Name = M. Saleem

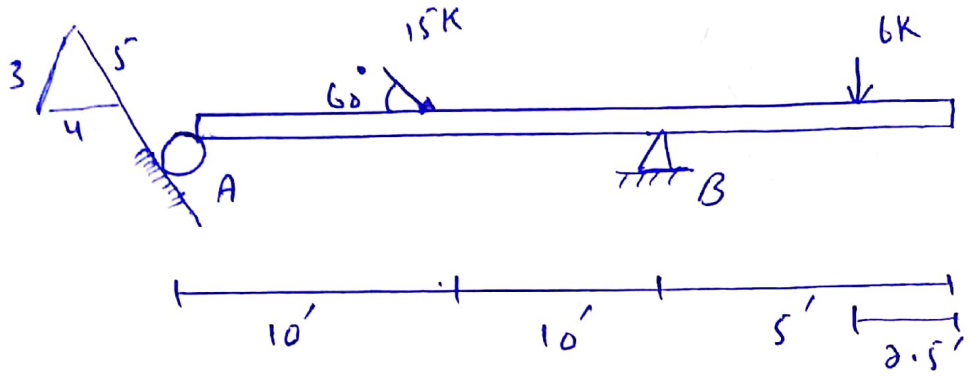
ID = 7859

semester = 07

Subject = Structure I

Teacher = Saqib sir

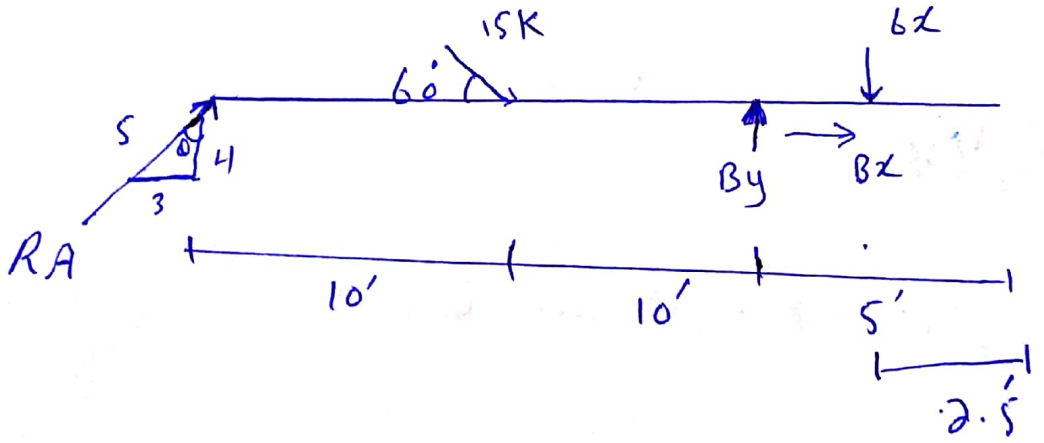
"Question No 1"



