Truss

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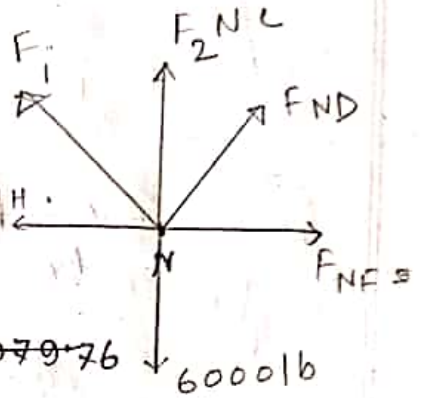
337. Consider the joint at N,

$\Sigma F_x = 0$,

$F_{NF} - F_{NH} + F_{ND}\cos 30° - F_1 \cos 30° = 0.$



$\Rightarrow 16900 - 12565 + 7000\cos 30° - F_1 \cos 30° = 0.$

$\Rightarrow F_1 \cos 30° = 12565 - 16900 + 1079.76$

$\Rightarrow F_1 \cos 30° = 5414.76.$

$F_1 \cos 30° = -1727.18.$

$\therefore F_1 = -1994.37. \quad \therefore F_1 = 1994.3716$ (C). Ans

$\Sigma F_y = 0.$

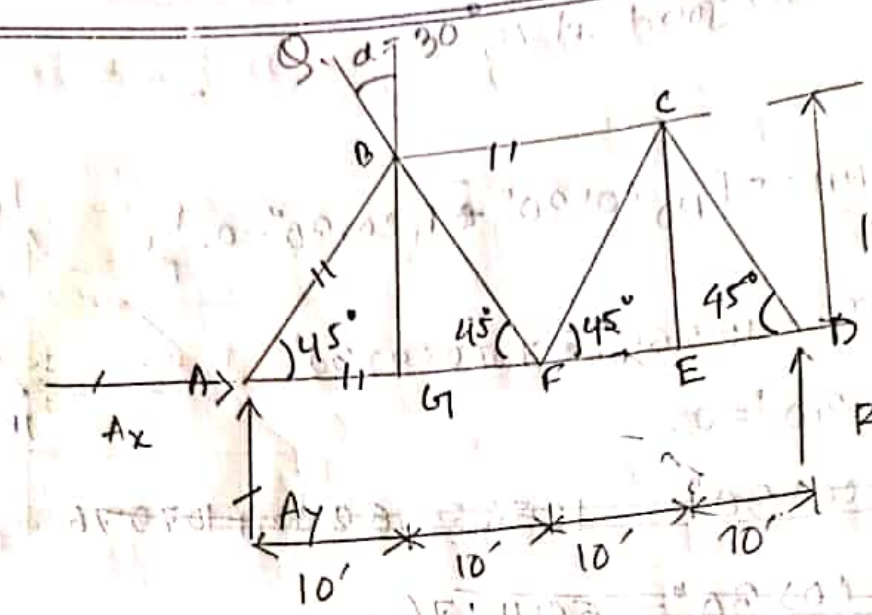
$F_2 \sin 30° - 6000 + F_{ND}\sin 30° - F_1 \sin 30° = 0$

$\Rightarrow F_2 \sin 30 - 6000 - 7000 \sin 30° + 1727.18 \sin 30° = 0.$

$\Rightarrow F_2 = \dfrac{10997.185}{\sin 30°}$

$\therefore F_2 = 20994.3716$ (T) (Ans)

398.



Consider at point A,

$\Sigma F_x = 0$.

$-1000 + AB\cos 45^\circ + AG = 0$.

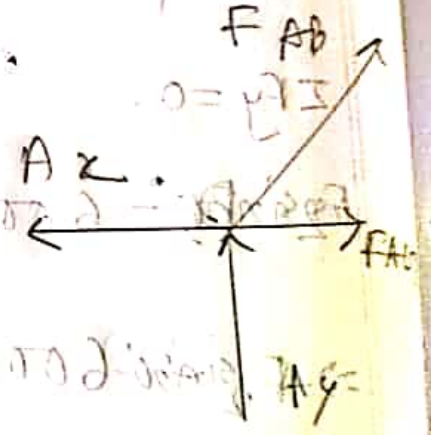
$AG = 1000 + AB\cos 45^\circ$ ——— (1).

$\Sigma F_y = 0$

$Ay + AB\sin 45^\circ = 0$.

$AB = \frac{-1049}{\sin 45^\circ}$

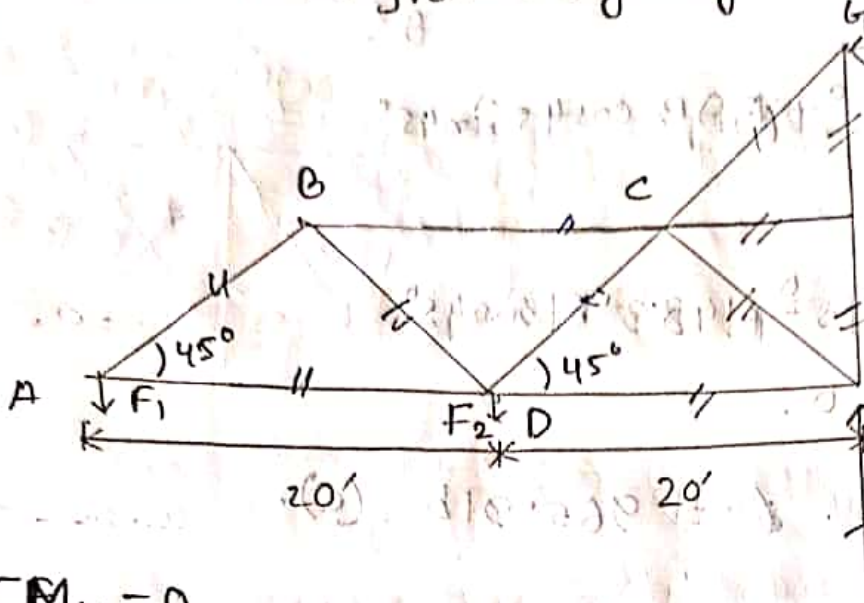
$AB = -1483.51$ lb $\Rightarrow$ 1483.51 lb (C) Ans



(1) $\Rightarrow AG = 1000 + 1483.51\cos 45^\circ$

$= 2049.16$ (T). Ans.

346. Consider the free body diagram of the frame,



(a) $\Sigma M_E = 0$.

$R_G \times 20 \times \tan 45^\circ - F_2 \times 20 - F_1 \times 40 = 0$.

$\Rightarrow R_G \times 20 \tan 45^\circ = 5 \times 20 + 1 \times 40$

$\Rightarrow R_G = 7$ kips. Ans

$\Sigma F_x = 0$.

$E_x = R_G$.

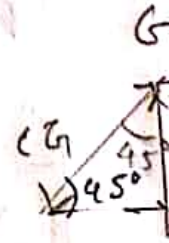
$E_x = 7$ kips. Ans

$\Sigma F_y = 0$

$\Rightarrow E_y = 5 + 6$

$E_y = 6$ kips. Ans

(b) At point G:



$\Sigma F_x = 0$.

$R_G - CG \cos 45^\circ = 0$.

$CG = \frac{7}{\cos 45^\circ} = 9.9$ kips (T). Ans

$\Sigma F_y = 0$.

$FG \sin 45^\circ - HG = 0$.

$\Rightarrow HG = -9 \sin 45^\circ$.

$\therefore HG = -7$ kips. (C). (Ans)

At point H:

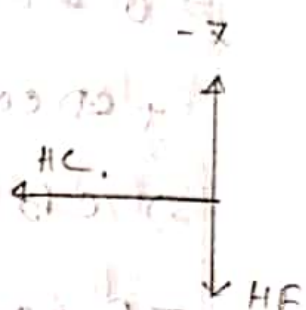
$\Sigma F_y = 0$

$HE - 7 = 0$.

$\Rightarrow HE = 7$ kips (T). Ans

$\Sigma F_x = 0$

$HC = 0$. Ans

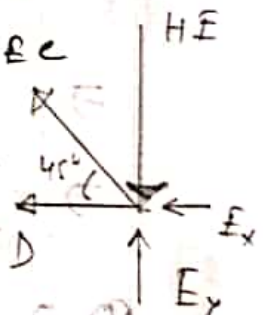


At point E,

$\Sigma F_x = 0$

$-F_x - ED - FC \cos 45^\circ = 0$.

$\Rightarrow EC \cos 45^\circ + ED + 7 = 0$ ——— (1).



$\Sigma F_y = 0$.

$F_y - HE + FC \sin 45^\circ = 0$

$\Rightarrow FC = \frac{7 - 6}{\sin 45}$

$FC = \sqrt{2}$ kips Ans

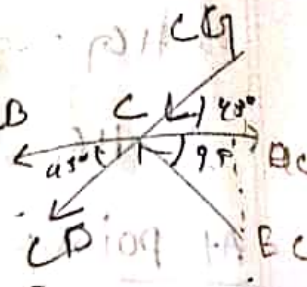
$\therefore$ (1) $\Rightarrow ED = -\sqrt{2} \cos 45 - 7$.

$ED = -8$ kips. $= 8$ kips (C). Ans

At point C:

$\Sigma F_x = 0$.

$HC - CB - EC\cos 45^\circ + CG\cos 45^\circ - CD\cos 45^\circ = 0$.



