淡江大學九十一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　　　9/- /
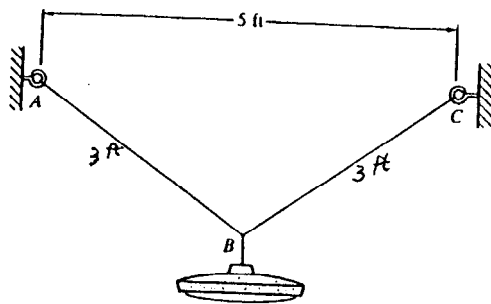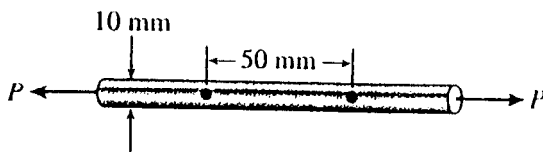
准帶項目請打「○」否則打「×」	
計算機	字典
○	×

*所有計算式需詳盡，答案之單位必須寫出。

1. (25%) A steel wire ABC supporting a lamp at its midpoint is attached to supports that are 5 ft apart (AC, as shown below). The length of the wire is 6 ft and its diameter is 16 mils (1 mil = 0.001 in.). If the lamp is weight 12 lbs, what is the tensile stress σ_t in the wire ABC?

2. A tensile test is performed on a brass specimen 10 mm in diameter using a gage length of 50 mm. When the tensile load P reaches a value of 20 kN, the distance between the gage marks has increased by 0.122 mm. (a) What is the modulus of elasticity E of the brass? (13%) (b) If the diameter decreases by 0.0083 mm, what is Poisson's ratio? (12%)

注意背面尚有試題▶

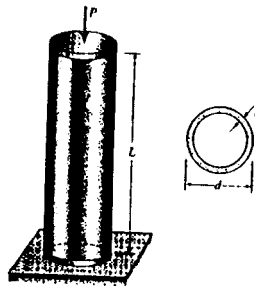3. (25%) A hollow circular column of steel ($E=30,000ksi$) is subjected to a compressive load P. The column has length $L=8.2\,ft$ and outside diameter $d=8.0\,in$. The load $P=110,000\,lb$. If the allowable compressive stress is $8.1\,ksi$ and the allowable shortening of the column is $0.025\,in.$, what is the required wall thickness t? (25%)

4. (25%) An aluminum column of length L and rectangular cross section has a fixed end B and supports a centric load at A. Two smooth and rounded fixed plates restrain end A from moving in one of the vertical planes of symmetry of the column, but allow it to moving in the other plane. (a) Determine the ratio a/b of the two sides of the cross section corresponding to the most efficient design against buckling. (b) Design the most efficient cross section for the column, knowing that L=500 mm, E=70 GPa, P=20 kN, and that a factor of safety of 2.5 is required.