IQRA NATIONAL
UNIVESTY PESHAWAR

B.Tech civil

BATCH 2015

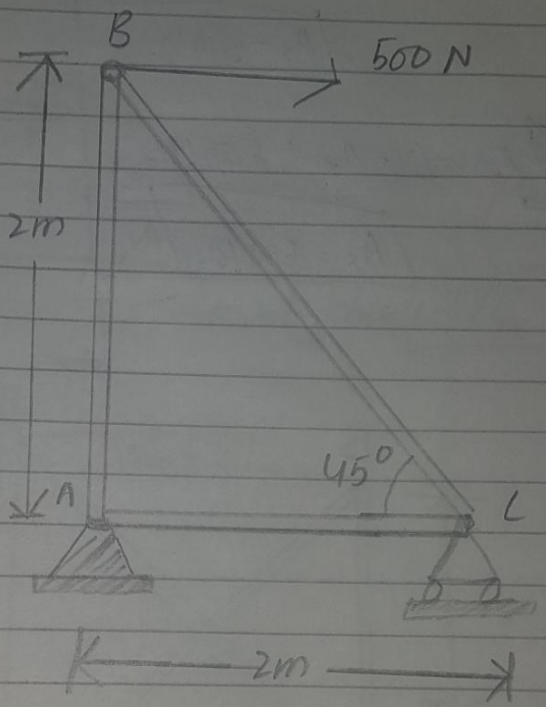
ID 12470

NAME DANISH
KHATTAK

PAPER Theory of
Structure.

Question No 1

Example 06: Analyze the following truss.



$r = 3$

$b = 3$

$J = 3$

$r + b = 2 \times J$

$3 + 3 = 2 \times 3$

$6 = 6$ Statically Determinate.