$\Rightarrow 0 - CB + EC\cos 45^\circ + CG\cos 45^\circ + CD\cos 45^\circ = 0$.

$\Rightarrow CB + CD\cos 45^\circ = -2\cos 45^\circ$ ——— (1)

$-8.9\cos 45^\circ = -8$ ——— (1)

$\Sigma F_y = 0$.

$EC\sin 45^\circ - CD\sin 45^\circ - CG\sin 45^\circ = 0$.

$\Rightarrow \sqrt{2} - CD = 8.9 = 0$

$\Rightarrow CD = -8.49$ Kips (C).

(1) $\Rightarrow CB = 1 - CD\cos 45^\circ$.

$CB = -2.9$ Kips. (C). Ans

At point A:

$\Sigma F_x = 0$.

$AB\cos 45^\circ + AD = 0$.

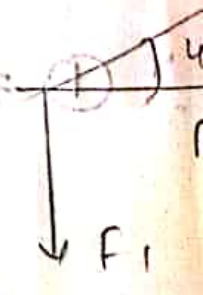
$\therefore AD = -1$ Kips

$= 1$ Kips (C) Ans

$\Sigma F_y = 0$.

$AB\sin 45^\circ - F_1 = 0$.

$AB = \sqrt{2}$ (T). Ans



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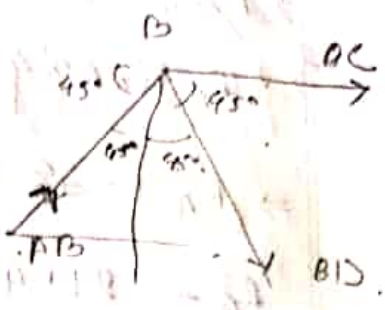
At point B:

$\Sigma f_y = 0$.

$AB\cos 45^\circ - BD \sin 45^\circ = 0$.

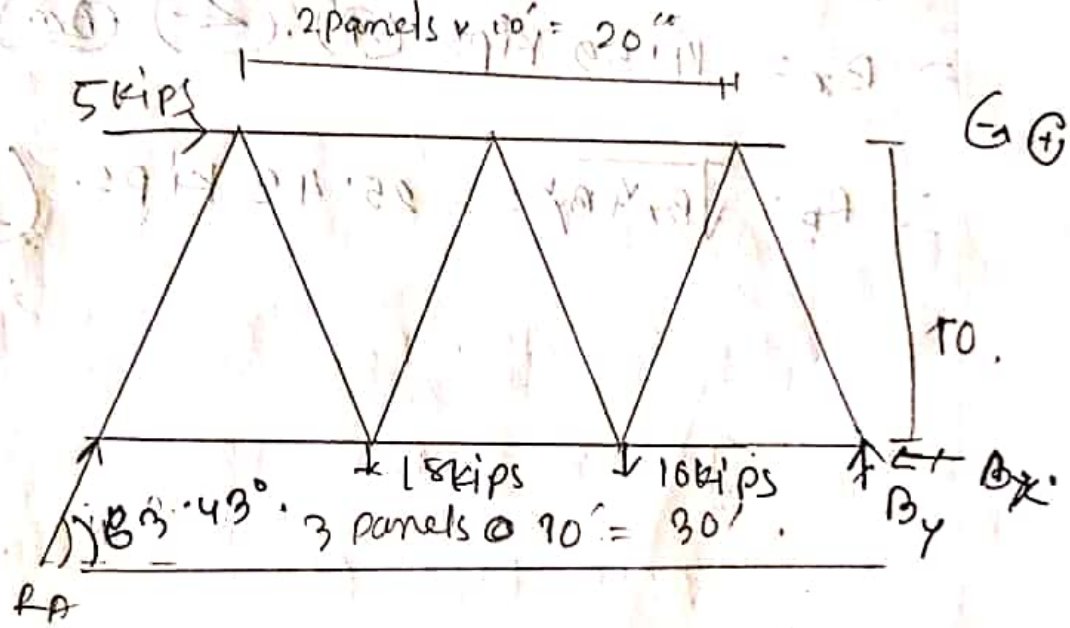
$BD = \frac{\sqrt{2}\cos 45^\circ}{\sin 45^\circ} = \sqrt{2}\,(T)$. Ans



$\Sigma f_x = 0$.

~~$AB \sin 45^\circ + BC + BD \cos 45^\circ = 0$~~.

350



Assuming the hight of the truss 10',

$\theta = \tan^{-1}\left(\frac{10}{5}\right) = 63.43^\circ$.

$\Sigma M_A = 0$.

$\Rightarrow -B_y \times 30 + 15 \times 10 + 10 \times 20 + 15 \times 15 \times 5 \times 10 = 0$.

$\Rightarrow B_y = 20.83$ kip $(\uparrow)$. Ans

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$\Sigma F_y = 0$

$R_A \sin 63.43° + B_y - 15 - 10 - 15 = 0.$

$\Rightarrow R_A \sin 63.43° + 20.83 - 15 - 10 - 15 = 0.$

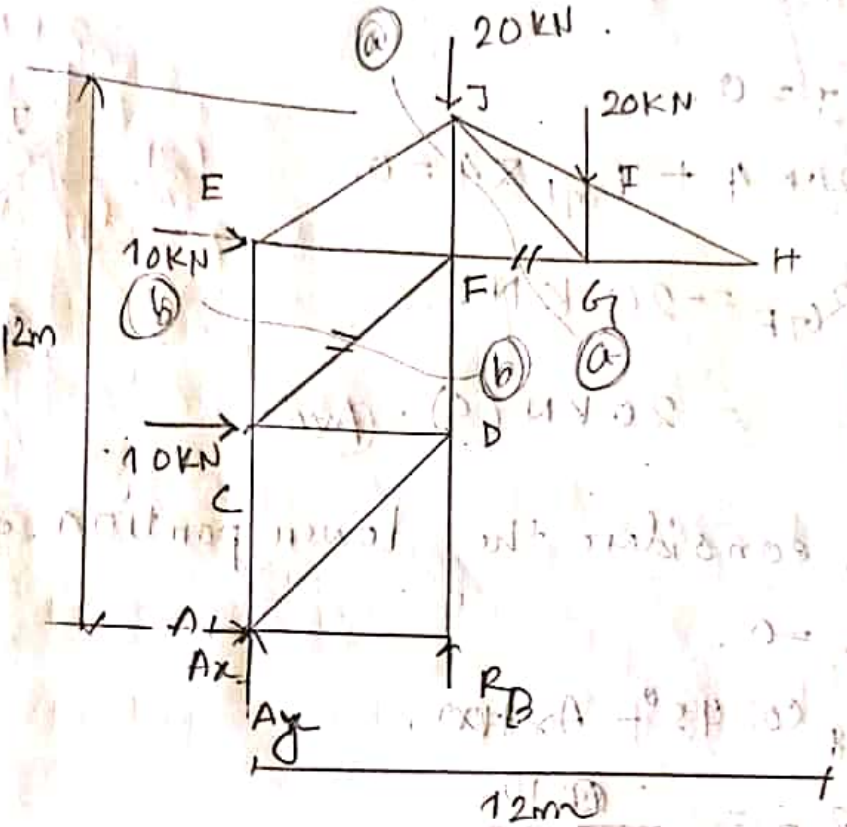
$R_A = 21.43$ kips. (↑). Ans.

$\Sigma F_x = 0.$

$R_A \cos 63.45° - B_x + 5 = 0$

$\Rightarrow B_x = 14.59$ kips. (→). (←) (Ans).

$\therefore R_B = \sqrt{B_x^2 + B_y^2} = 25.43$ kips. (Ans).



$\Sigma M_A = 0$.

$-R_B \times 9 + 10 \times 4 + 10 \times 8 + 20 \times 4 + 20 \times 8 = 0$.

$\Rightarrow \quad R_B = 90$ KN. (↑).

$\Sigma F_x = 0$.

$A_x + 20 = 0$.

$A_x = -20$ KN.

$= 20$ KN (←).

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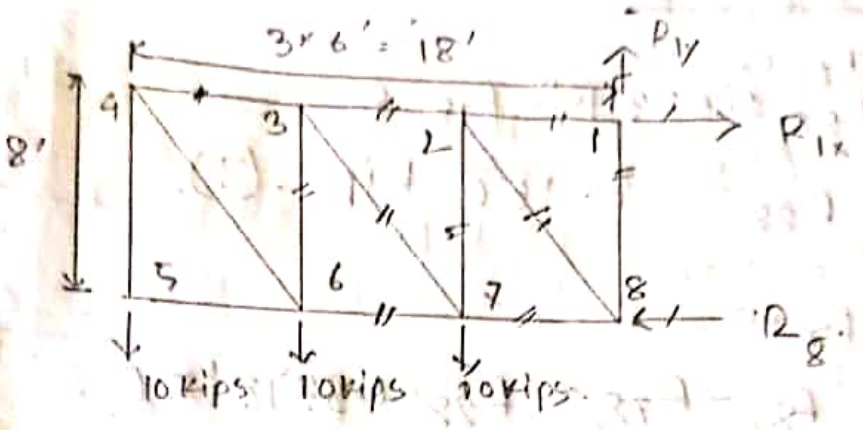
3.3 Consider the free body diagram of the truss.



$\Sigma M_1 = 0.$

$R_8 \times 8 - 10 \times 6 - 10 \times 12 - 10 \times 18 = 0.$

$R_8 = 45$ Kips. (T).

