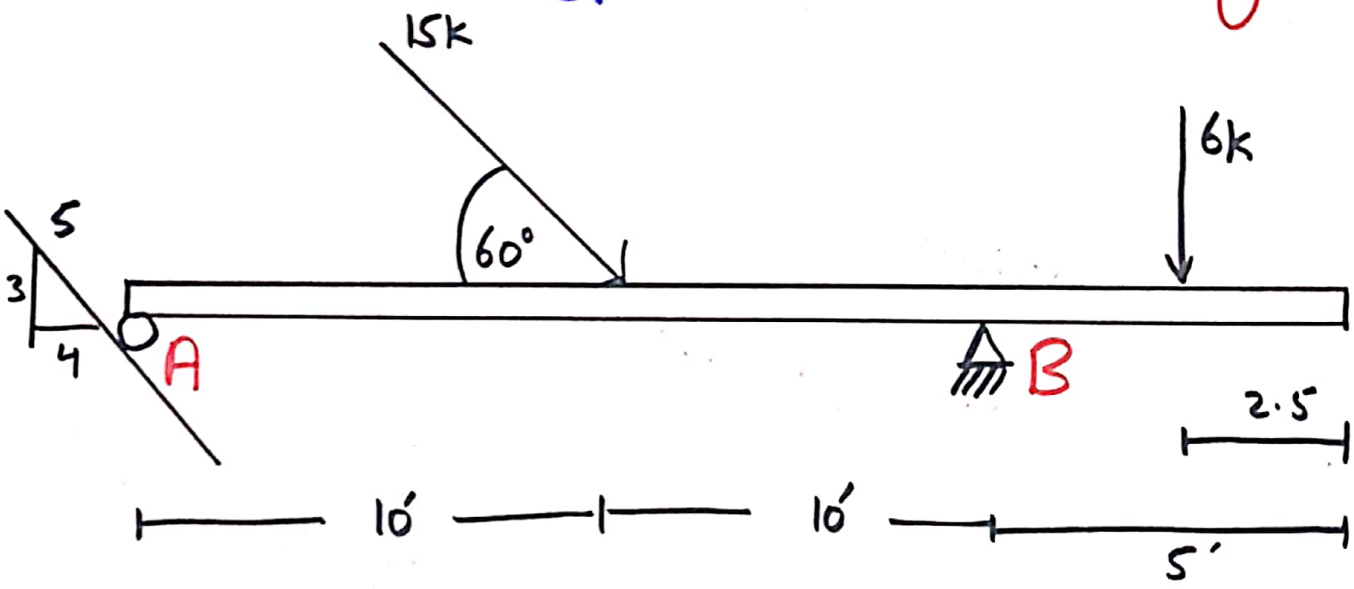
NAME SHERAZ

ID 7862

SEC B



Solution :-

Initially we have to Consider the angle of roller Support, By using trigonometry

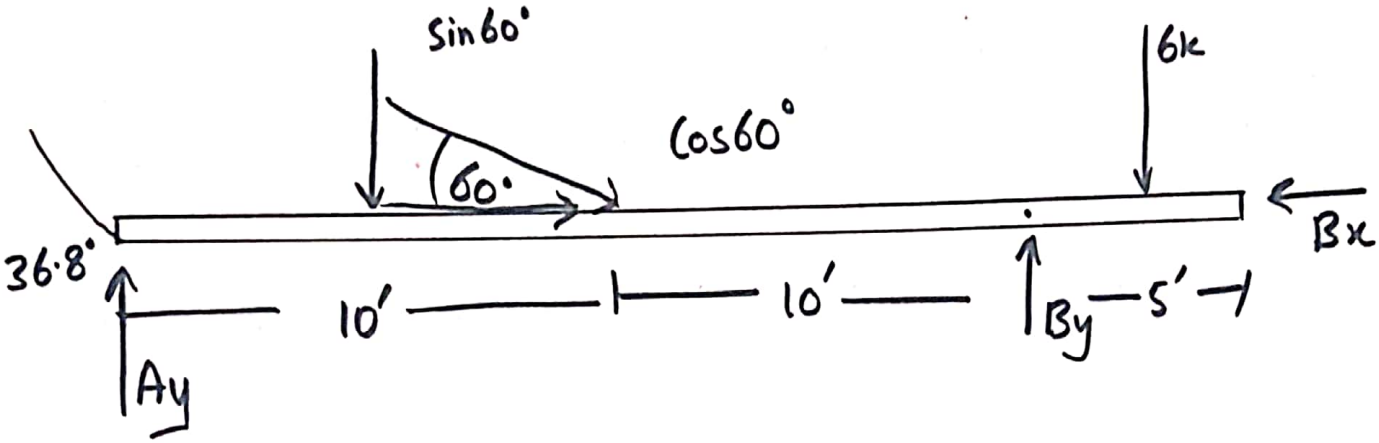
$$\sin\theta = \frac{P}{H}$$

$$\sin\theta = \frac{3}{5}$$

$$\theta = \sin^{-1}\left[\frac{3}{5}\right]$$

$$\boxed{\theta = 36.8^{\circ}}$$

Now to find Unknown reactions



$$\Sigma F_x = 0 \xrightarrow{+}$$

$$15\cos 60^\circ - Bx - Ay \sin(36.86) = 0$$

$$7.5 - Bx - 0.599 Ay = 0$$

$$\Sigma F_y = 0 \uparrow +$$

$$Ay \cos 36.86 + By - 6 - 15 \sin 60^\circ = 0$$

$$0.80 Ay + By - 18.99 = 0$$

$$\Sigma M_B = 0 \; (+\circlearrowleft)$$

$$[Ay \cos 36.8 \times 20) - [15 \sin 60^\circ \times 10] + 6 \times 2.5 = 0$$

$$16Ay - 190 + 15 = 0$$

$$16Ay - 175 = 0$$

$$\boxed{Ay = 10.93 k}$$

Putting the value in eq (2)

$$0.80[10.93] + By = 18.99$$

$$8.75 + By = 18.99$$

$$By = 18.99 - 8.75$$

$$\boxed{By = 10.25 k}$$

Putting the values of Ay in eq (1)