Solution:-

first we know to ~~find~~ draw

F. B. D



$$\circlearrowleft \Sigma M_B = 0$$

$$-\tfrac{4}{5} R_A (20) + 15 \sin(60)(10) - 6(2.5) = 0$$

$$+\tfrac{4}{5} R_A (20) = +114.9$$

$$R_A = \frac{114.9}{20} \times \tfrac{5}{4}$$

$$\boxed{R_A = 7.18\ K}$$

Now to find B_x

$\Sigma f_x = 0 \longrightarrow +$

$$\frac{3}{5}(7.18) + 15\cos(60^\circ) + B_x = 0$$

$$11.81 + B_x = 0$$

$$\boxed{B_x = -11.81\ K}$$

so its direction is opposite

Now

$\Sigma f_y = 0 \uparrow +$

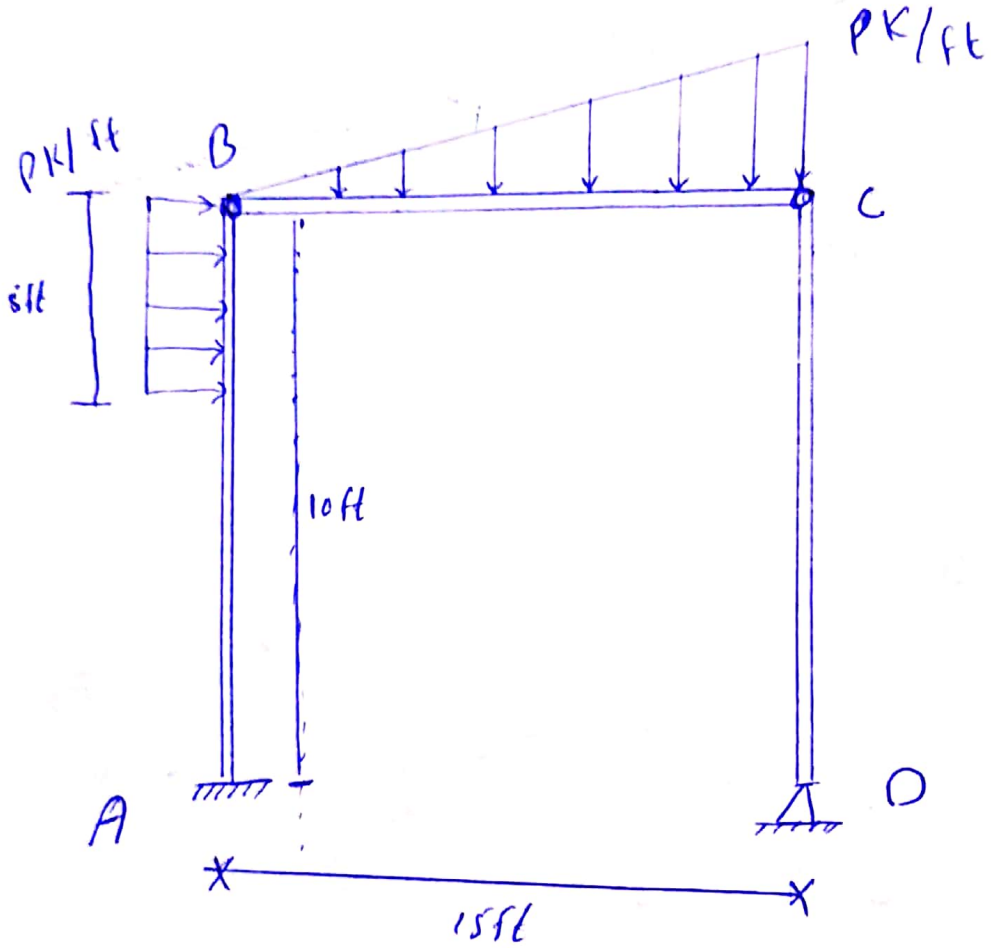
$$\frac{4}{5}(7.18) - 15\sin(60) + B_y - b = 0$$

$$-7.746 + B_y = b$$

$$B_y = b + 7.746$$

$$\boxed{B_y = 13.75\ K}$$

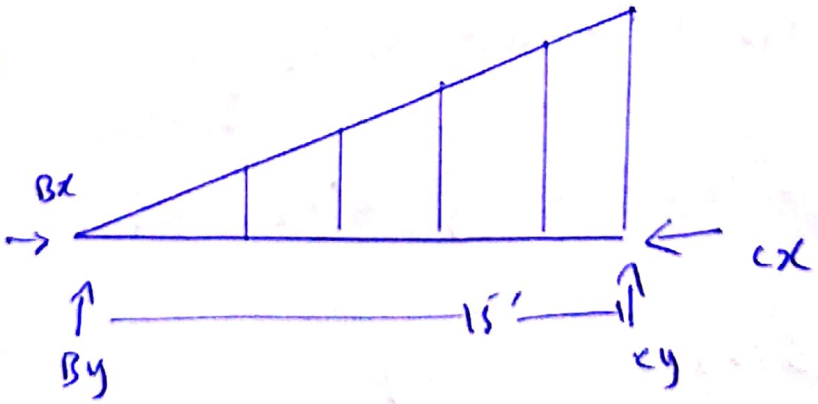
Question No 03"