$\theta = \tan^{-1} \frac{8}{6}.$

$= 53.13^\circ.$

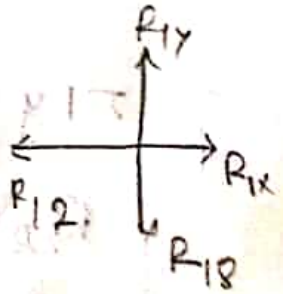
$\Sigma F_y = 0.$

$R_{1y} = 10 + 10 + 10 = 30$ Kip (T).

$\Sigma F_x = 0.$

$R_{1x} - R_8 = 0 \quad \therefore R_{1x} = 45$ Kips (T).

<u>At joint 1:</u>



$\Sigma F_x = 0.$

$R_{1x} - R_{12} = 0.$

$R_{12} = 45$ Kips (T). <u>Ans</u>

$\Sigma F_y = 0.$

$R_{1y} = R_{18}$

$R_{18} = 30$ Kips (T). <u>Ans</u>

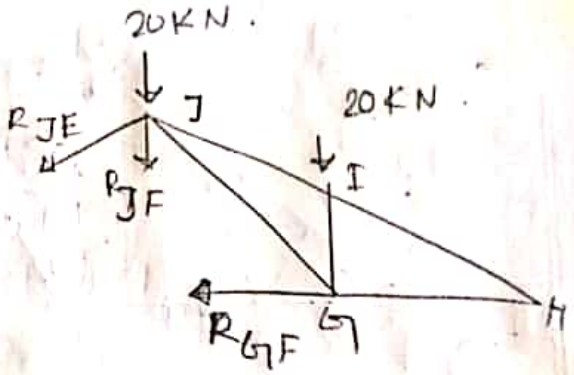
Now, consider the right portion of section (a-a).

$\Sigma M_J = 0$.

$20 \times 4 + R_{GF} \times 4 = 0$.

$\Rightarrow R_{GF} = -20 \text{ KN}$.

$= 20 \text{ KN (C)}$. (Ans)



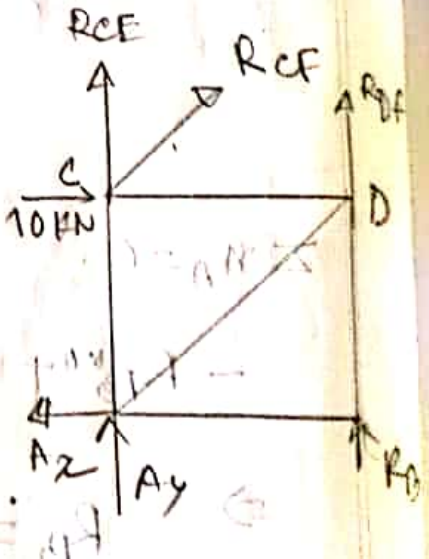
Now, consider the lower portion of section (b-b).

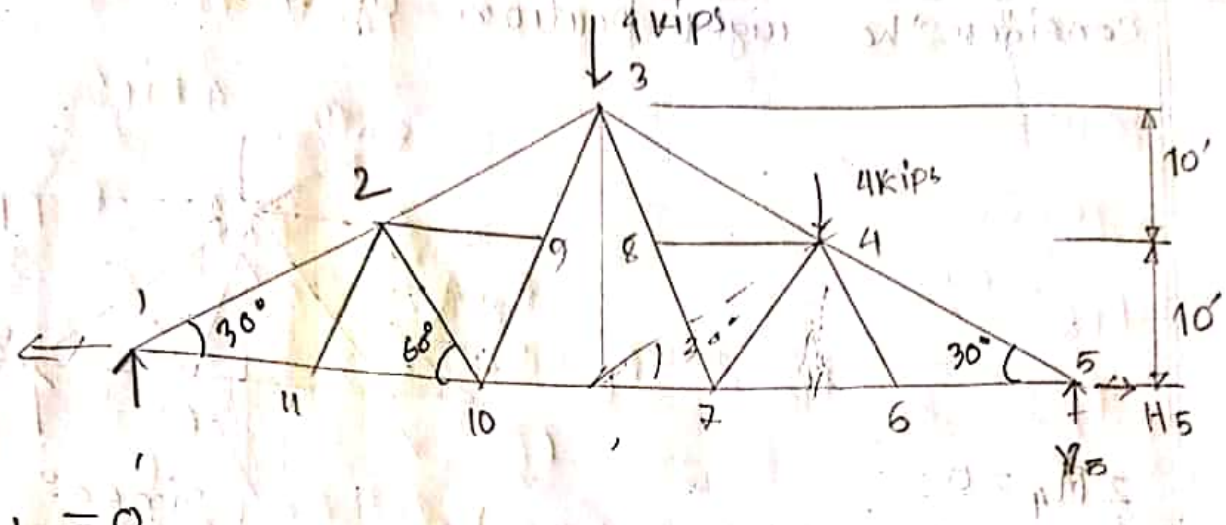
$\Sigma f_x = 0$.

$R_{CF} \cos 45^\circ - A_x + 10 = 0$.

$\Rightarrow R_{CF} = \dfrac{-10}{\cos 45^\circ}$

$R_{CF} = 14.14 \text{ KN (T)}$ (Ans)





$\Sigma M_1 = 0$.

$$\Rightarrow 4 \times \frac{20}{\tan 30^\circ} + 4\left(\frac{20}{\tan 30^\circ} + \frac{10}{\tan 30^\circ}\right) - V_5 \times \frac{2 \times 20}{\tan 30^\circ} \Rightarrow$$

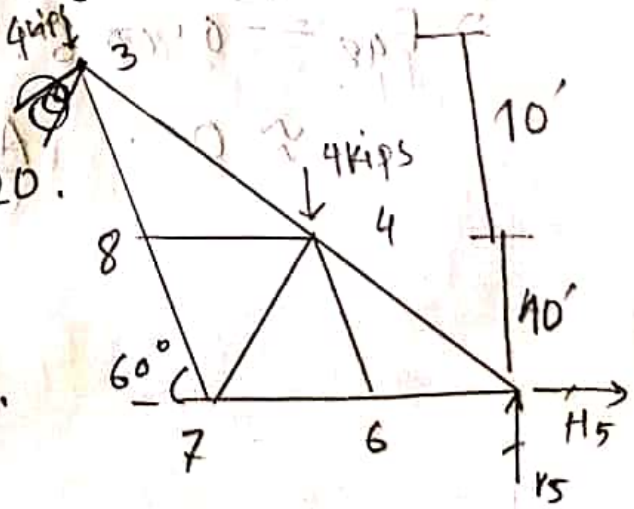
$\tan 30^\circ = \frac{h}{h}$

$\Rightarrow h = \frac{20}{t}$

$$\Rightarrow V_5 \times \frac{40}{\tan 30^\circ} = 346.41$$

$\therefore V_5 = 5$ kips.

Consider the left portion of the truss,

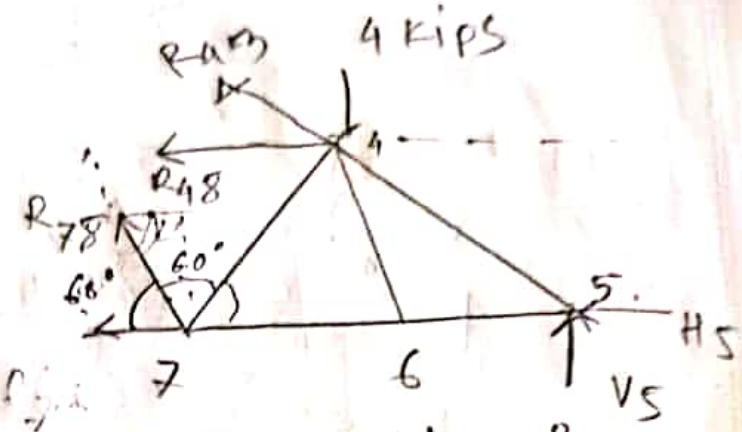


$\Sigma M_3 = 0$.

$$4 \times \frac{10}{\tan 30^\circ} - V_5 \times \frac{20}{\tan 30^\circ} = H_5 \times 20.$$

$H_5 = -5.2$ kips $(\leftarrow)$.

Consider the right portion of section (a-a),



$\Sigma M_4 = 0.$

$H_5 \times 10 - V_5 \times \frac{10}{\tan 30^\circ} + F_{78} \cos 60^\circ \times 10 + F_{78} \sin 60^\circ \times 8 = 0.$

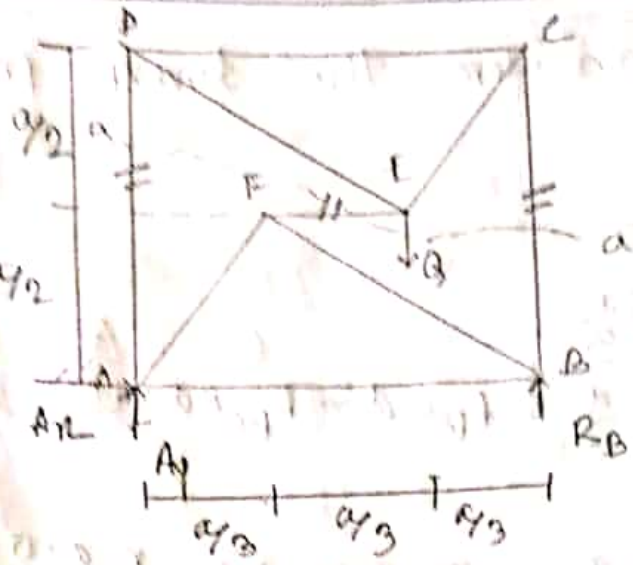
$\Rightarrow F_{78} = 3.46$ kips.