Solution Reaction

$\Sigma M_A = 500\,lb.(10ft.) + C_y(10ft)$

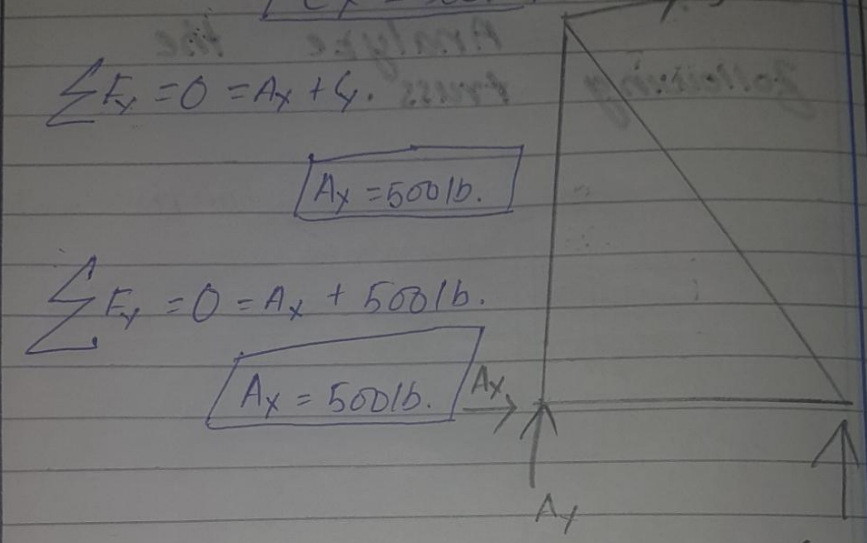
$C_x = 500lb$

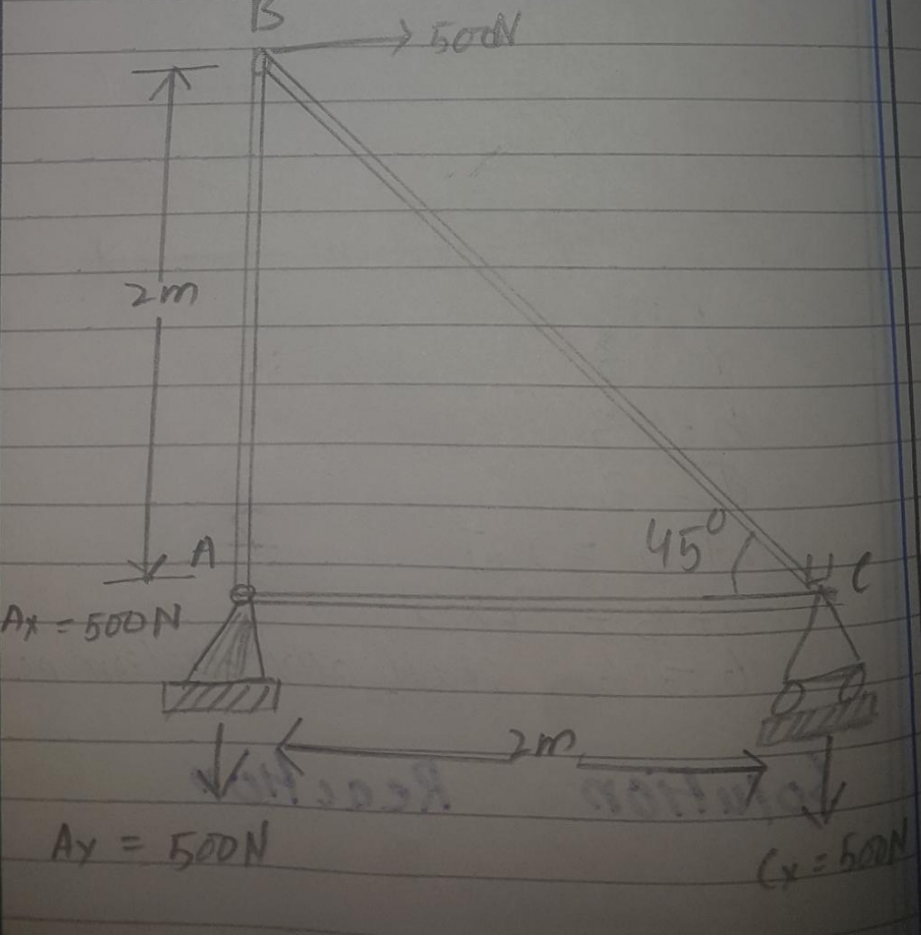
$\Sigma F_x = 0 = A_x + C_x$

$A_x = 500lb.$

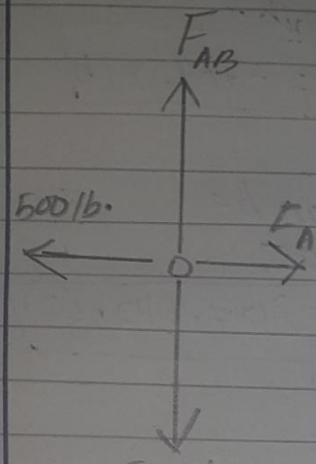
$\Sigma F_y = 0 = A_x + 500lb.$

$A_x = 500lb.$



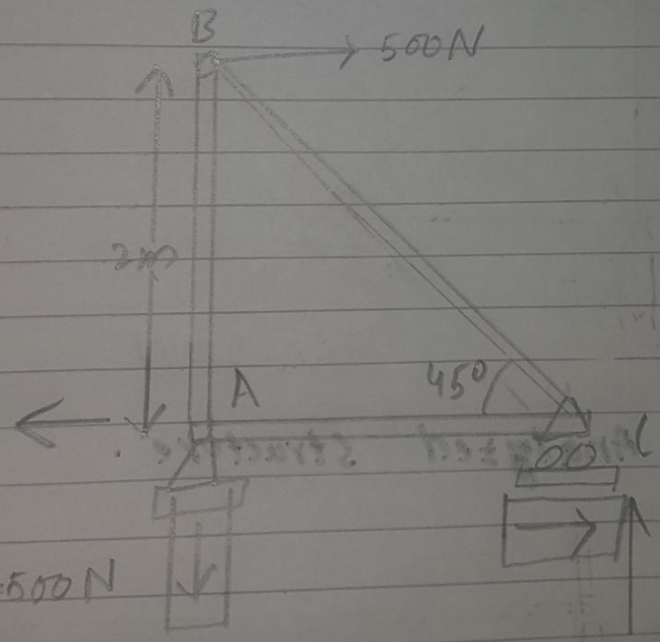


Equilibrium at joint "A"



$\sum F_x = 0 = F_{AC} - 500lb$ $\boxed{F_{AC} = 500lb.}$

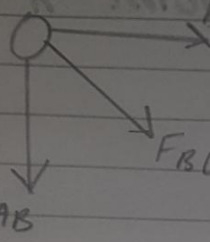
$\sum F_y = 0 = F_{AB} - 500lb.$ $\boxed{F_{AB} = 500lb.}$



$A_Y = 500N$

$C_Y = 500N$

Equilibrium at joint "B"



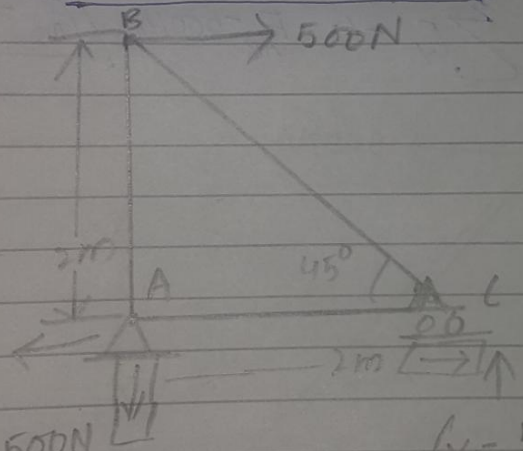
$\sum F_x = 0 = F_{BL} \cos 45° + 500lb.$

$F_{BL} = -707.21b$

The force in the bars can be summarized as;

