

NAME:-

NAVEED AHMAD

I.D.:

7880

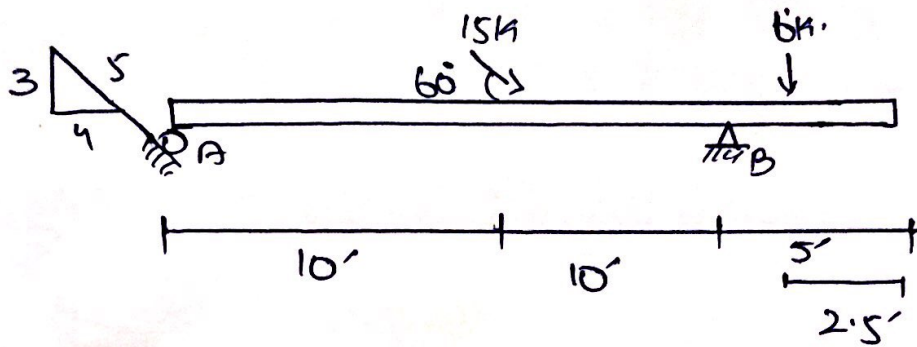
SUB:-

STRUCTURE I

INST:-

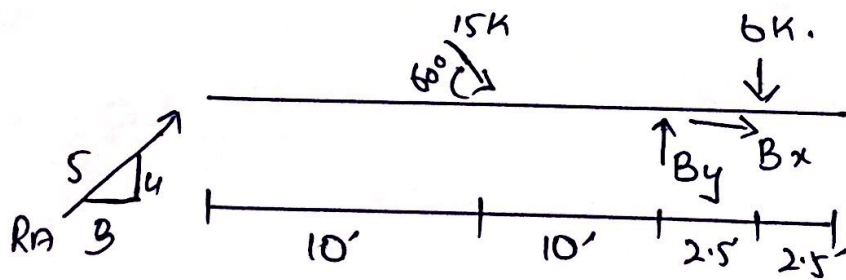
M. SAQIB.

QUESTION- 1



S
OLUTION-

First we have to draw F.B.D



$$\sum \curvearrowright^+ \text{EM}_B = 0$$

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

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

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

$$R_A = 7.18 \text{ k} \uparrow$$

Now to find B_x

$$\leftarrow F_x = 0 \rightarrow$$

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

$$11.81 + B_x = 0$$

$$B_x = -11.81 \text{ k}$$

∴ the direction is opposite

Now

$$\uparrow F_y = 0 \downarrow$$

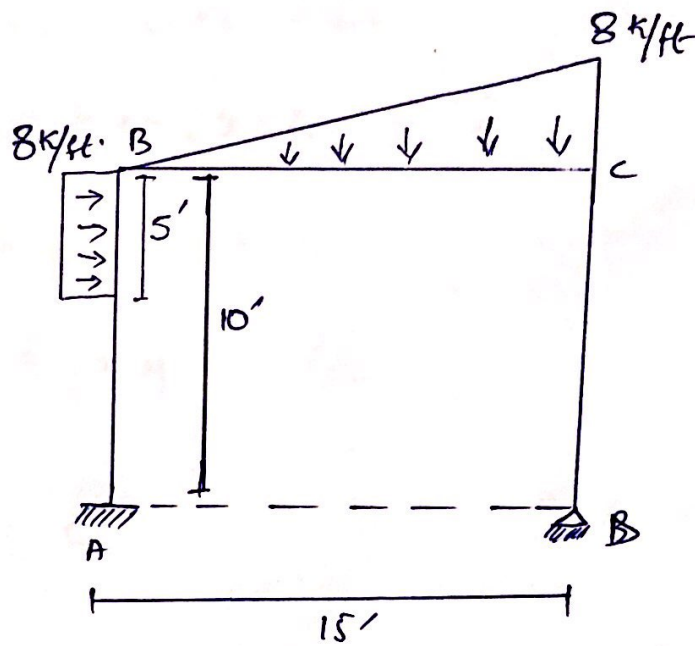
$$\frac{4}{5} (7.18) - 15 \sin(60) + B_y - 6 = 0$$

$$-7.246 + B_y = 6$$

$$B_y = 6 + 7.246$$

$$B_y = 13.25 \text{ k}$$

QUESTION- 2

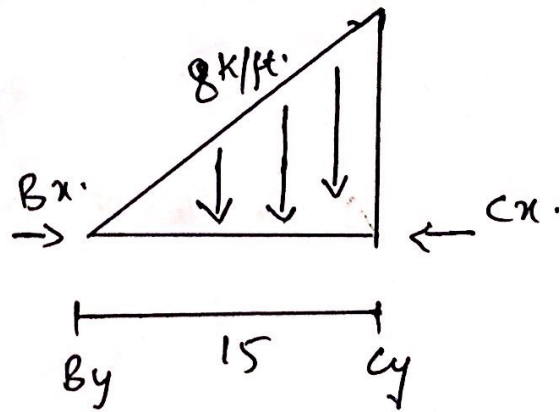


SOLUTION.