$\Sigma M_5 = 0.$

$F_{78} \sin 60 \times 23.1 - 4 \times 17.32 - F_{48} \times 10 = 0.$

$\Rightarrow F_{48} = -0.006.$

$\approx 0.$ Ans



Q = 3000 kg

$\Sigma M_A = 0$.

$Q \times \frac{2a}{3} - R_B \times a = 0$.

$\Rightarrow 3000 \times \frac{2a}{3} - R_B \times a = 0$.

$\Rightarrow 2000a - R_B \times a = 0$.

$\Rightarrow R_B = 2000$. kg

$\Sigma f_x = 0$.

$Q - Ax = 0$.

$\Sigma f_y = 0$.

$Ay + R_B - Q = 0$.

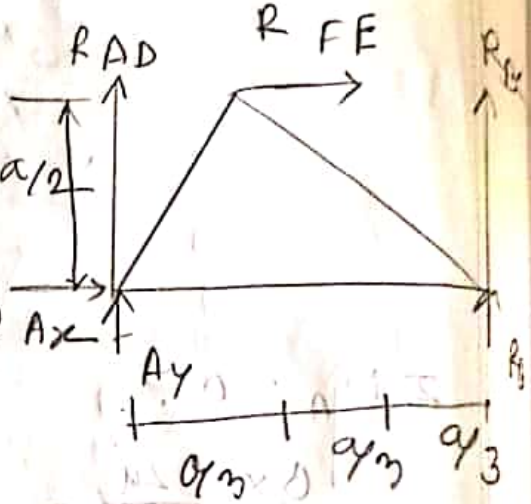
$Ay = 4000$ kg.

Now, consider the lower portion of section 366 (a-a)

$\Sigma M_A = 0.$

~~$R_{FE} \times \frac{2a}{3}$~~

$R_{FE} \times \frac{a}{2} - R_B \times a - R_{BC} \times a = 0$



$\Rightarrow R_{FE} \times \frac{a}{2} - 2000 \times a - R_{BC} a = 0$

$\therefore R_{FE} - R_{BC} = 2000 \quad \text{---(1)}$

$\Sigma F_x = 0.$

$A_x + R_{FE} = 0.$

$\therefore R_{FE} = 0$ (Am)

$\therefore R_{BC} = -2000$

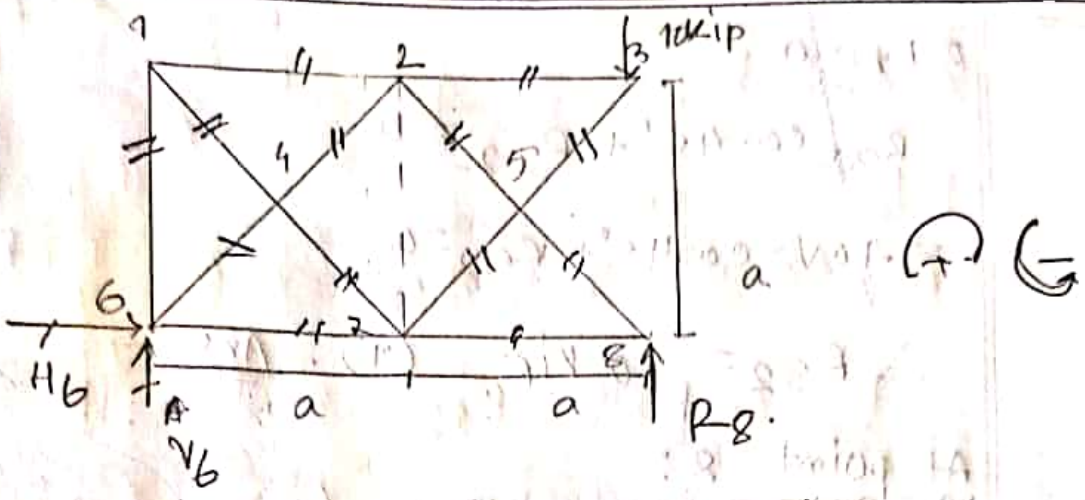
$= 2000 \text{ kg}$ (C) (Am)

$\Sigma F_y = 0.$

$A_y + R_{AD} + R_B + R_{BC} = 0.$

$1000 + R_{AD} + 2000 - 2000 = 0.$

$R_{AD} = -1000 \text{ kg} = 1000 \text{ kg}$ (↓) (Am)



$\Sigma M_6 = 0$.

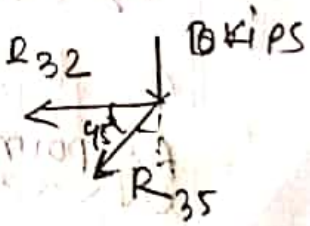
$-R_8 \times 2a + 10 \times 2a = 0$.

$\therefore R_8 = 10$ kips. (↑)

$\Sigma F_x = 0$. $\quad \Sigma F_y = 0$.

$H_6 = 0$. $\quad V_6 + R_8 - 10 = 0$.

$\Rightarrow V_6 = 0$.



At point 3 :

$\Sigma F_y = 0$.

$10 + R_{35} \sin 45^\circ = 0$

$\Rightarrow R_{35} = \dfrac{-10}{\sin 45^\circ}$

$= -10\sqrt{2}$ kips.

$= 10\sqrt{2}$ kips (↓). (Ans)

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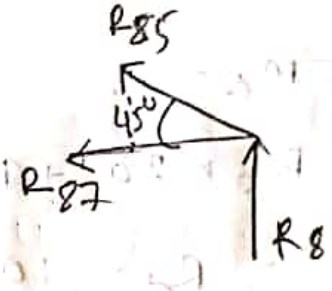
$\Sigma F_x = 0$

$R_{35}\cos 45^\circ + R_{32} = 0$.

$\Rightarrow -10\sqrt{2}\cos 45^\circ + R_{32} = 0$.

$\therefore R_{32} = 10$ kips (T). Ans

At point 8:



$\Sigma F_x = 0$.

$R_{87} + R_{85}\cos 45^\circ = 0$.

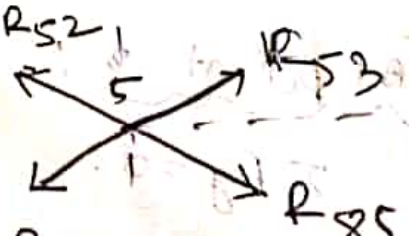
$\therefore R_{87} = 10$ kips (T). Ans

$\Sigma F_y = 0$

$R_8 + R_{85}\sin 45^\circ = 0$. $\Rightarrow R_{85} = -10\sqrt{2}$ kips

$= 10\sqrt{2}$ kips (C). Ans

At point 5:



$\Sigma F_y = 0$

$R_{53}\sin 45^\circ + R_{52}\sin 45^\circ - R_{57}\sin 45^\circ R_{57}$

$- R_{85}\sin 45^\circ = 0$.

$R_{52} - R_{57} = R_{85} - R_{53}$.

$= -10\sqrt{2} + 10\sqrt{2}$

$= 0$. ——— (1).

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$\Sigma F_x = 0.$

$R_{53}\cos 45^\circ + R_{57}\cos 45^\circ - R_{52}\cos 45^\circ - R_{57}\cos 45^\circ = 0.$

$\Rightarrow \quad R_{52} + R_{57} = 20 - 10\sqrt{2} - 10 - 20\sqrt{2}.$

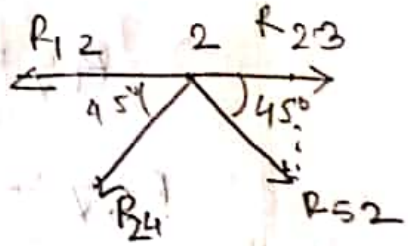
$\Rightarrow \quad 2R_{52} = -10\sqrt{2}.$

$\therefore R_{52} = -10\sqrt{2}$ kip. $\therefore R_{52} = 10\sqrt{2}$ kip (C) Ans

$\therefore R_{57} = 10\sqrt{2}$ kips (C) Ans

At point 2:

$\Sigma F_y = 0.$



$R_{52}\sin 45^\circ + R_{24}\sin 45^\circ = 0.$

$\therefore R_{24} = 10\sqrt{2}$ kips (T). (Ans)

$\Sigma F_x = 0.$

$R_{23} + R_{52}\cos 45^\circ - R_{12} - R_{24}\cos 45^\circ = 0.$

$\Rightarrow \quad R_{12} = R_{24}\cos 45 - R_{23} - R_{52}\cos 45^\circ.$

$= 10\sqrt{2}\cos 45^\circ - 10 + 10\sqrt{2}\cos 45^\circ$

$= 10$ kips. (T) Ans

R_{12}

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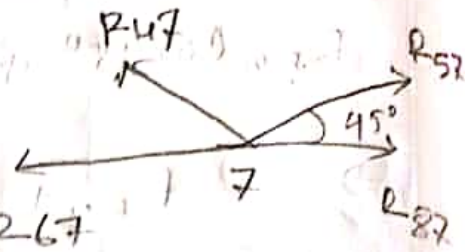
At point 7:



$\Sigma F_y = 0.$

$R_{47} \sin 45^\circ + R_{57} \sin 45^\circ = 0.$

$\Rightarrow R_{47} = -R_{57} = a$

$\Rightarrow R_{47} = 10\sqrt{2}$ kips. (T). Ans

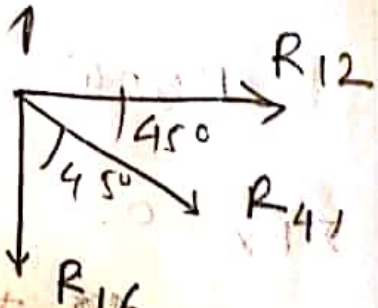
$\Sigma F_x = 0.$

$R_{57} \cos 45^\circ + R_{87} - R_{67} - R_{47} \cos 45^\circ = 0.$

$\Rightarrow R_{67} = 10 - 10 + 10 - 10 = 0.$

$R_{67} = 10$ kips $= 10$ kips (C). Ans

At point 1:



$\Sigma F_x = 0.$

$R_{12} + R_{41} \cos 45^\circ = 0.$

$R_{41} = \frac{-10}{\cos 45^\circ} = -10\sqrt{2}$

$= 10\sqrt{2}$ kips (C).

