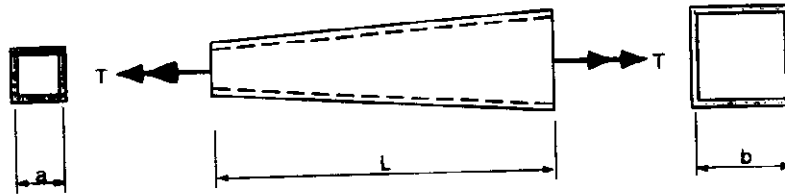


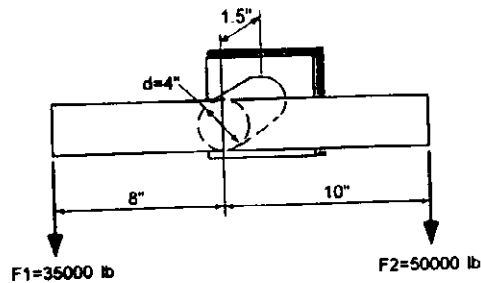
所別：機械工程技術研究所
學程別：

組別：固力與設計組、製造組 科目：材料力學

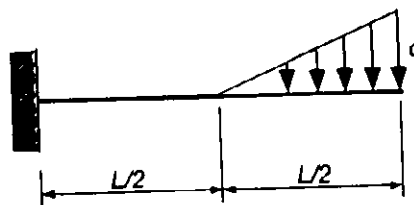
1. A long, thin-walled, tapered tube of square cross section shown in the following figure is subjected to a torque T . The tube has constant wall thickness t . Derive a formula for the angle of twist ϕ of the tube. (20%)



2. The T-bracket shown in the following figure is fixed to a rigid wall and supports the two loads as shown. Consider only the solid cylinder portion of the bracket, and neglecting stress concentration and buckling effect. (a) Clearly indicate the locations of the critical stress concentration and buckling effect. (b) Calculate the magnitudes of the principal stresses and the maximum shearing stresses at your selected points. From your results, where is the location of the maximum normal stress and where is the location of the maximum shearing stress? (20%)



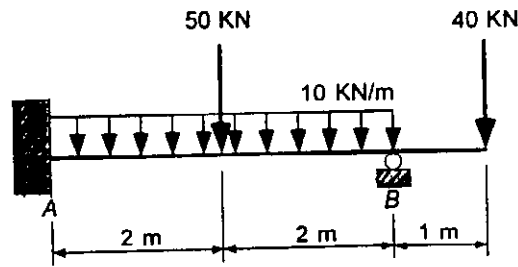
3. A cantilever beam supporting a triangularly distributed load is shown in the following figure. The flexural rigidity of the beam is EI . Derive the equation of the deflection for the beam. (20%)



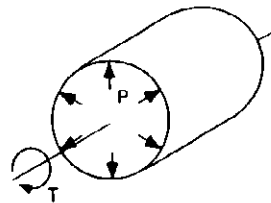
所別：機械工程技術研究所
學程別：

組別：固力與設計組、製造組 科目：材料力學

4. Determine the reactions at supports *A* and *B* for the beam shown in the following figure. Also draw the shear force and bending moment diagrams for the beam, labeling all critical ordinates including the maximum and minimum values. (20%)



5. A closed-ends thin-walled cylinder 100mm internal diameter, 250mm long with walls 2mm thick is subjected to an internal pressure of 8 MN/m². Modulus of elasticity $E=2 \times 10^5$ MN/m². Poisson $\nu=0.3$. (a) Determine the change in internal diameter and the change in length. (b) If, in addition to the internal pressure, the cylinder is subjected to a torque of 800 Nm, find the principal stresses and maximum shearing stresses set up in the cylinder. (20%)



HINT:

