ID 7655

Name USAMA AKHTAR

Subject Structure I

Submitted to Saqib Khan

Semester 12th (Summer)

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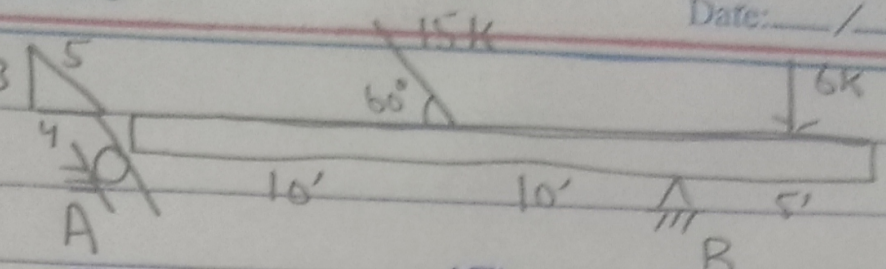
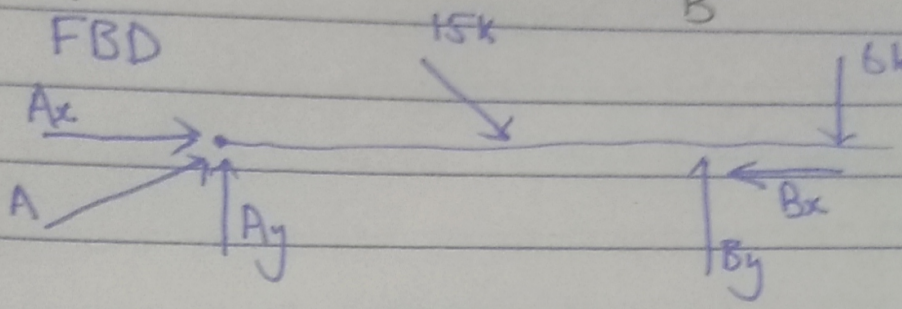
Date: __/__/__

(Q1)



Sol

FBD



$\Sigma M_A = 0 \quad \curvearrowright +$

$\Rightarrow \quad 15 \times \sin 60^\circ \times 10 + 6 \times 22.5 = By \times 20$