$\Sigma F_y = 0.$

$R_{16} + R_{41} \sin 45^\circ = 0$

$R_{16} = 10$ kips (T).

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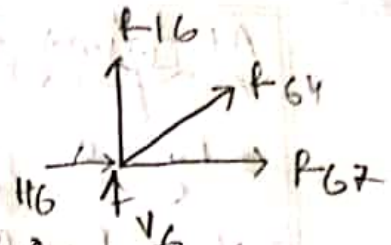
At point 6:

$\Sigma F_x = 0.$

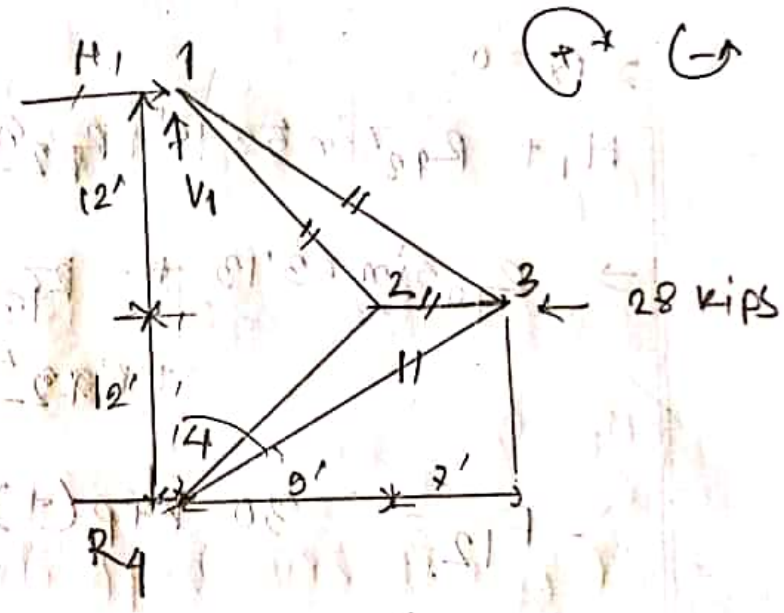
$R_{67} + R_{64}\cos 45° = 0.$

$\Rightarrow R_{64} = \frac{-70}{\cos 45°} = 70\sqrt{2}$ kips (T).



(Ans)

67:



$\Sigma M_1 = 0.$

$28 \times 12 - R_4 \times 24 = 0.$

$R_4 = 14$ kips.

$\Sigma F_x = 0.$

$H_1 + R_4 - 28 = 0.$

$H_1 = 14.$ kips.

$\Sigma F_y = 0.$

$V_1 = 0.$

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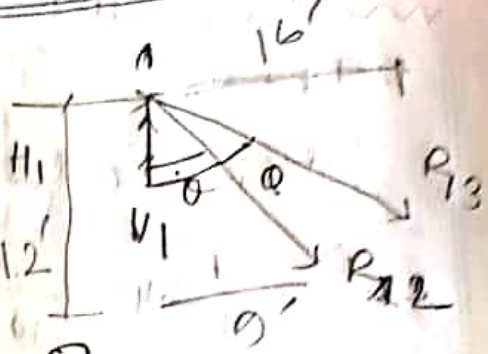
At joint 1:



$\Sigma F_y = 0.$

$V_1 - R_{13}\cos 53'13 - R_{12}\cos 36'87° = 0$

$\Rightarrow R_{13}\cos 53'13 = -R_{12}\cos 36'87° \quad -①$

$\theta = \tan^{-1}\frac{9}{12}$

$\theta = 36'87°$

$\Sigma F_x = 0.$

$H_1 + R_{13}\sin 53'13° + R_{12}\sin 36'87° = 0.$ $\quad \phi = \tan^{-1}\frac{16}{12}$

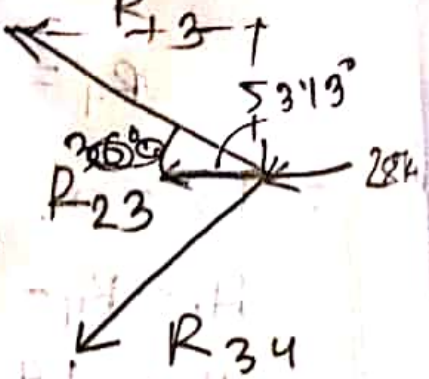
$= 53'13°.$

$\Rightarrow R_{13}\sin 53'13 - R_{13}\cos 36 + R_{12}\sin 36'87 = -14 \quad -(ii).$

$\therefore F_{12} = 30$ Kip (T). (Ans)

$F_{13} = 40$ Kips (C). (Ans)

At joint 3:



$\Sigma F_y = 0.$

$R_{13}\cos 53'13° - R_{34}\cos 53'13° = 0.$

$\therefore R_{34} = -40$ Kips (C). (Ans)

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$\Sigma F_x = 0$

$$28 + R_{23} + R_{13}\sin 53.13^\circ + R_{34}\sin 53.13^\circ = 0.$$

$$\Rightarrow R_{23} = -28 + 40\sin 53.13^\circ + 40\sin 53.13^\circ = 0.$$

$$R_{23} = 36 \text{ kips. (T)} \quad \text{(Ans)}$$

At point 4:

$\Sigma F_x = 0.$

$$R_4 + R_{34}\cos\sin 53.13^\circ + R_{42}\sin 36.87^\circ = 0.$$

$$R_{42} = -30 \text{ kips. (T)} \quad \text{(Ans)}$$

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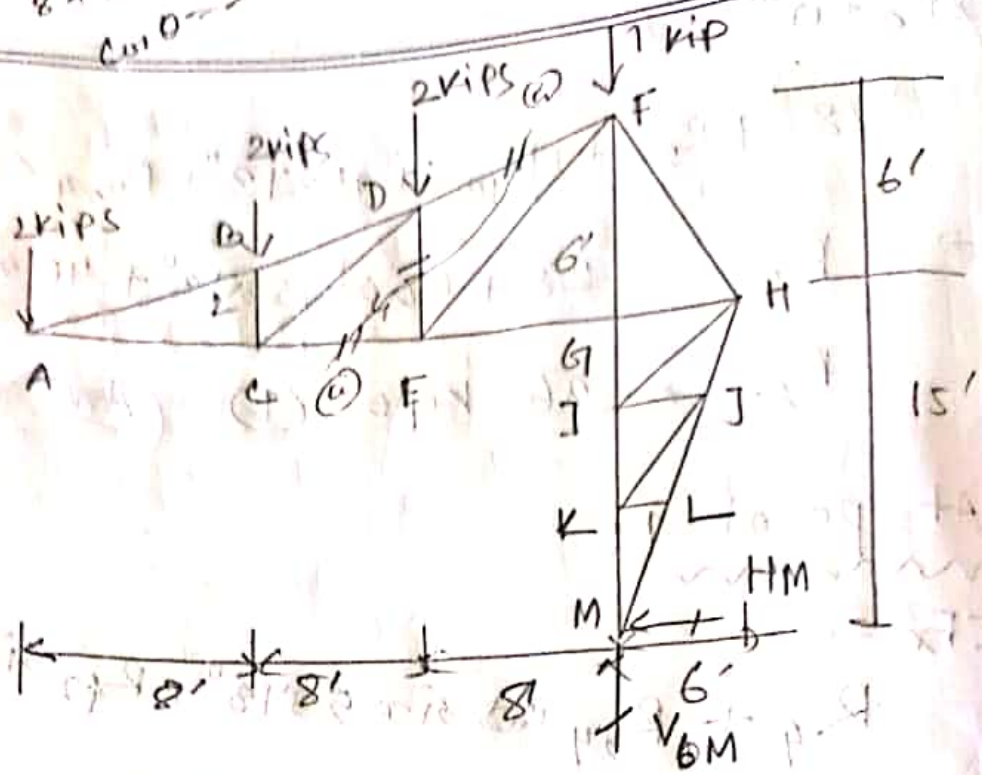
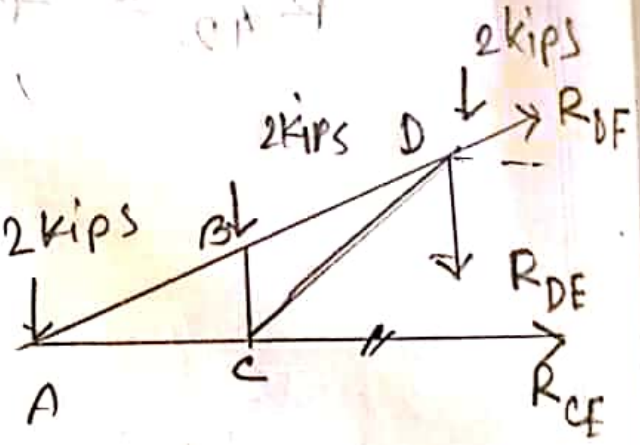


Consider the section (a-a)

$\Sigma M_D = 0$.