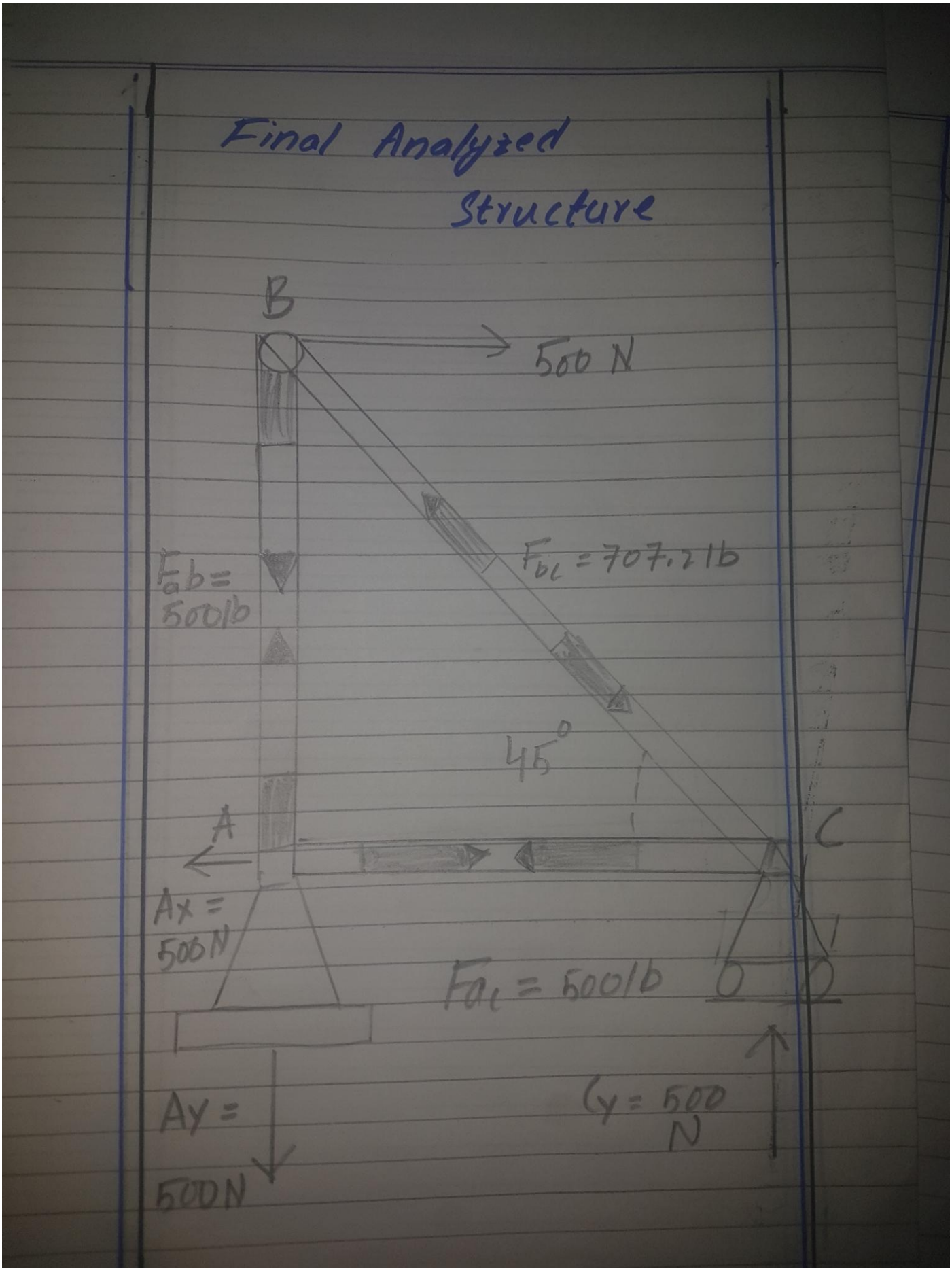
$F_{AB} = 500lb.(T)$ $F_{BL} = 707.21b.(C)$

$F_{AL} = 500lb.(T)$



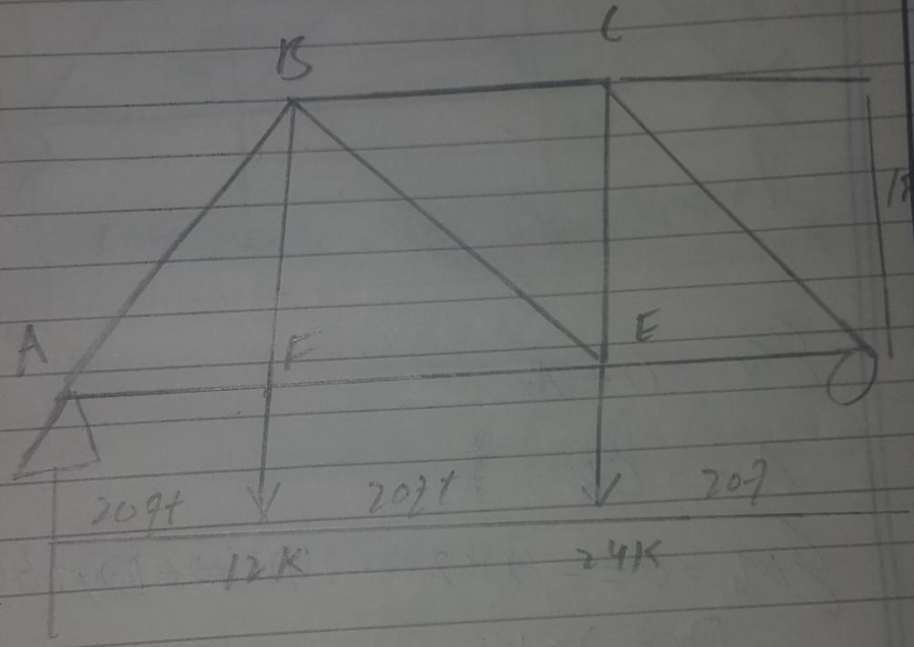
Final Analyzed structure.

Final Analyzed Structure



Question No 2

Example 07: Determine the force in each member of the truss show in the figure.



Solution: Determine

$r = 3$

$b = 9$

$j = 6$

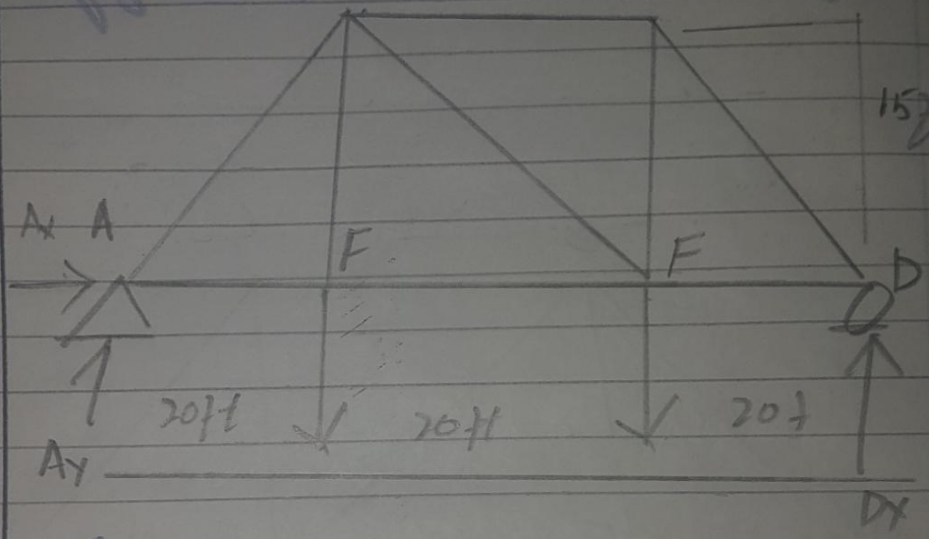
$r + b = 2 \times j$

$3 + 9 = 2 \times 6$

$12 = 12$

Statically Determinate.

