請打「○」否則打「×」
簡單型計算機

1. A tension test is performed on a bar. The bar is 1.283 cm in diameter, with a gage length (distance between two chosen points along the bar) of 5 cm. The extension Δl between these two points is measured during the tension test. The bar is loaded elastically with a force of 1.56×10^5N. Under this load, the gage length is elongated by 0.0356 cm and the diameter of the bar is 1.280 cm.
(a) (10%) What is the modulus of elasticity (E) of the bar?
(b) (10%) What is the Poisson ratio (ν) of the bar?
(c) (10%) What is the shear modulus (G) of the bar?

2. (30%) A cantilever beam AB is subjected to three different loading conditions: (a) a concentrated load *P* at its free end, (b) a couple Mo at its free end, and (c) both loads acting simultaneously. For each loading condition, determine the strain energy of the beam.



3. (20%) A symmetrical framework consisting of three pin-connected bars is loaded by a force *P*. The angle between the inclined bars and the horizontal is α=50°. The axial strain in the middle bar is measured as 0.0839. Determine the tensile strain in the outer bars.



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4. (20%) The truss ABC supports a vertical load W at joint B. Each member is a slender circular steel pipe (E=200 GPa) with outside diameter 100 mm and wall thickness 6.0 mm. The distance between supports is 7.0 m. Determine the critical value W_{cr} of the load.