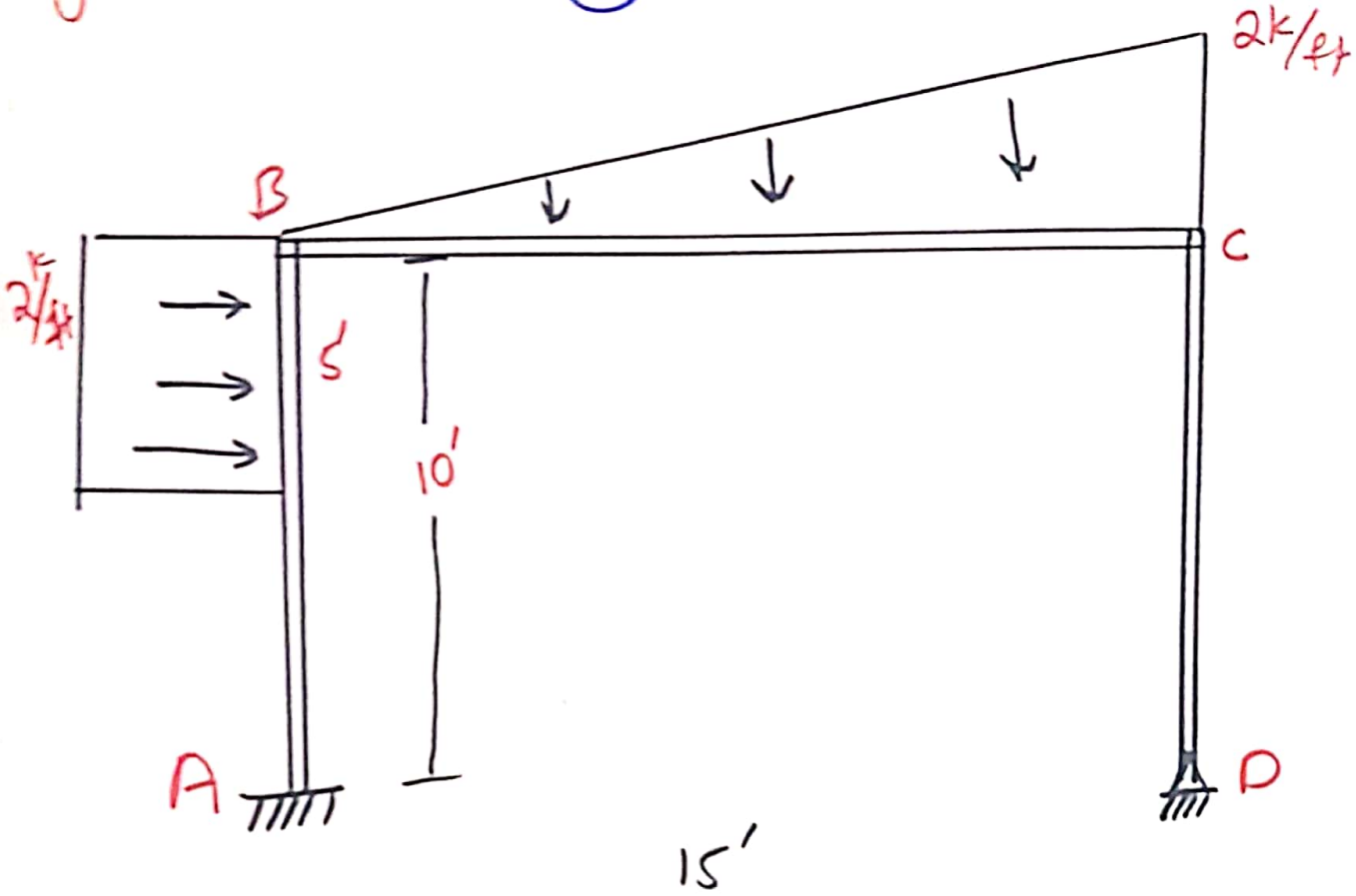
$$7.5 - Bx - 0.599[10.937] = 0$$

$$\boxed{Bx = 0.93 k}$$

Pg #04

Q no #02

7862



first of all :-

As we know

$$\text{Area} = \frac{1}{2}(b \times h)$$

$$\text{Area} = \frac{1}{2}(15)(2)$$

$$A = 15$$

$$\text{Distance} = (1/3)(15)$$

$$\text{//} = 5'$$

(Part 1)

$\Sigma F_x = 0 \quad \overset{+}{\rightarrow}$

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

$\Sigma F_y = 0 \quad \uparrow + \downarrow -$

$B_y + C_y = 15 \quad - (2)$

$\Sigma M_B = 0 \quad \circlearrowright + \circlearrowleft -$

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