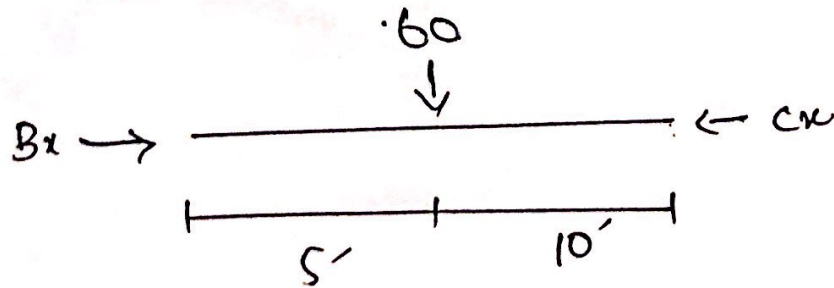
$$FD = 7880$$

F.B.D.

U.V.L.



B.D.



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

$$\frac{1}{2}(15 \times 3)$$

$$= 60$$

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

(i)

$$\sum F_x = 0 \rightarrow + \leftarrow$$

$$B_x - C_x = 0 \quad \text{--- (1)}$$

(ii)

$$\sum F_y = 0 \uparrow \downarrow$$

$$B_y + C_y = 60 \text{ k.}$$

(iii)

$$\sum M_B = 0 \downarrow \uparrow$$

$$(60 \times 5) - C_y \times 15 = 0$$

$$(300) - C_y \times 15 =$$

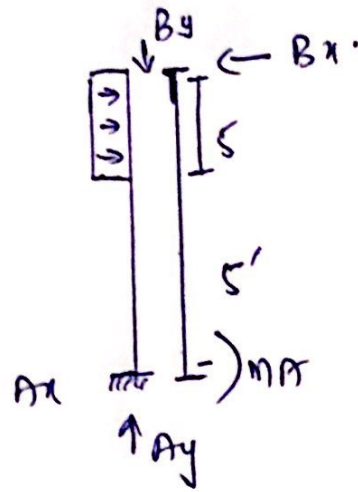
$$300 = 15 C_y$$

$$C_y = 20 \text{ k.}$$

Put values in eq (1) eq (2)

$$B_y + 20 = 22.5$$

$$B_y = 22.5 - 20 \Rightarrow 2.5$$



$$\textcircled{i} \quad \sum F_x = 0 \rightarrow + \leftarrow -$$

$$A_x + (8 \times 5) - B_x = 0$$

$$A_x - B_x = -40 \quad \text{---} \textcircled{3}$$

$$\textcircled{ii} \quad \sum F_y = 0 \downarrow + \uparrow -$$

$$A_y - B_y = 0$$

$$\textcircled{iii} \quad \sum M_2 = 0 \uparrow + \downarrow -$$

$$(8 \times 5) \times (2.5 + 5) - B_x \times 10 = 0$$

$$40 \times 7.5 - B_x \times 10 = 0$$

$$B_x \times 10 = 40 \times 7.5$$

$$B_x = \frac{40 \times 7.5}{10} \Rightarrow \frac{300}{10} \Rightarrow 30$$

Put the value in eq $\textcircled{3}$

$$A_x - 30 = -40$$

$$A_x = -10 \text{ k}$$

Now Since C & D are at same line that load is transferred so

$$C_y = \text{[scribble]}$$

$$\text{So } D_y = 20$$

Put the values of B_y in (2)

$$A_y - 40 = 0$$

$$A_y = 40 \text{ k}$$

Put the value of B_x in eq (1)

$$30 - C_x = 0$$

$$C_x = 30 \text{ k}$$

$$M_B = 0 \text{ } \uparrow$$

$$-(8 \times 5)(2.5) - (A_x \times 10) + M_A = 0$$

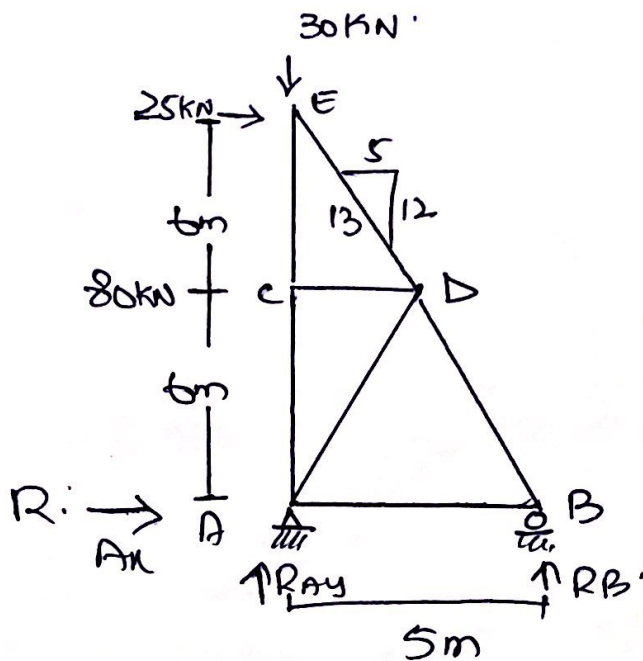
$$- (40)(2.5) - (A_x \times 10) + M_A = 0$$