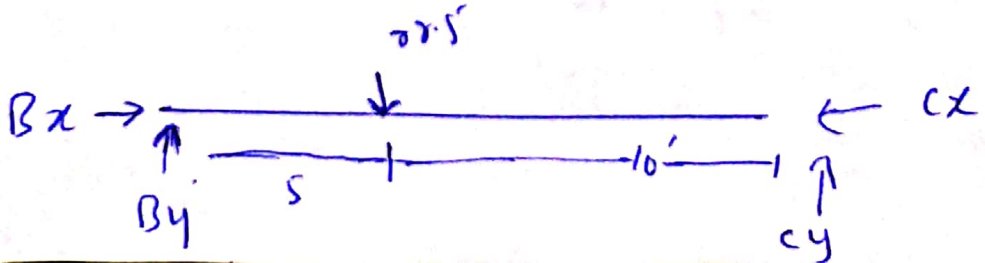


Solution:-

ID: 7859

UUL





Area $= \frac{1}{2} bh$

$= \frac{1}{2} (15 \times 9)$

$= 67.5$

Distance $= \frac{1}{3}(b) = \frac{1}{3}(15) = 5$

(i) $\{ f_x = 0 \quad \rightarrow + \quad \leftarrow -$

$B_x - C_x = 0 \quad -(1)$

(ii) $\Sigma f_y = 0 \quad \uparrow_+ \quad \downarrow -$

$B_y + C_y = 67.5\ K \quad -(2)$

(iii) $\Sigma M_B = 0 \quad \circlearrowleft + \quad \circlearrowright -$

$(67.5)(5) - C_y \times 15 = 0$

$337.5 = 15 C_y$

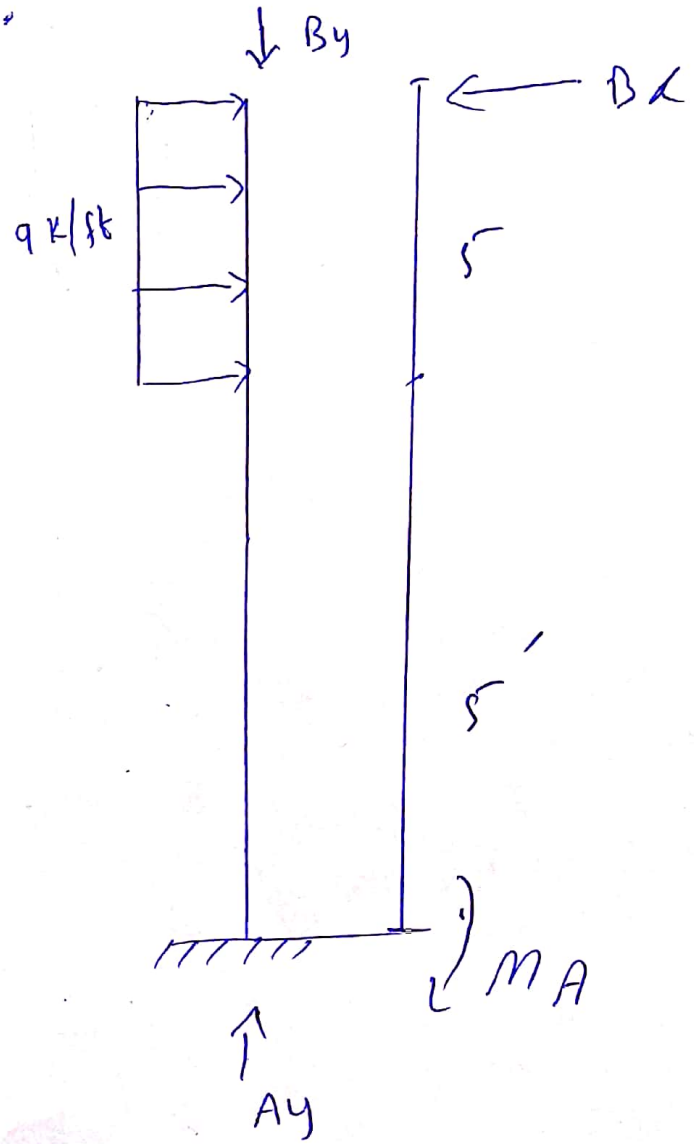
$\boxed{C_y = 22.5\ K}$

Put the value equation (2)

