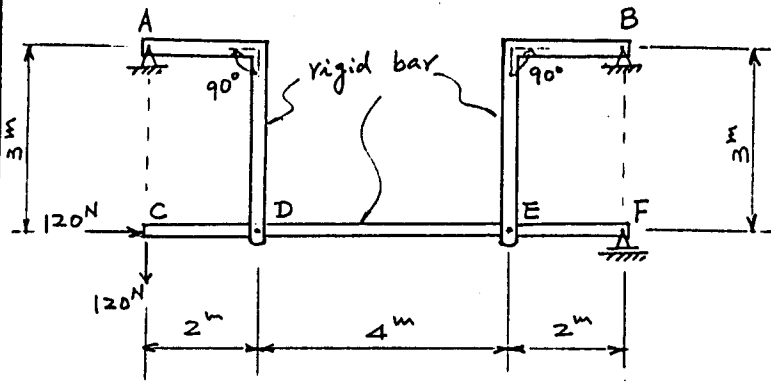
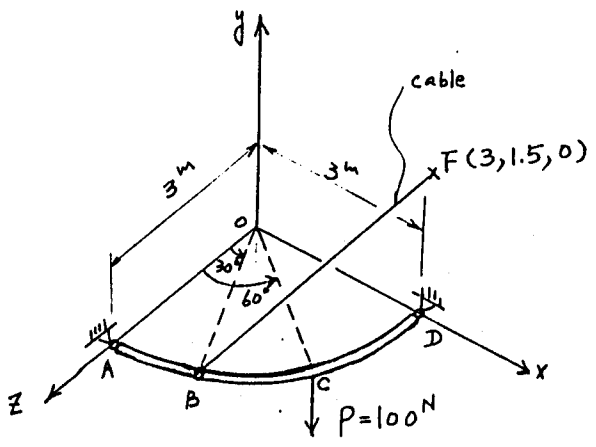


5/6 (1)

- 1) The frame structure is supported at A, B and F as shown, determine
 - (1) the reaction at support F. (9%)
 - (2) the reactions at supports A and B. (16%)



- 2) A rigid bar ABCD of quarter circular shape is supported at the ball and socket joints A and D, respectively, and also supported by a cable BF. A 100-N force is applied at point C of the rigid bar. Determine
 - (1) the moment about point "A" due to the force P (5%)
 - (2) the moment about axis AD due to the force P (10%)
 - (3) the force in the cable BF when the system is in equilibrium. (10%)



3. The roof of a long walkway is idealized as an infinitely long simply supported plate as shown in Fig. 1. On a rainy day, the roof starts collecting water due to 排水不良 (bad drainage). Find the minimum value of the plate bending rigidity D so that the plate does not collapse under the rain load. Disregard the weight of the plate itself. (20%)

Note: The equilibrium equation for an infinitely long plate reduces to

$$D \frac{d^4 w}{dx^4} = q(x)$$

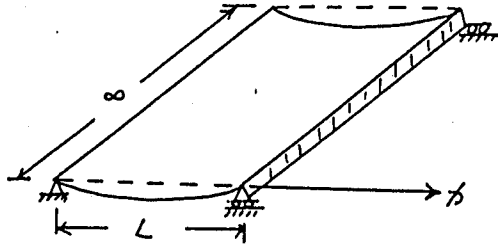


Fig. 1

4. Referring to Fig. 2. A simple beam with a initially uniform temperature T_0 . The beam has its temperature change to T_1 on its upper surface and T_2 on its lower surface.

We assume that the variation in temperature is linear between the top and bottom of the beam. Disregard the weight of the beam itself.

- (1) Find the deflection curve of this beam. (15%)

- (2) If we assume $P = 1$ kip, $L = 40$ ft, $a = 10$ ft, $b = 10$ in, $h = 20$ in, $T_1 = 50^\circ\text{F}$,

$T_2 = 100^\circ\text{F}$, $T_0 = 75^\circ\text{F}$, Find the principal stress and maximum shear stress for point B. (15%)

$$E = 30 \times 10^6 \text{ psi, and } \alpha = 8.0 \times 10^{-6} / ^\circ\text{F}.$$

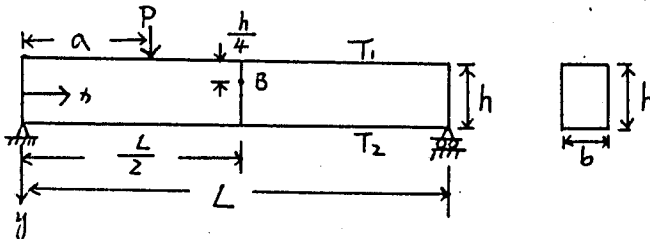


Fig. 2.