$\boxed{By = 13.245\ k}$

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

$\Rightarrow \quad Ay + By = 15 \sin 60^\circ + 6k$

$3/5\ A + 13.245 = 13 + 6$

$\Rightarrow \quad A = 9.575\ k$

$Ax = 9.575 \times 4/5 = 7.66\ k$

$\Sigma F_x = 0 \quad \rightarrow +$

$Ax + 15 \cos 60 - Bx = 0$

$Bx = 7.66 + 15 \cos 60^\circ = 15.16\ k$

✓ $A = 9.575\ k$

✓ $Bx = 15.16\ k$, $By = 13.245\ k$

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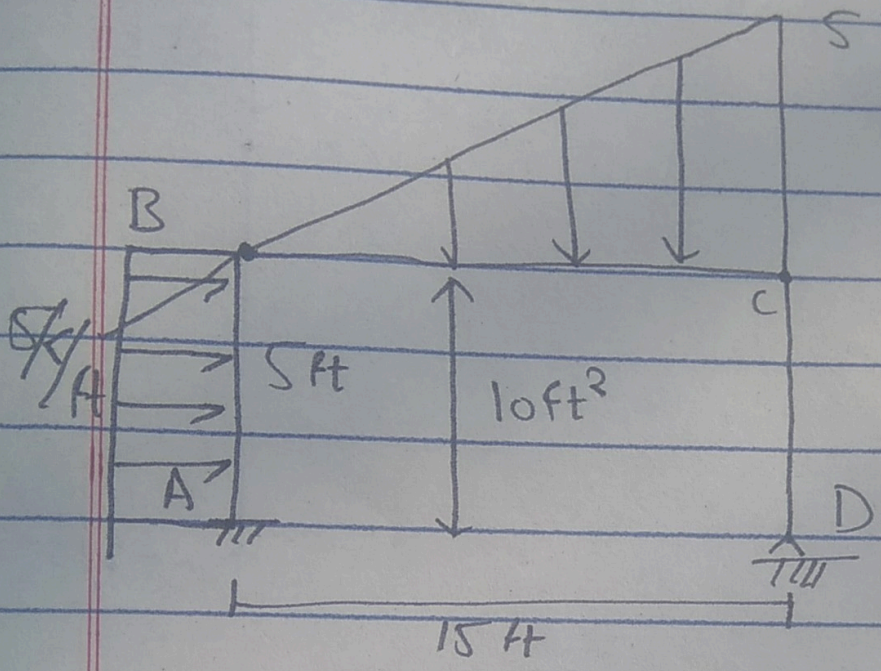
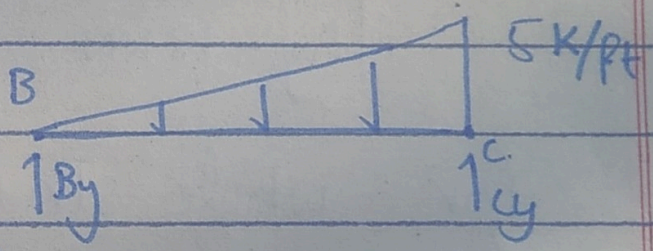
Q2