$-R_{CE} \times 4 - 2\times 8 - 2\times 16 = 0$

$\Rightarrow R_{CE} = -12$ kips.

$= 12$ kips (C). (Ans)

$\Sigma F_y = 0$.

$R_{CE} + R_{DF} \cos\dfrac{8}{\sqrt{8^2+2^2}} = 0$.

$\Rightarrow -12 - R_{DF} \cos\left(\dfrac{8}{\sqrt{8^2+2^2}}\right) = 12$

$R_{DF} \cos 14° = 12$

$\therefore R_{DF} = 12.37$ kips (T). (Ans)

$\Sigma f_y = 0.$

$R_{DF} \sin 14° - R_{DE} - 2 - 2 - 2 = 0.$

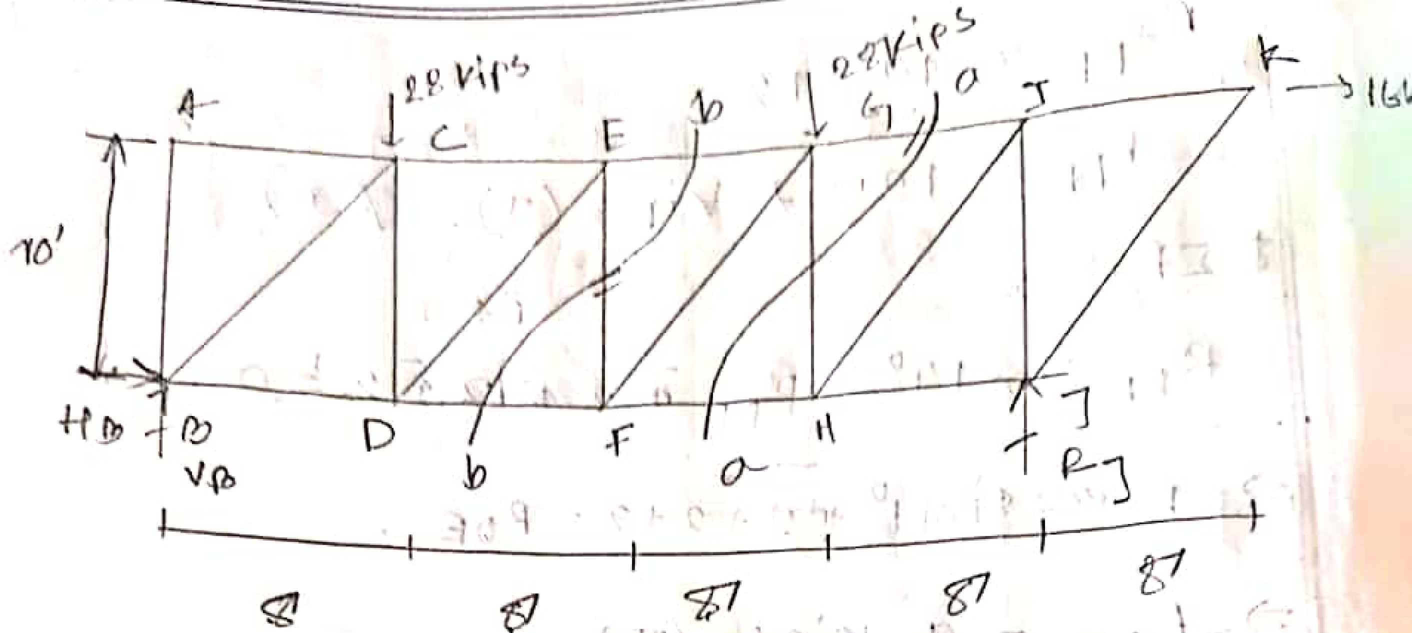
$\Rightarrow 12.37 \sin 14° - 6 = R_{DE}.$

~~$\Rightarrow R_{DE} = 9$ kips (T).~~

$R_{DE} = -3$ kips.

$= 3$ kips (C). Ans

37.

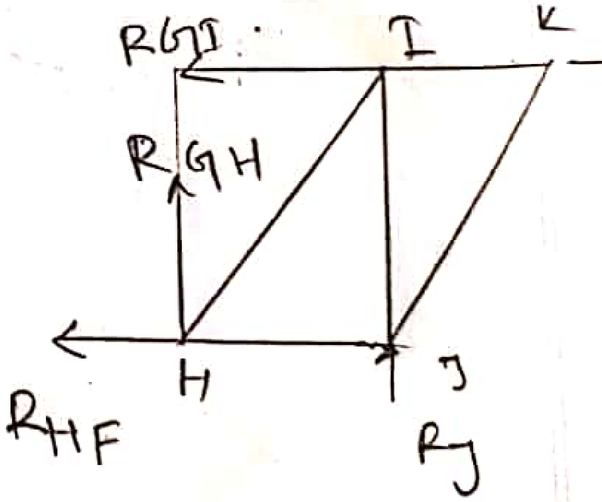


$\Sigma M_B = 0.$

$8 \times 28 + 28 \times 24 + 16 \times 10 - R_J \times 32 = 0.$

$R_J = 33$ kips.

Considere the right portion of (a-a) section,



$\Sigma M_H = 0,$

$-R_J \times 8 + 16 \times 10 - R_{GI} \times 10 = 0.$

$\Rightarrow R_{GI} = -\frac{33 \times 8 + 16 \times 10}{10}$

$= -10.4$ kips

$R_{GI} = 10.4$ kips (C). Ans

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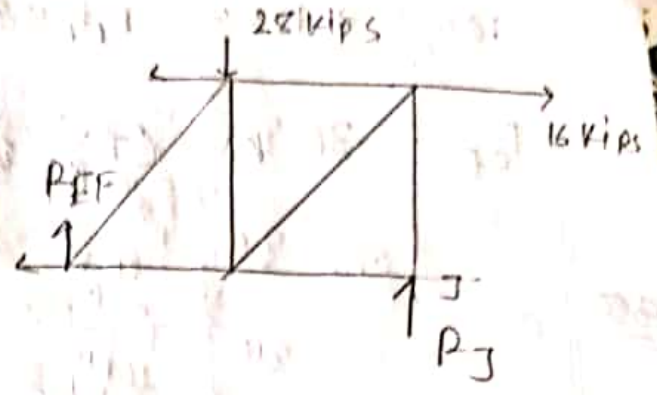
Consider the right portion of (b-b) section



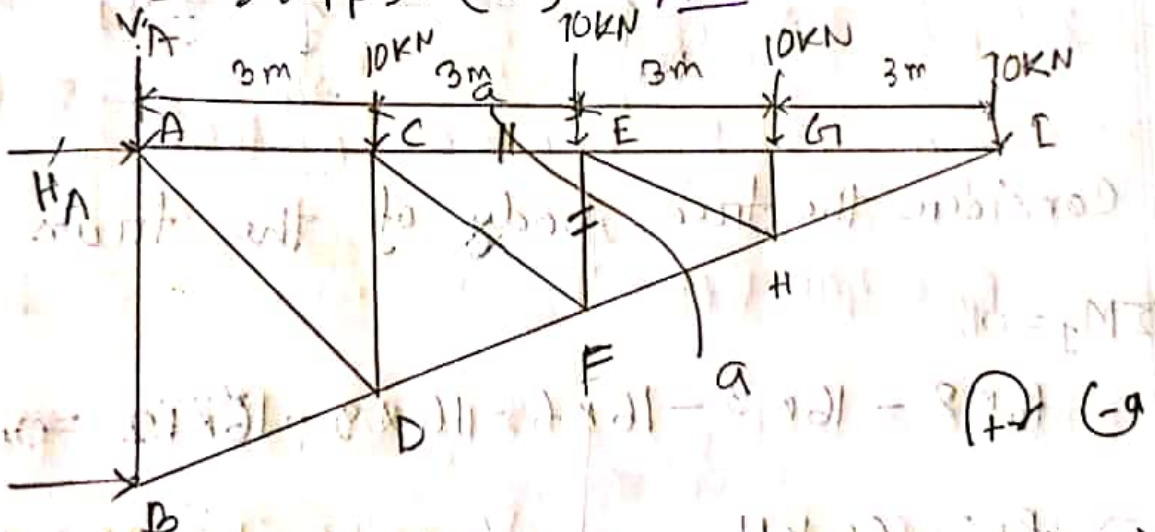
$\Sigma F_y = 0.$

$R_{FF} + R_J - 28 = 0.$

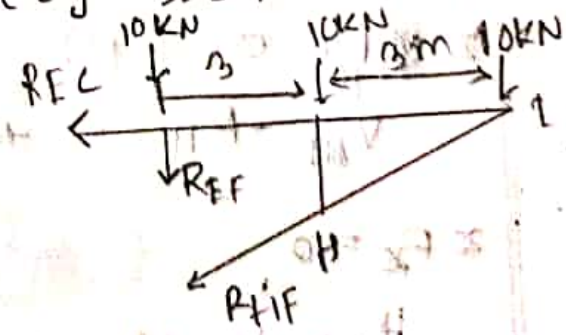
$R_{EF} = 28 - 33$

$= -5$ kips.