$$By + 22.5 = 67.5$$

$$By = 67.5 - 22.5$$

$$\boxed{By = 45\ K}$$



(i) $\Sigma fx = 0 \quad \rightarrow + \quad \leftarrow -$

$$Ax + (9 \times 5) - Bx = 0$$

$$A_x - B_x = -45 \longrightarrow (3)$$

(2) $\Sigma f_y = 0 \quad \uparrow + \downarrow -$

$$A_y - B_y = 0 \longrightarrow (4)$$

(iii) ~~$\Sigma f_y = 0$~~ $\quad \Sigma M_A = 0 \quad \circlearrowleft + \circlearrowright -$

$$(9 \times 5) \times (2.5 + 5) - B_x \times 10 = 0$$

$$(45) \times 7.5 - B_x \times 10 = 0$$

$$337.5 = B_x \times 10$$

$$\boxed{B_x = 33.75\,K}$$

Put value in equation 3

$$A_x - 33.75 = -45$$

$$\boxed{A_x = -11.25}$$

Now since C and D are at same line thus load is transfered so

$$C_y = -22.5\,K$$

Put the value of By in eq (4)

$$Ay - 45K = 0$$

$$\boxed{Ay = 45K}$$

Put the value of BK in equation (1)

$$33.75 - Cx = 0$$

$$\boxed{Cx = 33.75}$$

$$M_D = 0 \;)+$$

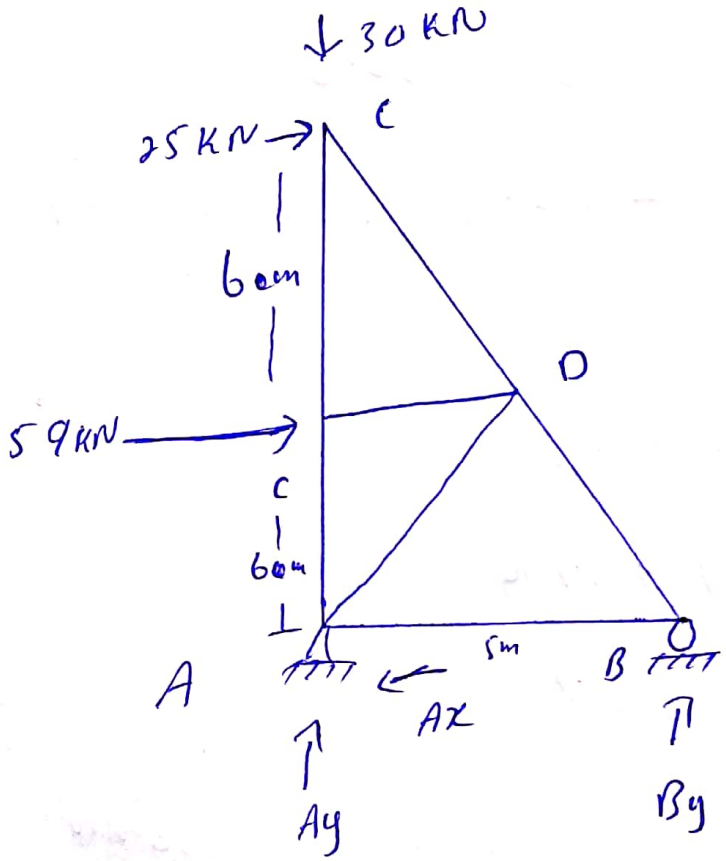
$$-(9 \times 5)(2.5) - (Ax \times 10) + MA = 0$$