Member CD



$\Sigma M_B = 0$ $\curvearrowright +$

$= \frac{1}{2} \times 15 \times 5 \times \frac{2}{3} \times 15 = Cy \times 15$

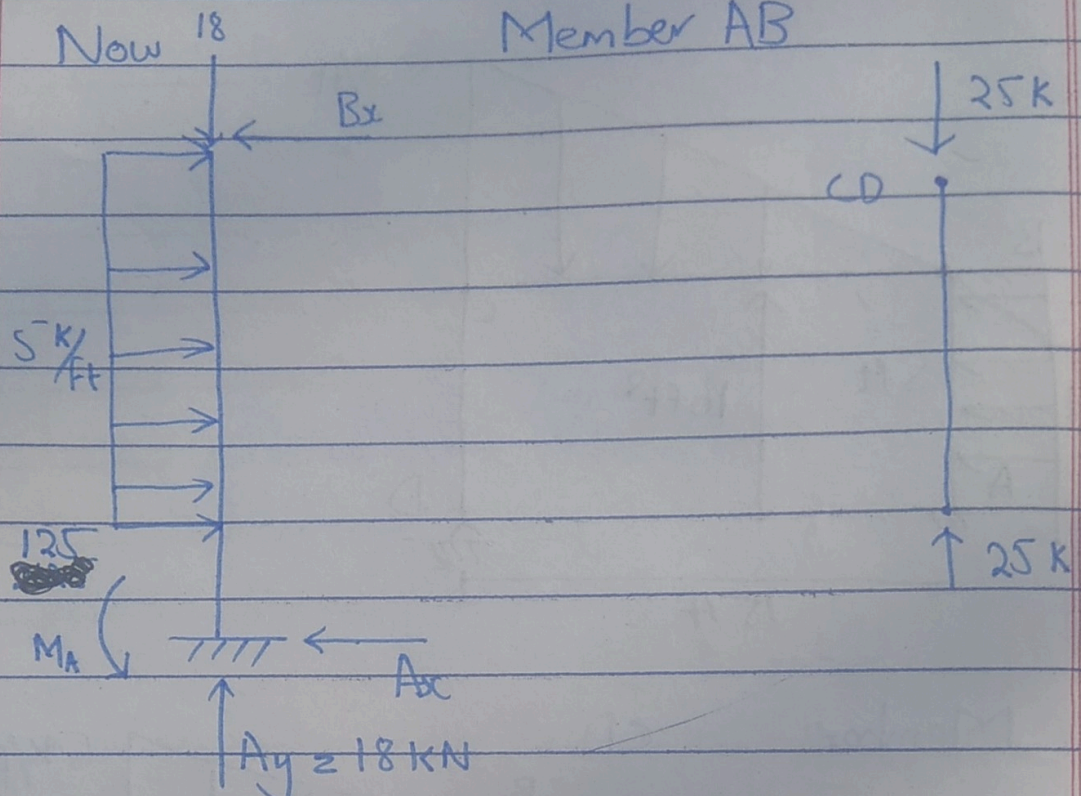
$\therefore Cy = 25\ K$

$\Sigma F_y =$ [illegible]

$By + Cy = \frac{1}{2} \times 15 \times 5$ [illegible]

$By = 7.5 - 25 = -18\ K$

Now



for whole structure

$\Sigma M_A = 0$ ↻

$\Rightarrow -M_A + 5 \times 5 \times 7.5 + \frac{1}{2} \times 5 \times 15 \times \frac{2}{3} \times 15 - 25 \times 18 = 0$