$= 5$ kips. (C). Ans



Consider the right portion of section (a-a),



$\Sigma M_I = 0.$

$-10 \times 3 - 10 \times 6 - R_{EF} \times 6 = 0.$

$\Rightarrow R_{EF} = -15$ KN

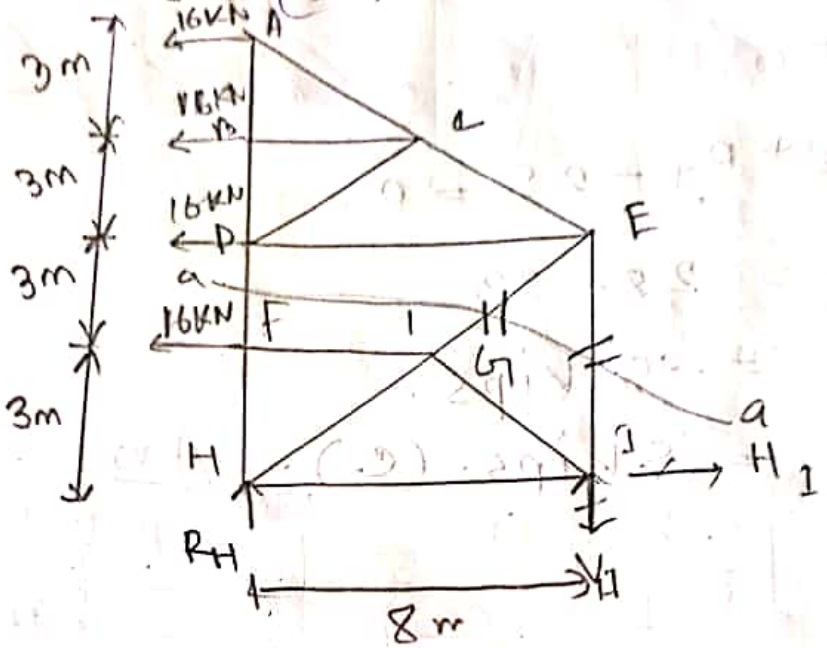
$= 15$ KN (C). Ans

$\Sigma M_H = 0.$

$10 \times 3 - 10 \times 3 - F_{CF} \times 3 - F_{CE} \times 2.25 = 0.$

$F_{CE} = 36$ KN. (T). (Ans)

3&0



Consider the free body of the truss.

$\Sigma M_1 = 0.$

$R_H \times 8 - 16 \times 3 - 16 \times 6 - 16 \times 9 - 16 \times 12 = 0.$

$\Rightarrow R_H = 60$ KN.

$\Sigma F_y = 0.$

$V_1 - R_H = 0 \Rightarrow V_1 = R_H = 60$ KN.

$\Sigma F_x = 0.$

$H_1 - 16 - 16 - 16 - 16 = 0 \therefore H_1 = 64$ KN.

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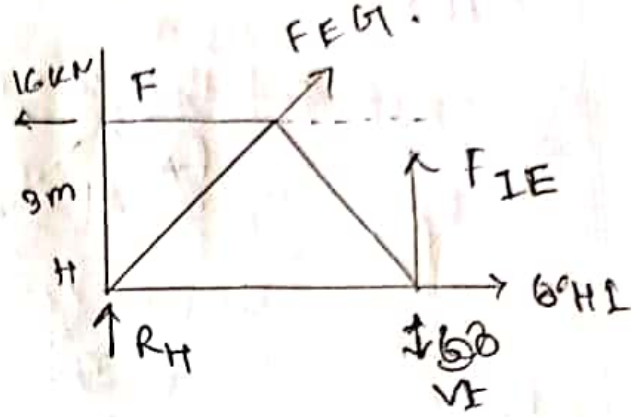
Now, consider the lower portion of section (a-b).



$\Sigma M_I = 0$.

~~$R_H \times 8 - 16 \times 3 + F_{EG} \times$~~

$\Sigma M_H = 0$.

$V_1 \times 8 - F_{EI} \times 8 - 16 \times 3 = 0$.

$\tan\theta = \frac{3}{4}$

$\theta = \tan^{-1}\frac{3}{4}$

$\theta = 36'87°$.

$\Rightarrow F_{II} = 54\ KN.\ (+)$. Ans

$\Sigma F_x = 0$.

$H_I - 16 + F_{EG}\cos 36'87° = 0$.

$\Rightarrow 64 + 16 + F_{EG}\cos 36'87° = 0$

$F_{EG} = -60\ KN.$

$= 60\ KN\ (C)$. (Ans)

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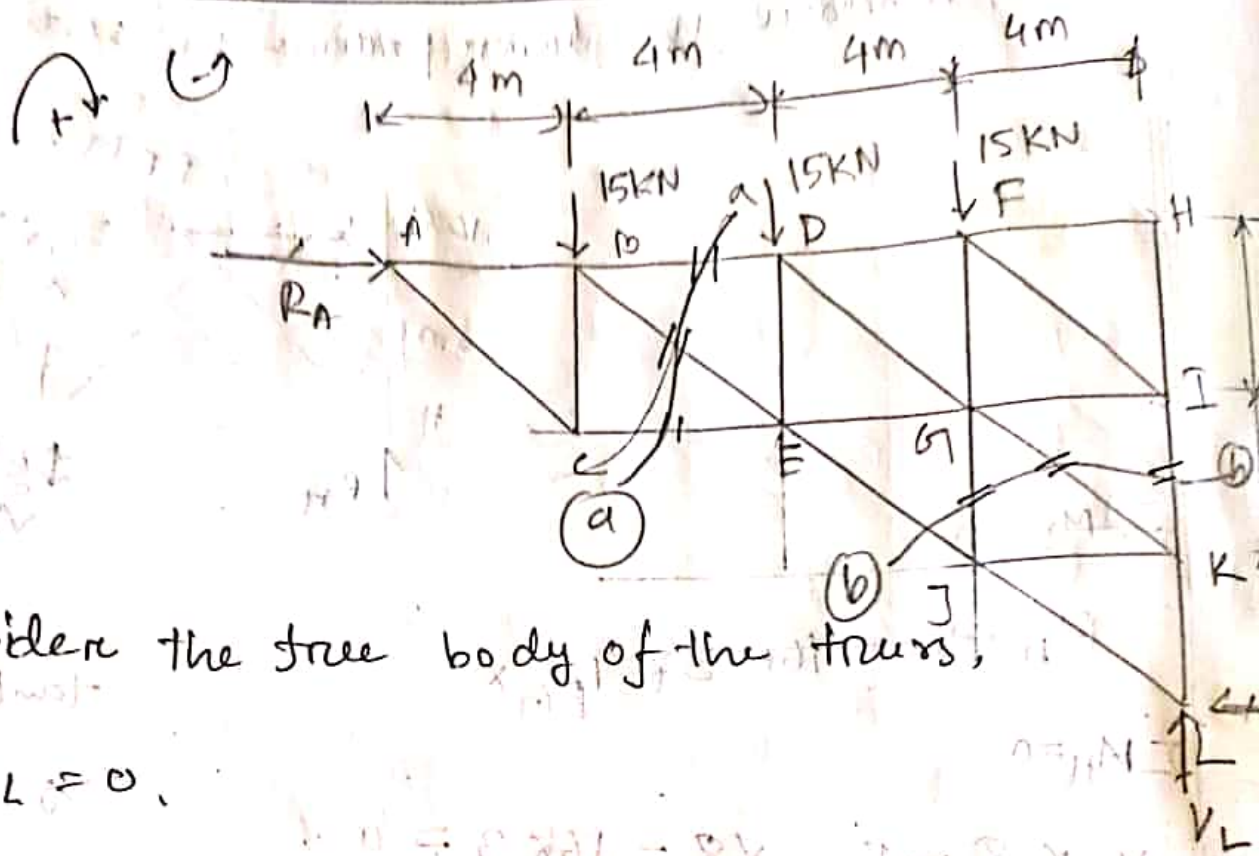

Consider the free body of the truss,

$\Sigma M_L = 0$.

$-15 \times 4 - 15 \times 8 - 15 \times 12 + R_A \times 16 = 0$.

$\Rightarrow R_A = 40$ KN.

$\Sigma F_x = 0$.

$\Rightarrow H_L - R_A = 0$.

$H_L = 40$ KN.

$\Sigma F_y = 0$.

$V_L - 15 - 15 - 15 = 0$.

$\therefore V_L = 45$ KN.