$$-(45)(2.5 - (-11.25)(10) + MA = 0$$

$$-112.5 - (-112.5) + MA = 0$$

$$\boxed{MA = 0}$$

Question no 3



Solution:-

$$\Sigma M_A = 0 \curvearrowleft +$$

$$(25 \times 12) + -(By \times 5) + (59 \times 6)$$

$$300 - 5By + 354$$

$$300 + 354 = 5By$$

$$654 = 5By$$

$$\boxed{By = 130.8 \text{ k}}$$

now

$$Ay + By = 30$$

$$\Rightarrow Ay = 30 - 130.8$$

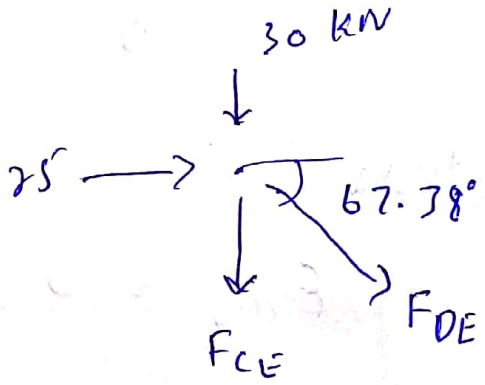
$$\boxed{Ay = -100.8} \text{ (downward)}$$

$$\Sigma f_x = 0 \quad \rightarrow + \leftarrow$$

$$25 + 59 = Ax$$

$$\boxed{Ax = 84\ K}$$

Joint E :



$$\Rightarrow 25 + F_{DE} \cos 67.38$$

$$\Rightarrow F_{DE} = \frac{-25}{\cos 67.38}$$

$$FDE = \frac{-25}{\cos 67.38^{\cdot}} = -65\ KN$$

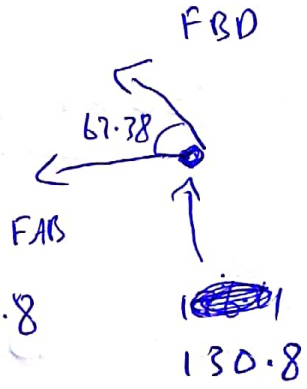
compresion.

$\Sigma f_y = 0 \uparrow$

$\Rightarrow -30 - F_{CE} + 65 \sin 67.38$

$\Rightarrow F_{CF} = 30\ KN$ // Tension

Now joint B



$\Rightarrow F_{BD} \sin 67.38 = -130.8$

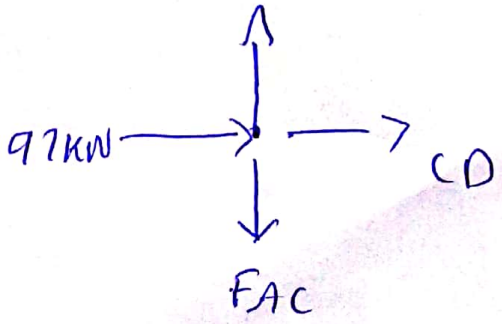
$\boxed{F_{BD} = -141.71\ KN}$ compression

$\Sigma f_x = 0 \rightarrow +$

$-F_{AB} + 141.7 \times \cos 67.38 = 0$

$\boxed{F_{AB} = 54.50\ KN}$ Tension

Now Joint C



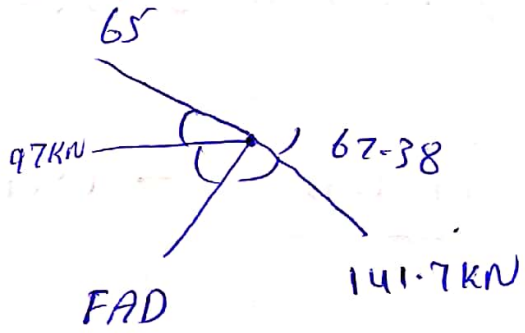
$\Sigma F_x = 0$

$= F_{CD} = -59\ KN$ compression

$\Sigma f_y = 0$

$F_{AC} = 30\ KN$ (Tension)

Now joint D



$\Sigma f_y = 0 \uparrow$

$= 141.7 \times \sin 67.38° \Rightarrow 65 + F_{AD} \sin 67.38$

$F_{AD} = 64.86\ KN$ Tension.