$$- 100 - (10 \times 10) + M_A = 0$$

$$- 100 - (-100) + M_A = 0$$

$$M_A = 0$$

QUESTION-3



$$\theta = \tan^{-1} \frac{12}{5}$$

$$\theta = 67.38 = 67.4^\circ$$

$$B = 90^\circ - 67.4$$

$$B = 22.6^\circ$$

$$\sum M_B = 0 \quad [\uparrow +]$$

$$25 \times 12 - 30 \times 5 + 80 \times 6 + R_{Ay} \times 5 = 0$$

$$R_{Ay} = -126 \text{ kN}$$

$$\sum F_y = 0 \quad [\uparrow +]$$

$$-126 - 30 + R_B \Rightarrow$$

$$R_B = +156 \text{ kN}$$

$$\sum F_x = 0 \quad [\rightarrow +]$$

$$R_{Ax} + 80 + 25 = 0$$

$$R_{Ax} = -105 \text{ kN}$$

Using joints method

Joint ~~A~~ B:

$$\sum F_y = 156 + F_{BD} \sin \theta$$

$$F_{BD} = F_{BD} = \frac{-156}{\sin 67.04}$$

$$F_{BD} = 169.5$$

$$\sum F_x = 0$$

$$F_{BA} = 169.5 \cos \theta$$

$$= 64.41 \text{ kN}$$

Joint E:

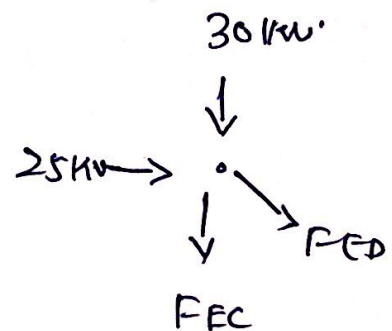
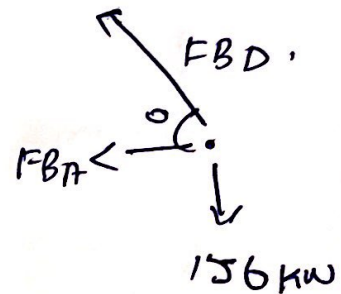
$$\sum F_y = 0 \quad [\uparrow +]$$

$$-30 - F_{EC} - F_{ED} \cos \beta = 0$$

$$30 - F_{EC} - \left(\frac{-65.05 \text{ kN}}{\cancel{0.65}} \right) \cos 22.6^\circ = 0$$

~~F_{EC}~~

$$F_{EC} = 30.05 \text{ kN}$$



$$25 + F_{ED} \sin \beta = 0 \Rightarrow F_{ED} = -65.05 \text{ kN}$$

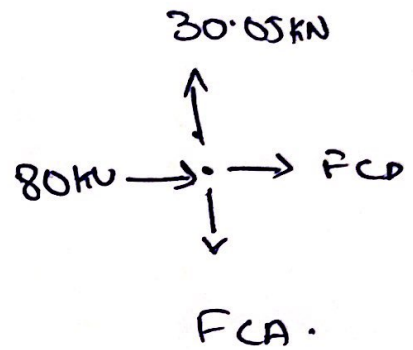
$$\sum F_x = 0 \quad [\rightarrow +]$$

$$25 + F_{FD} - 8 \sin 60^\circ = 0$$

~~F_{FD}~~ Joint "C"

$$\sum F_x = 0 \quad [\rightarrow +]$$

$$F_{CD} = -80 \text{ kN}$$



$$\sum F_y = 0 \quad (\uparrow +)$$

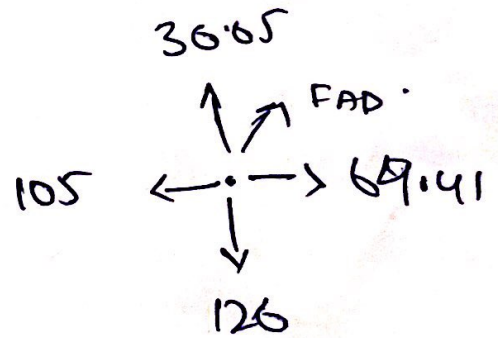
$$F_{CA} = 30.05$$

Joint A.

$$\sum F_x = 0$$

$$-105 + F_{AD} \cos 40^\circ + 64.41 = 0$$

$$F_{AD} = 106.81$$



Members Forces .

FAB 64.41

FAC 30.5

FBD 169.5

FCD -80

PCE 30.5 KN .

FDE 65.05