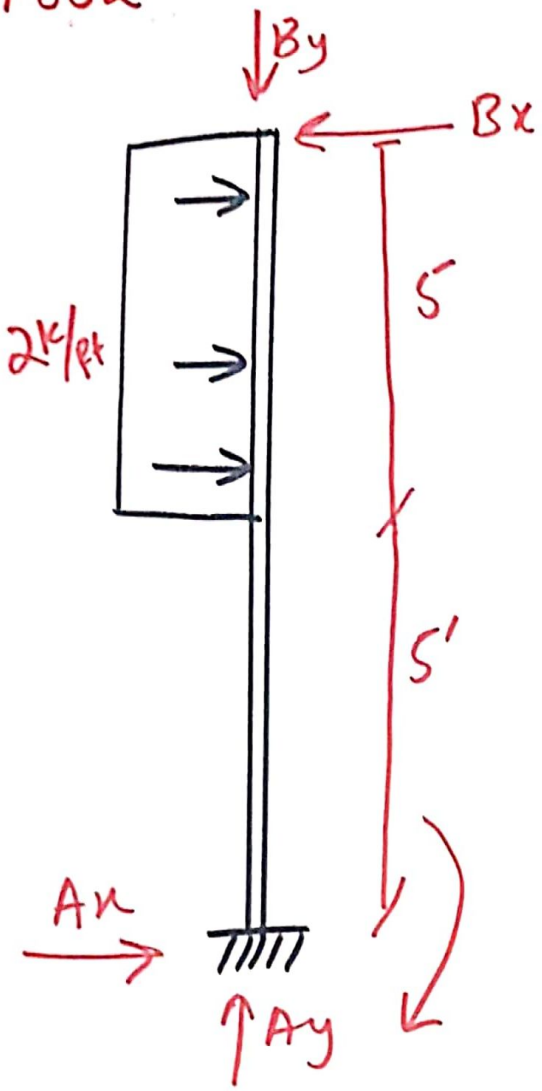
$$C_y = 5k$$

Putting values in eq (2)

$B_y + 5 = 15$

$B_y = 15 - 5$

$$B_y = 10k$$



(Part B)

First of all

$\Sigma F_x = 0 \quad \xrightarrow{+}$

$$A_x + (2 \times 5) - B_x = 0$$

$$A_x - B_x = -10 \longrightarrow (3)$$

$\Sigma F_y = 0 \quad \uparrow +$

$$A_y - B_y = 0$$

$\Sigma M = 0 \quad \circlearrowleft +$

$$(2 \times 5) \times (2.5 + 5) - B_x \times 10 = 0$$

$$10 \times 7.5 - 10 B_x = 0$$

$$B_x = 7.5$$

Putting values in eq (3)

$$A_x - 7.5 = -10$$

$$A_x = -2.5$$

Thus C & D are at same line So load is transfered.

As

$$C_y = 5k$$

So $D_y = -5k$

Putting value of B_y in eq

$$A_y - 10k = 0$$

$$A_y = 10k$$

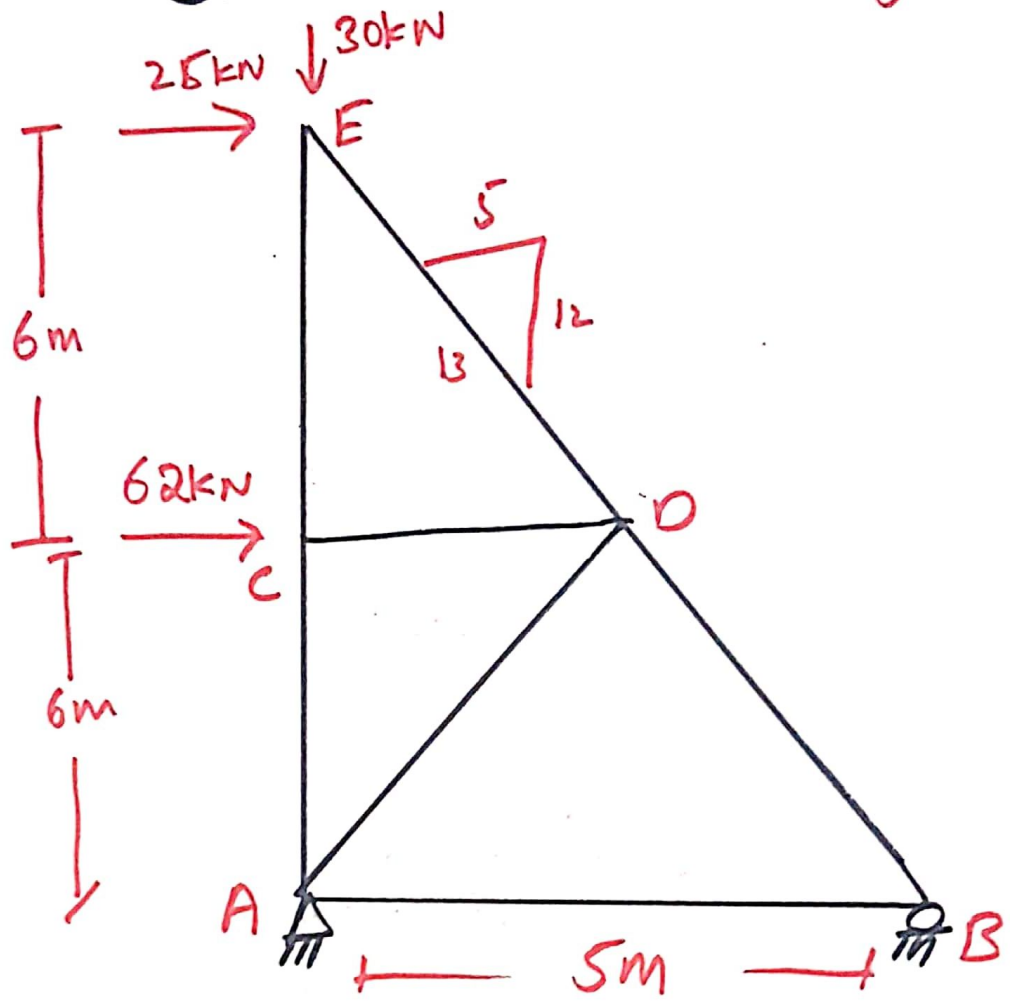
Putting the value of B_x in eq (1)

$$7.5 - C_x = 0$$

$$C_x = 7.5$$

So $D_x = -7.5$ ∵ b/c lies on Same plane

Qno #3



$\Sigma M_A = 0 \circlearrowright +$

$25 \times 12 + 62 \times 6 = By \times 5$

$By = 134.4$

Now $Ay + By = 30$

$Ay = 30 - 134.4$

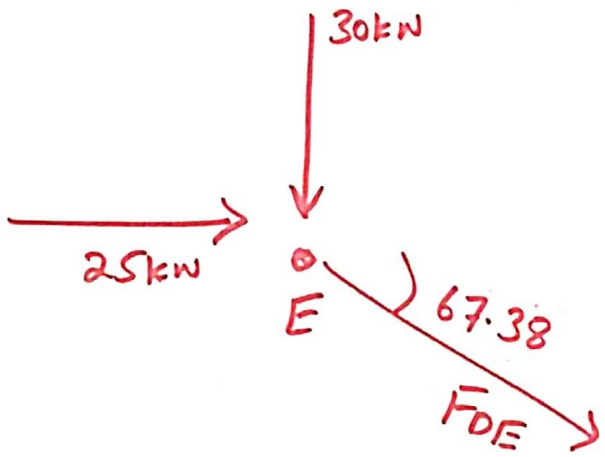
$Ay = -104.4$

$\Sigma F_x = 0$

$A_x = 25 + 62$

$A_x = 87\,kN.$

Joint (E)