$M_A = 187.5$ K.ft

Now in memeber AB

$\Sigma M_B = 0$ ↺ +

$5 \times 5 \times 2.5 + 187.5 = A_x \times 10$

$A_x = 25$

$\Sigma F_x = 0$

$A_x + B_x = 25$, $B_x = 25 - 25$

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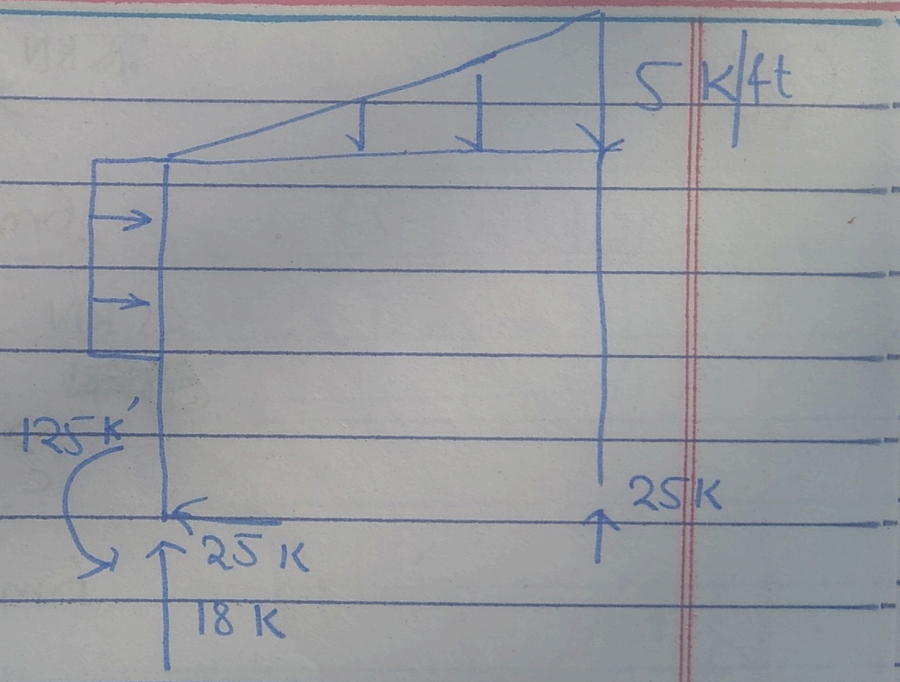
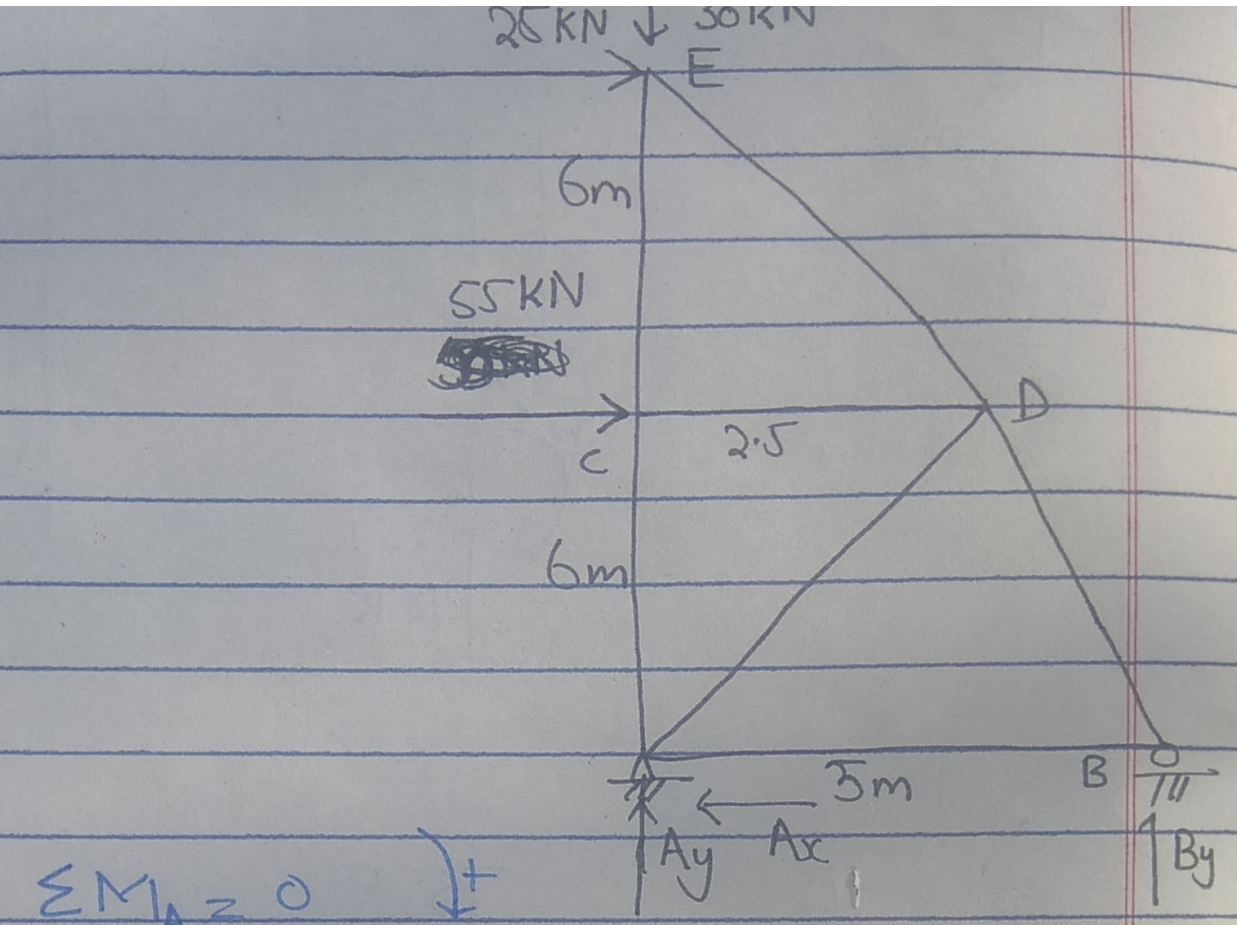
$B_x = 0$

So,



Q3



$\Sigma M_A = 0$ $\circlearrowleft +$

$\Rightarrow 25 \times 12 + 55 \times 6 = By \times 5$

$By = 130.8\ kN \simeq 130\ kN$

Now

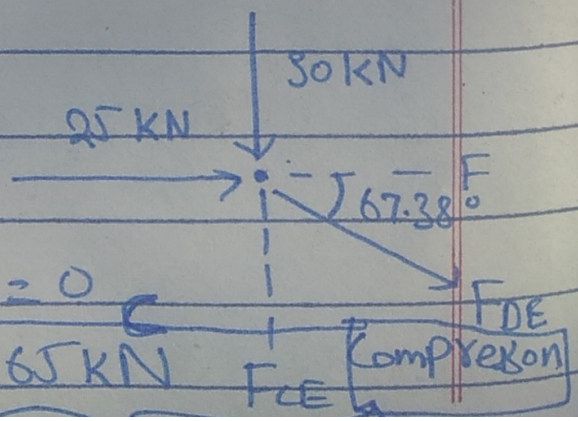
$Ay + By = 30\ kN$

$Ay = 30 - 130 = -100$

(means down)

$Ax = 25 + 55 = 80\ kN$

Joint E ;



$\Sigma F_x = 0 \longrightarrow +$

$\Rightarrow 25 + F_{DE} \cos 67.38 = 0$

$F_{DE} = \frac{-25}{\cos 67.38} = -65\ kN$ Compression

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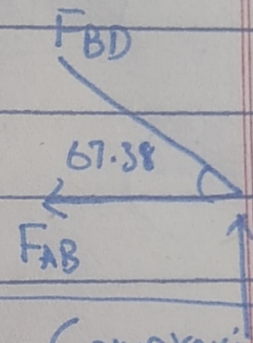
$\Sigma F_y = 0 \quad \uparrow$

$\Rightarrow \quad -30 - F_{CE} + 65 \sin 67.38 = 0$

$F_{CE} = 30 \text{ kN (Tension)}$

Now Joint B

$\Sigma F_y = 0 \quad \uparrow$



$F_{BD} \sin 67.38 = -130$

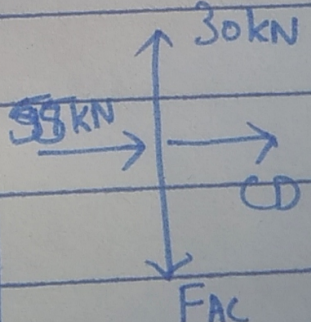
$F_{BD} = -141.5043 \text{ kN}$ Compression

$F_x = 0 \quad \rightarrow +$

$-F_{AB} + 141.5043 \times \cos 67.38 = 0$

$F_{AB} = +54.42503$ Tension

Now Joint "C"



$\Rightarrow \Sigma F_x = 0$

$F_{CD} = -55 \text{ kN}$

Compression

$\Rightarrow \Sigma F_y = 0$

$F_{AC} = 30 \text{ kN}$ Tension

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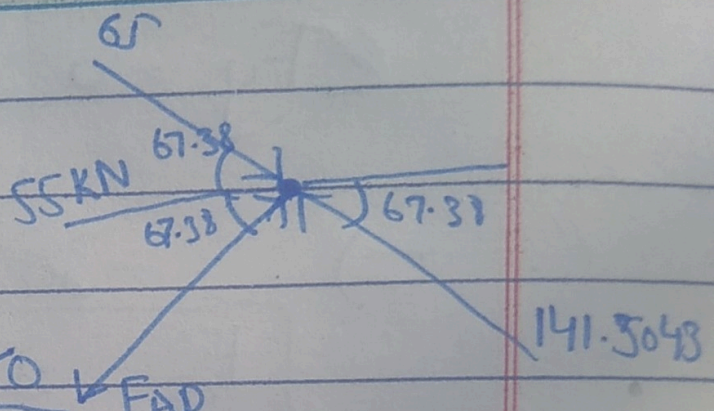
Now Joint D



$\Rightarrow$ 65 + F_{AD} Sin 67.38 = 0

F_{AD} = 190.6191 KN

Tension

$\Rightarrow$ F_{AD} Sin 67.38 + 65 = 0

F_{AD} = 65.9230 KN

Tension