

長庚大學108學年度研究所碩士班招生考試試題

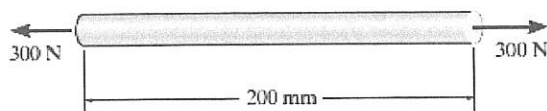
系所：生物醫學工程研究所碩士班

考試科目：應用力學

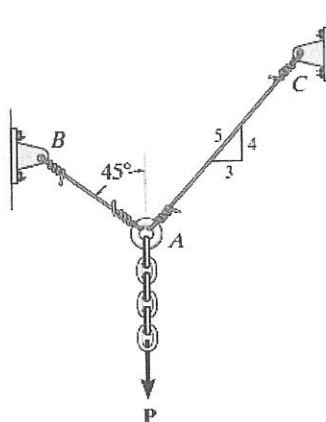
注意：請詳細閱讀下列試題，並請標明題號依試題順序將答案書寫於答案卷上。 本試題共2頁：第1頁

應用力學

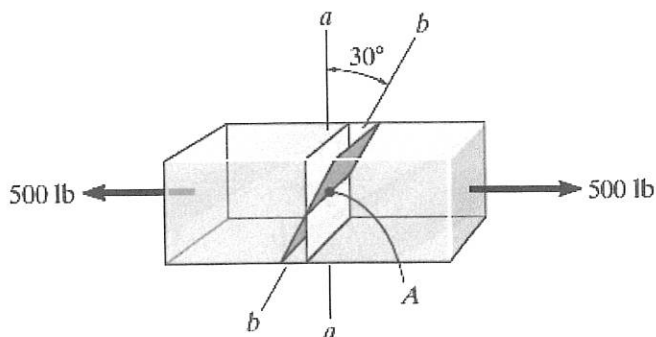
1. The acrylic plastic rod is 200 mm long and 15 mm in diameter. If an axial load of 300 N is applied to it, determine the change in its length and the change in its diameter. $E_p = 2.70$ GPa, $\nu_p = 0.4$. (15%)



2. If the allowable tensile stress for wires AB and AC is $\sigma_{\text{allow}} = 200$ MPa, determine the required diameter of each wire if the applied load is $P = 6$ kN. (15%)



3. Determine the resultant internal normal and shear force in the member at (a) section $a-a$ and (b) section $b-b$, each of which passes through the centroid A . The 500-lb load is applied along the centroidal axis of the member. (15%)



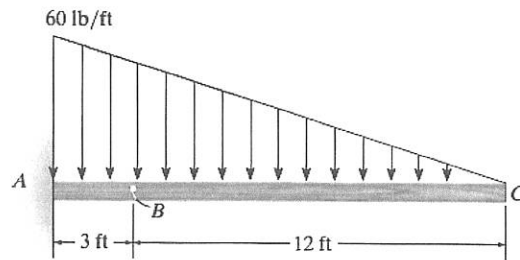
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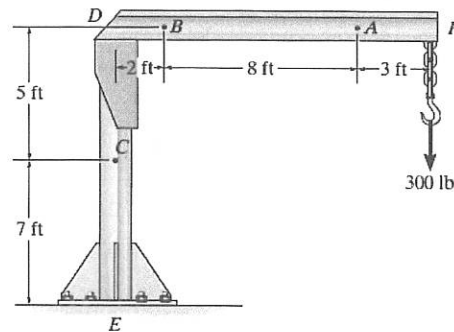
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4. Determine the resultant internal loadings acting on the cross section at point *B*. (15%)



5. The boom *DF* of the jib crane and the column *DE* have a uniform weight of 50 lb/ft. If the supported load is 300 lb, determine the resultant internal loadings in the crane on cross sections at points *A*, *B*, and *C*. (20%)



6. A shaft is made of an aluminum alloy having an allowable shear stress of $\tau_{\text{allow}} = 100 \text{ MPa}$. If the diameter of the shaft is 100 mm, determine the maximum torque *T* that can be transmitted. What would be the maximum *T'* if a 75-mm-diameter hole were bored through the shaft? Sketch the shear-stress distribution along a radial line in each case. (20%)

(Hint: $\tau = \frac{T \cdot r}{J}$, $J = \frac{\pi \cdot r^4}{2}$)