Solution: Reaction



$$\Sigma F_x = 0 = A_x$$

$$A_x = 0K$$

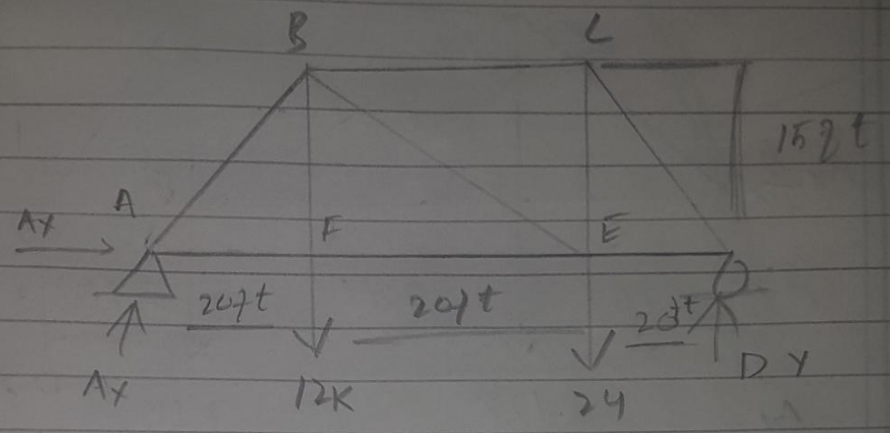
$$\Sigma M_A = 0 = -12 \times 20 - 24 \times 40 + D_y \times 60$$

$$D_y = 20K$$

$$\Sigma M_D = 0 = -A_y \times 60 + 12 \times 40 + 24 \times 20$$

$$A_y = 16K$$

Equilibrium at joint "A"

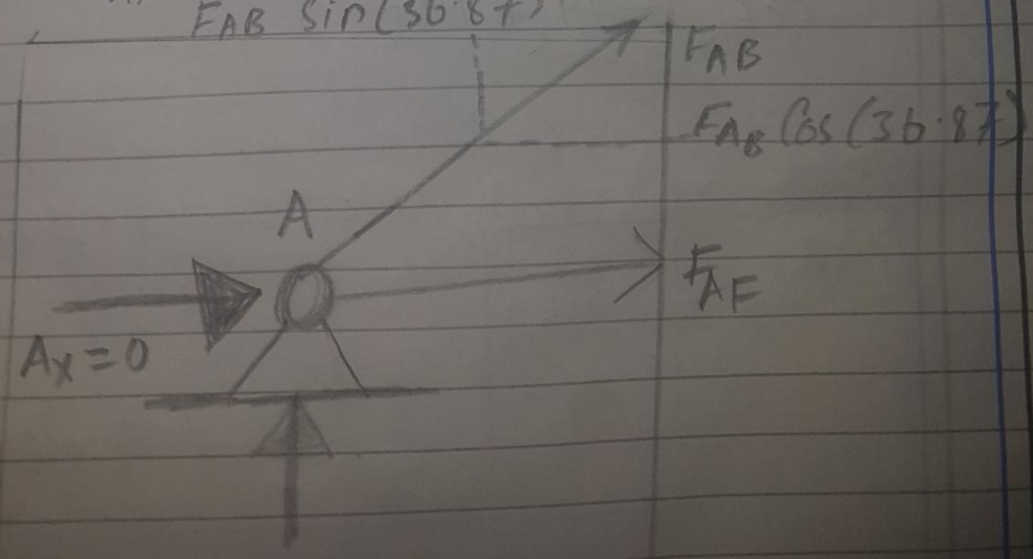


$$\sum F_Y = 0 = A_Y + F_{AB} \sin(36.87)$$

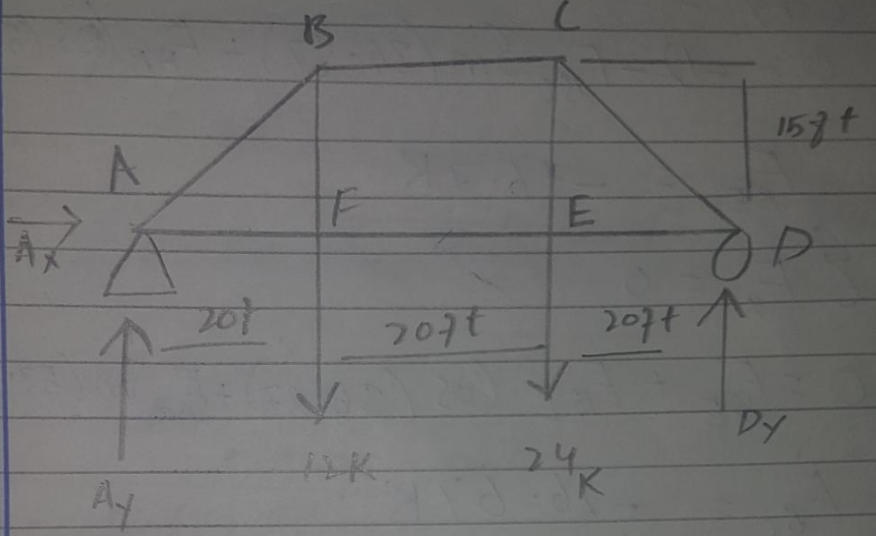
$$F_{AB} = -96.67\,K$$

$$\sum F_X = 0 = A_X + F_{AF} + F_{AB} \cos(36.87)$$

$$F_{AF} = +21.34\,K$$



Equilibrium at joint "F"

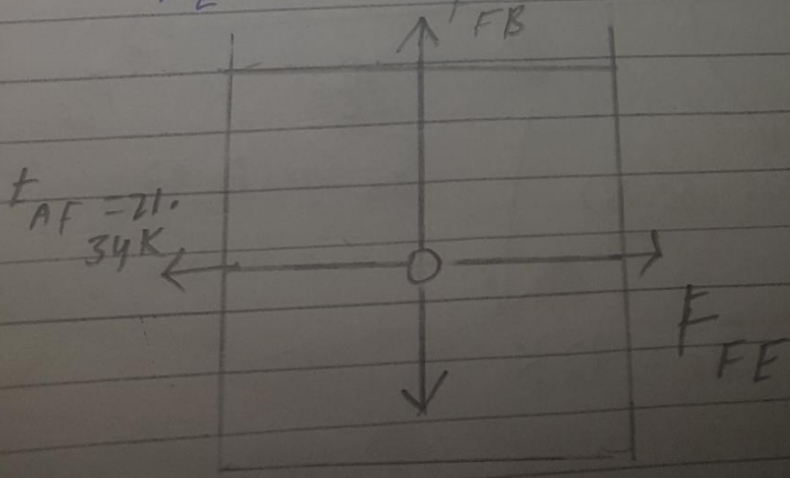


$$\sum F_x = 0 = -12 + F_{FB}$$

$$F_{FB} = +12\ K$$

$$\sum F_x = 0 = -F_{AF} + F_{FE}$$

$$F_{FE} = +21.34\ K$$



Equilibrium at joint "B"

$$\Sigma F_y = 0$$

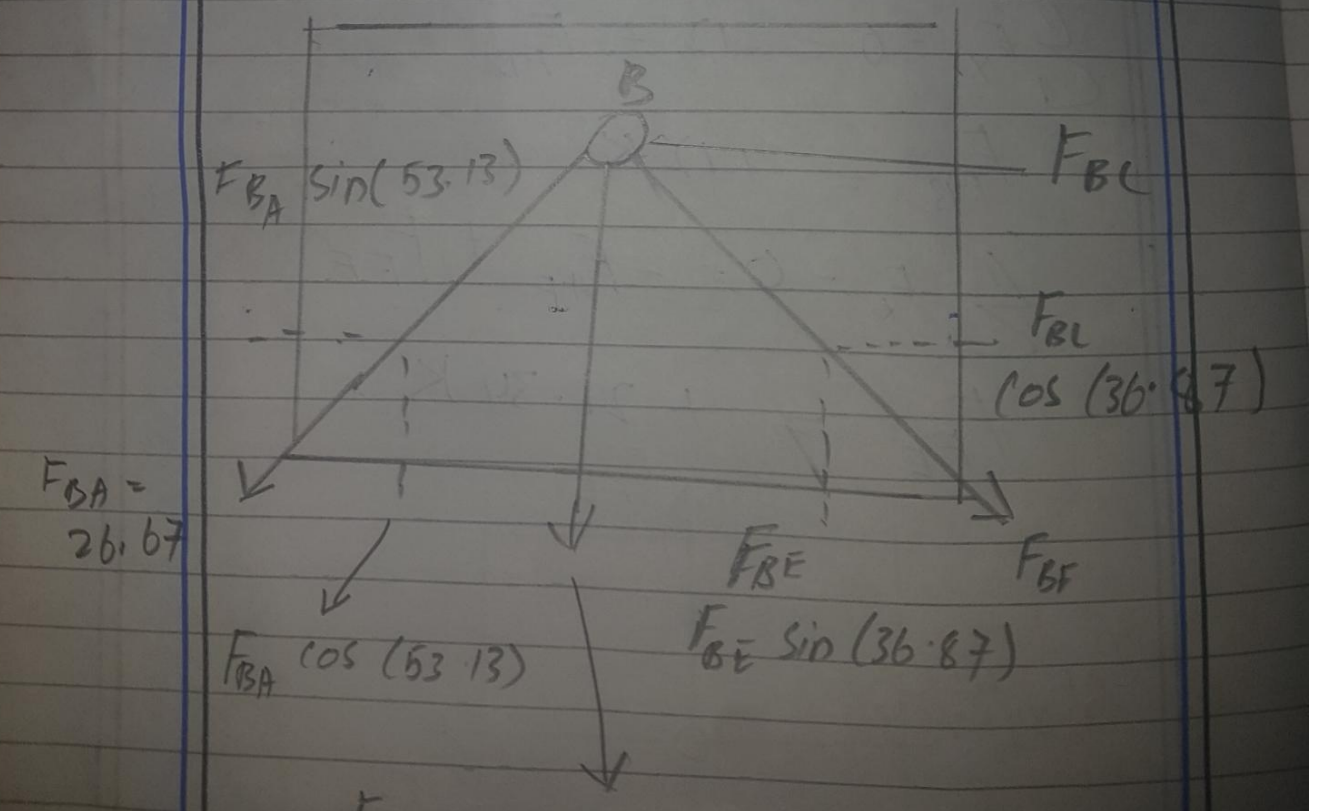
$$0 = -12 - F_{BE}\sin(36.87) + F_{AB}(\cos(53.13))$$

$$F_{BE} = -+6.7K$$

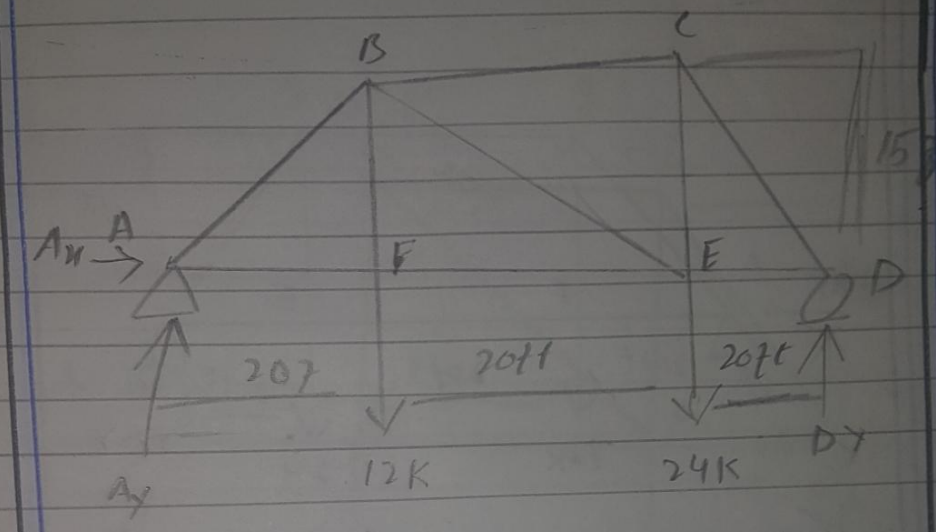
$$\Sigma F_x = 0$$

$$0 = F_{BE} + F_{BE}\cos(36.87) + F_{AB}\sin(53.13)$$

$$F_{BC} = -26.67K$$



Equilibrium at joint "F"

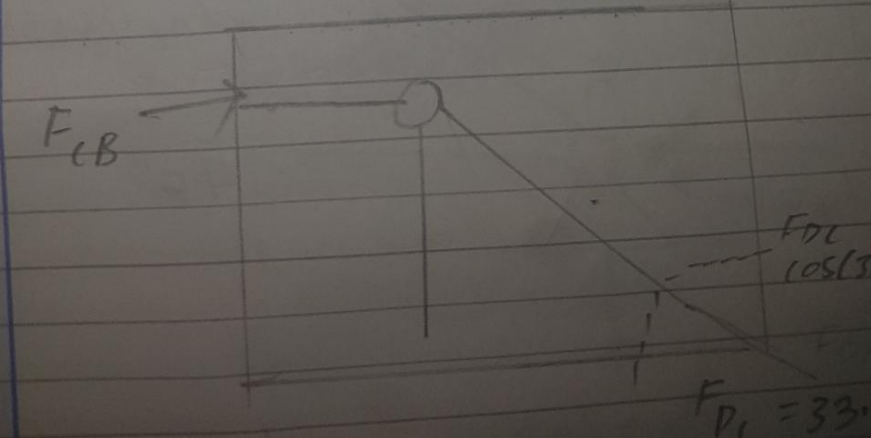


$$\Sigma F_x = 0 = F_{CB} - F_{DC}\cos(36.87)$$

$$F_{DC} = 33.33K$$

$$\Sigma F_x = 0 = -F_{CE} + F_{DC}\sin(36.87)$$

$$F_{CE} = 19.99K$$



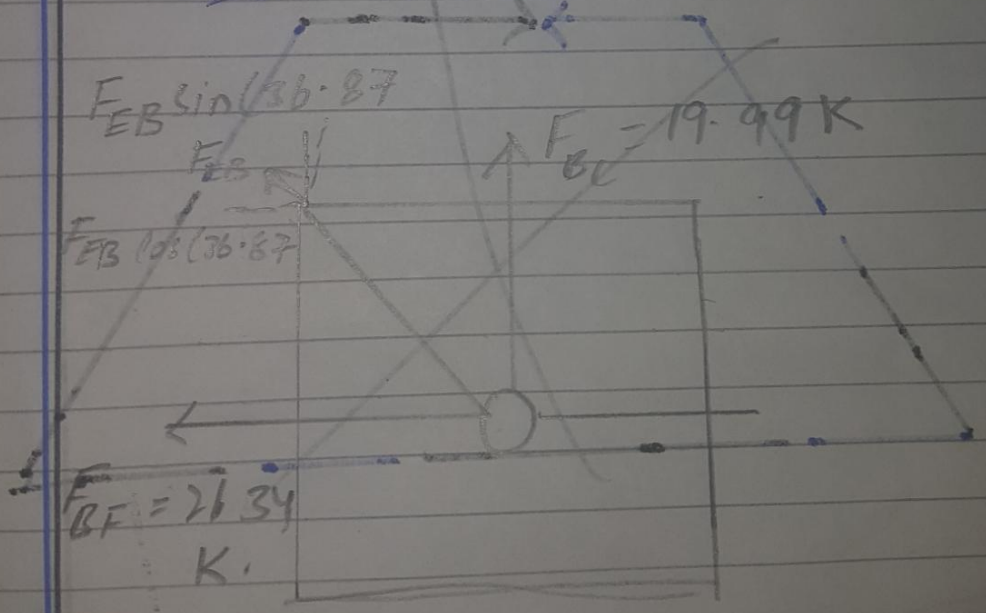
Equibrium at joint "C"

$$\Sigma F_y = 0 - 24 + F_{BC} + F_E \sin(36.87$$

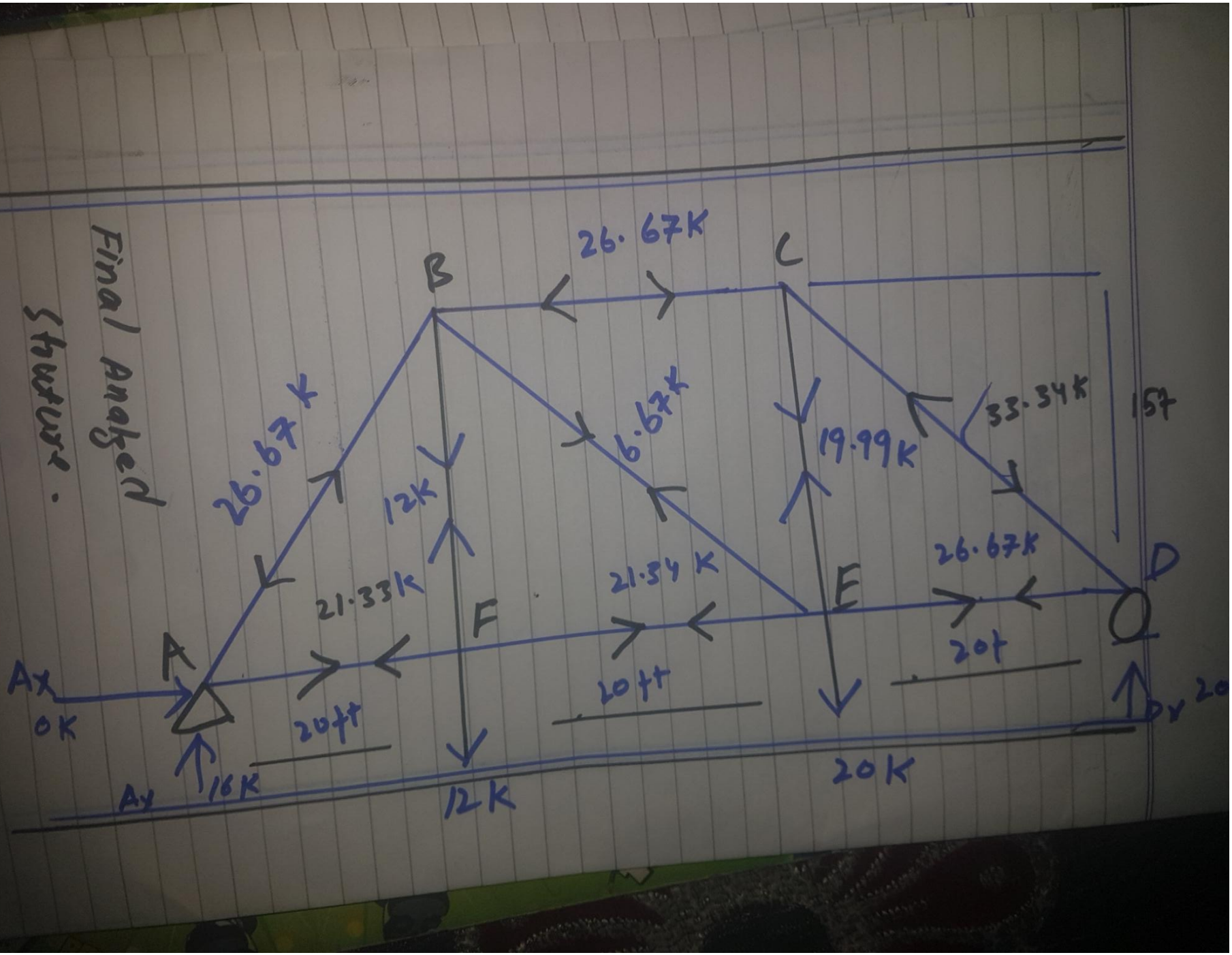
$$F_{EB} = 6.66\,K$$

$$\Sigma F_x = 0 = -F_{BE} + F_{EB} - F_{EB}\cos(36.87$$

$$F_{EB} = 6.66\,K$$

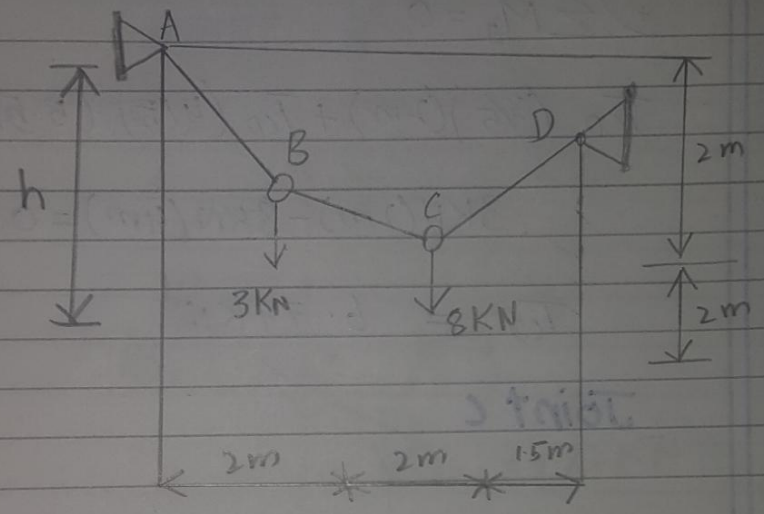


Final Analysed Structure.

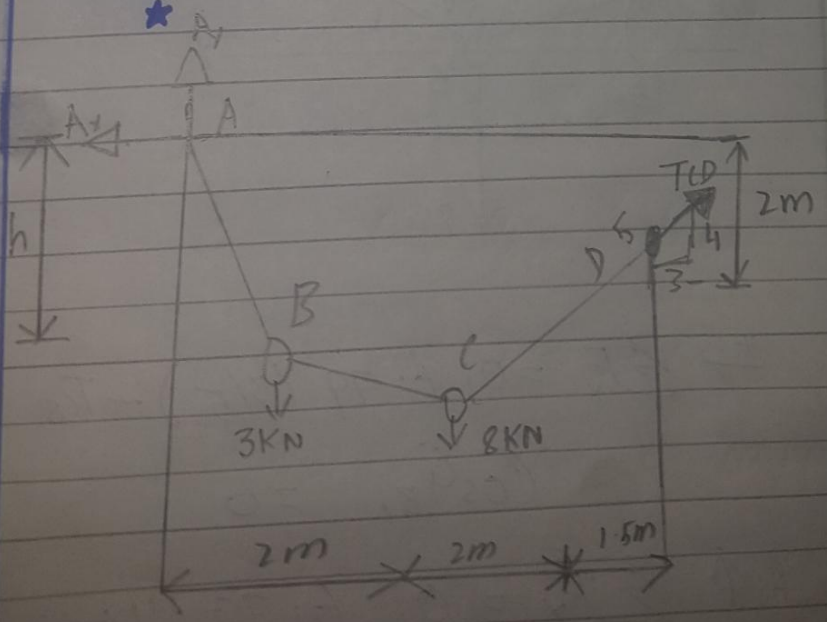


Question No 3

Determine the tension in each segment of the cable shown in Figure. Also what is the dimension h?



Solution



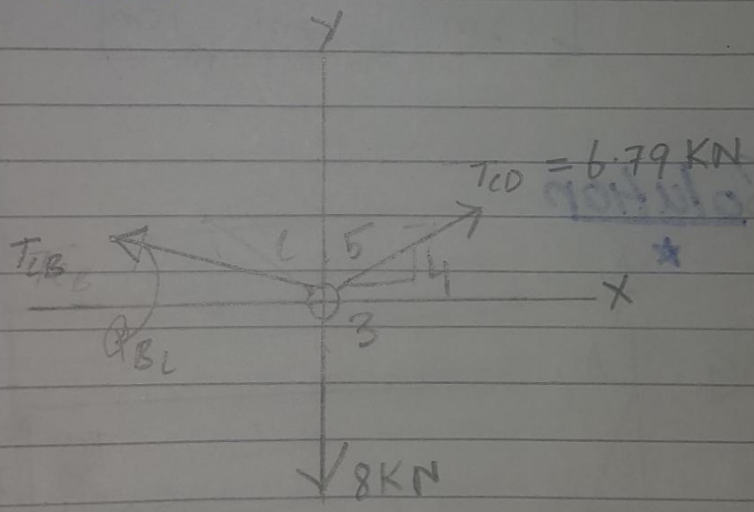
$+\circlearrowleft \sum M_A = 0$

$T_{CD}(3/5)(2m) + T_{CD}(4/5)(5.5m) -$

$3KN(2m) - 8KN(4m) = 0$

$T_{CD} = 6.79KN$

Joint C



$\pm\rightarrow \sum F_x = 0: 6.79(3/5) - T_{CB}$

$\cos\theta_{BL} = 0$

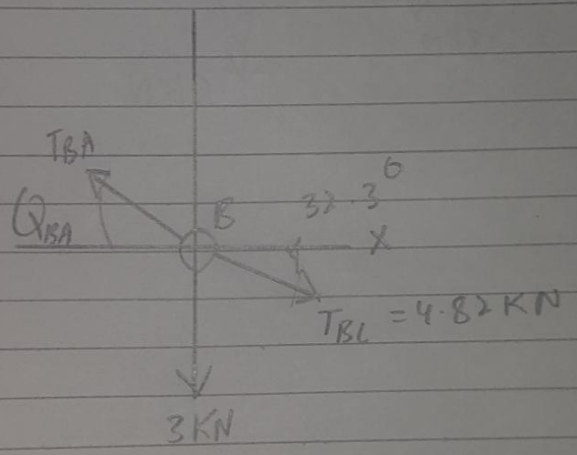
$+\uparrow \sum F_y = 0: 6.79(4/5) -$

$8 + T_{CB} \sin \theta_{CB} = 0$

$\theta = 32.3^\circ$

$T_{CB} = 4.82\,KN$

Joint B



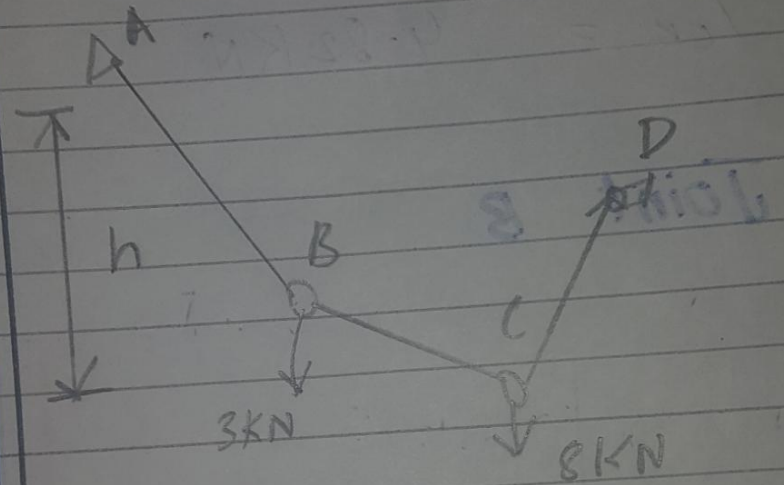
$\overset{+}{\rightarrow} \sum F_x = 0: T_{BA} \cos \theta_{BA} + 4.82 \cos 32.3^\circ = 0$

$+\uparrow \sum F_y = 0: T_{BA} \sin \theta_{BA} - 4.82 \sin 32.3^\circ - 3 = 0$

$\theta_{BA} = 53.8^\circ \quad T_{BA}\ 6.90\,KN$

$h = 2 \tan \theta_{BA} = 2 \tan 53.8^\circ$

$= 2.74\,m$


A
A
h
B
D
C
3KN
8KN