$\Sigma F_x = 0 \xrightarrow{+}$

$25 + F_{DE}\,Cos(67.38) = 0$

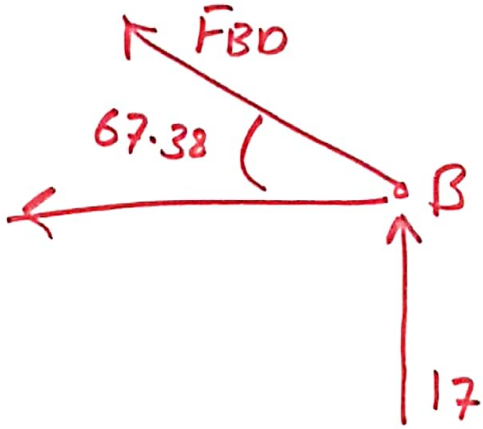
$F_{DE} = -65kN$ Compression

$\Sigma F_y = 0 \uparrow +$

$-30 - F_{CE} + 65\,Sin\,67.38$

$F_{CE} = 30kN$ Tension

Now Joint B



$\Sigma F_y = 0 \uparrow +$

$F_{BD} \sin 67.38 = -176.4$

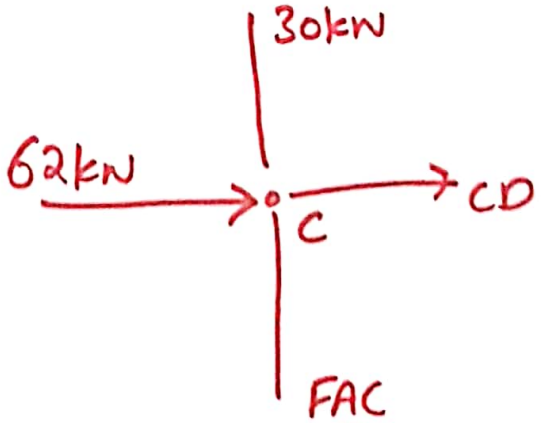
$F_{BD} = -191.1$ kN Compression

$\Sigma F_x = 0 \rightarrow +$

$-F_{AB} + 191.1 \times \cos 67.38 = 0$

$F_{AB} = 73.5$ kN Tension

Now joint 'C'



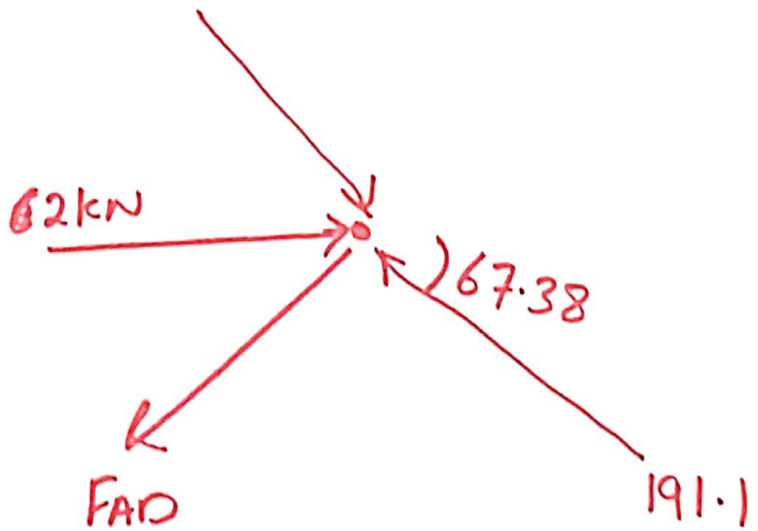
$\Sigma F_x = 0$

$F_{CD} = -62\ kN$ Compression

$\Sigma F_y = 0$

$F_{AC} = 30kN$ Tension

Now joint D



$\Sigma F_y = 0 \uparrow$

$191.1 \times \sin 67.38$

$= 65 + F_{AD} \sin 67.38$

$F_{AD} = 126.1\ kN$ Tension