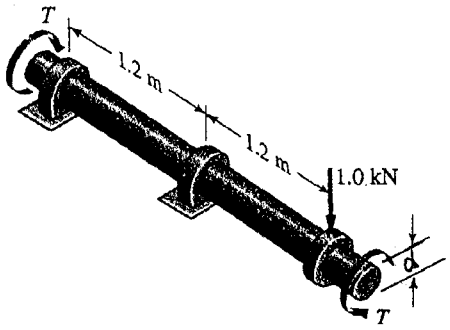
國立中央大學97學年度碩士班考試入學試題卷

所別：機械工程學系碩士班 甲組(固力與設計)　科目：材料力學　共 1 頁 第 1 頁

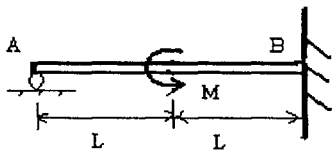
＊請在試卷答案卷（卡）內作答

1. A shaft is subjected to the loads shown. The applied torque is T = 1 kN·m. If the maximum allowable normal and shear stresses are σ_w = 120 MPa and τ_w = 70 MPa, respectively, determine the smallest allowable diameter, d, of the shaft. Neglect the weight of the shaft as well as the stress due to the transverse shear force. **(30%)**

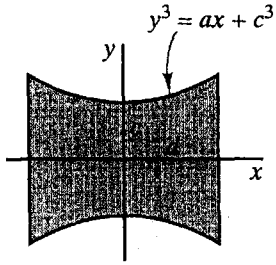


2. Determine the relationship between the elastic constants E, ν, and G. (E is the Young's modulus, ν is the Poisson's ratio, and G is the shear modulus.) (10%)

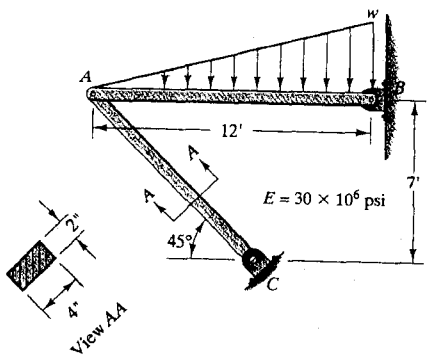
3. A beam is loaded by a moment M and supported as shown. Determine
   (a) The reactions at supports A and B. (10%)
   (b) The deflection at the middle of the span. (10%)



4. Consider the cross section shown in the figure where the upper boundary in the first of four identical quadrants is given as $y^3 = ax + c^3$. What is the flexure formula for pure bending at this section about the x axis? (20%)



5. What is the maximum loading intensity w, for the triangular loading to avoid buckling of member AC in the figure? Buckling is in the plane of the problem. (20%)



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