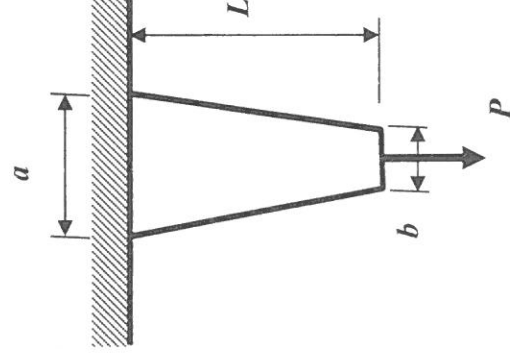
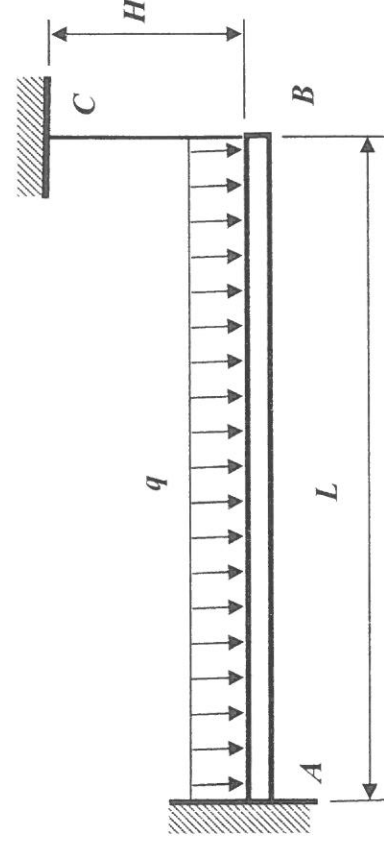


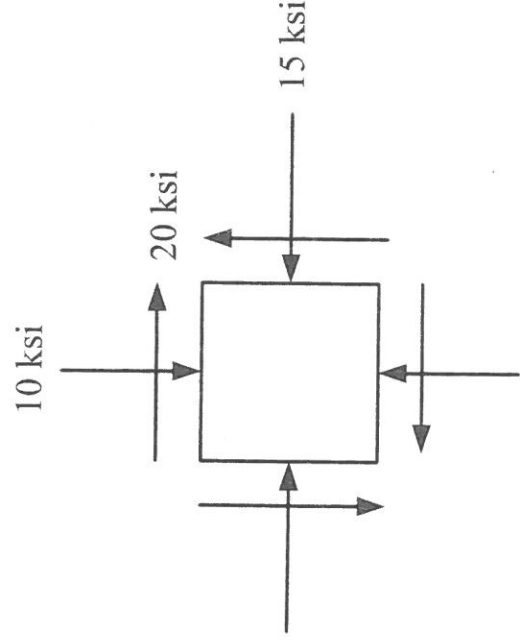
1. A tapered bar of rectangular cross-section and constant thickness  $t$  carries a force  $P$  as shown in the figure. The modulus of elasticity is  $E$ . Find the elongation  $\delta$  of the bar due to the force  $P$ . (25%)



2. The cantilever beam  $AB$  with flexural rigidity  $EI$  shown in the figure is supported by a cable  $BC$  at its free end. The axial rigidity of the cable is  $EA$ . Before the load is applied, the cable is taut but has no force in it. Find the force  $T$  in the cable produced by the uniform load of intensity  $q$ . (25%)



3. (a) Subjected to external loads, a thin plate is under plane strain condition. Explain the plane strain condition and then draw the stress field in a differential volume element of the thin plate that satisfies plane strain condition. (5%)
- (b) The state of stress at a critical point in an Al machine bracket is shown in the figure. If the yield stress for Al is  $\sigma_y = 60$  ksi, determine if yield occurs using the maximum-shear-stress theory. (20%)



4. (a) What is the principle of superposition? (5%)
- (b) Determine the horizontal displacement and slope at the end  $A$  of the bracket as shown in the figure. Assume that the bracket is fixed supported at its base and neglect the axial deformation of segment  $BC$ .  $EI$  is constant. (20%)