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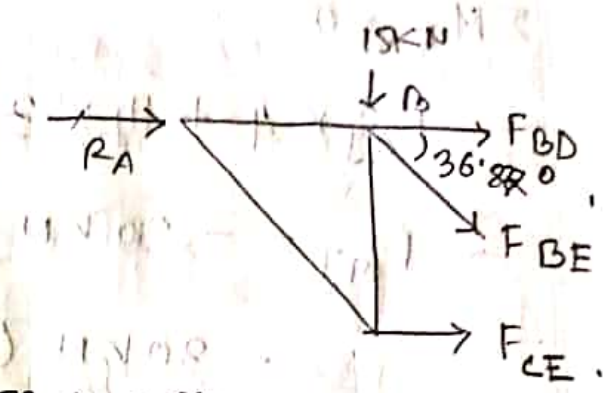
Consider the left portion of (a-d)

$\Sigma M_B = 0$.

$F_{CE} \times 3 = 0$.

$\therefore F_{CE} = 0$. (Ans)



$\Sigma F_x = 0$.

$F_{BD} + F_{BE} - R_A \cos 36.87^\circ + R_A = 0$.

$\Rightarrow F_{BD} + R_A + F_{BE} \cos 36.87^\circ = 0$ ——— (1)

$\Sigma F_y = 0$.

$15 + F_{BE} \sin 36.87^\circ = 0$.

$F_{BE} = -25$ KN. $= 25$KN (c). (Ans)

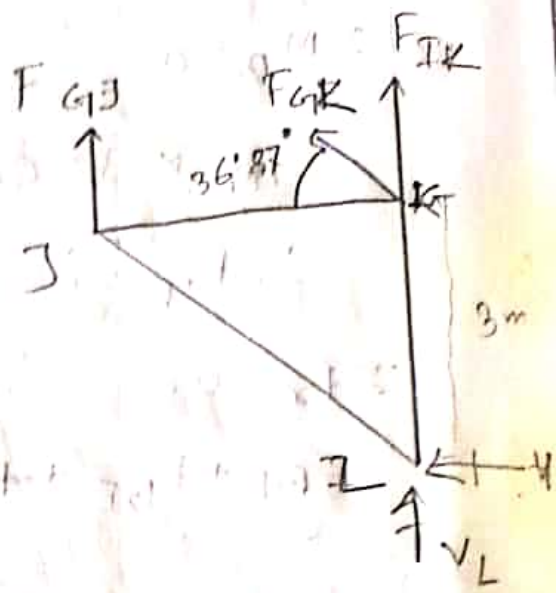
(1) $\Rightarrow F_{BD} + 40 + F_{BE} \cos 36.87^\circ = 0$

$\therefore F_{BE} = -18.75$ KN. $F_{BD} = -20$ KN.

$\therefore F_{BE} = 18.75$ KN (c). (Ans)

$\therefore F_{BD} = 20$ KN (C). (Ans)

Consider the lower portion of section (b-b).



$\Sigma M_K = 0.$

$F_{GJ} \times 4 + H_L \times 3 = 0.$

$\Rightarrow F_{GJ} = -30\ KN.$

$= 30\ KN\ (C).$ (Ans)

$\Sigma F_x = 0.$

$H_L + F_{GK} \cos 36'87° = 0.$

$\Rightarrow F_{GK} = -50\ KN.$

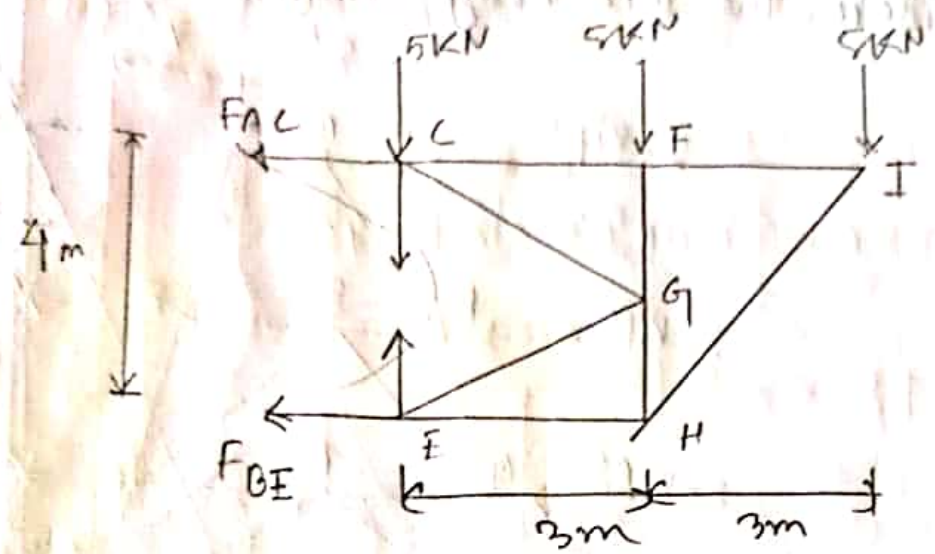
$= 50\ KN\ (C).$ (Ans)

$\Sigma F_y = 0.$

$F_{GJ} + V_L + F_{IK} + F_{GK} \sin 36°87° = 0.$

$\Rightarrow -30 + F_{IK} - 50 \sin 36'87° + 45 = 0.$

$\therefore F_{IK} = 15\ KN\ (T).$ (Ans)



Consider the right portion of section (a-a),

$\Sigma M_e = 0$.

$5 \times 3 + 5 \times 6 + F_{BE} \times 4 = 0$.

$\Rightarrow F_{BE} = -11.25$ KN.

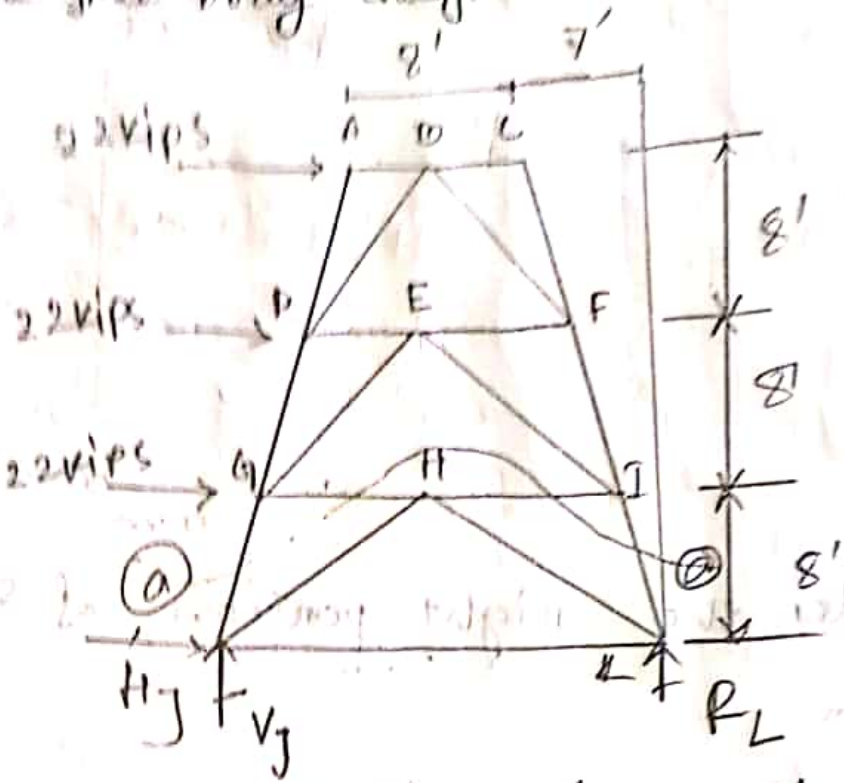
$= 11.25$ KN. (C). (Ans)

$\Sigma f_x = 0$.

$-F_{AC} - F_{BE} = 0$.

$\therefore F_{AC} = 11.25$ KN. (T). (Ans).

Complete the free body diagram of the truss.



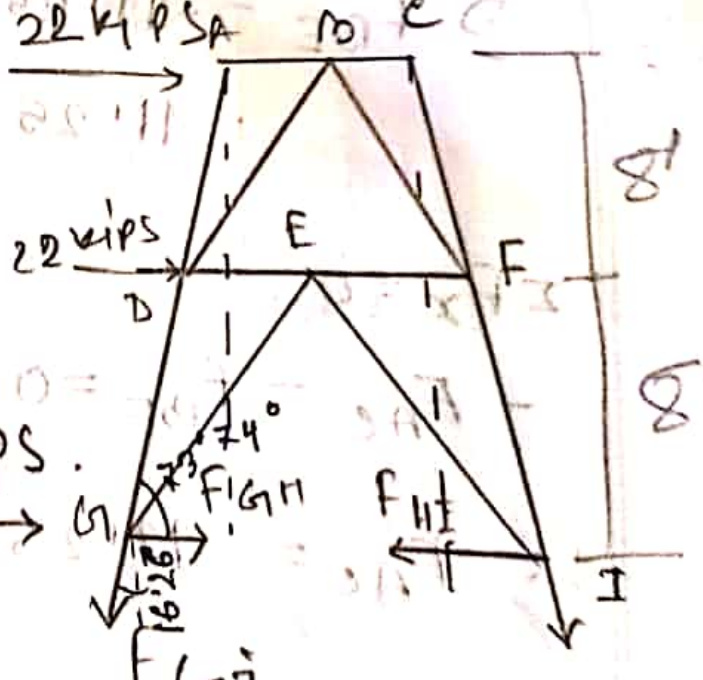
Consider the upper portion of section (a-a).

$\Sigma M_J = 0$.

$22 \times 8 + 22 \times 16 - F_{GJ} \times 17' 33'' \times \cos 16' 26 = 0$.

$F_{GJ} = 31'74$ kips (T).

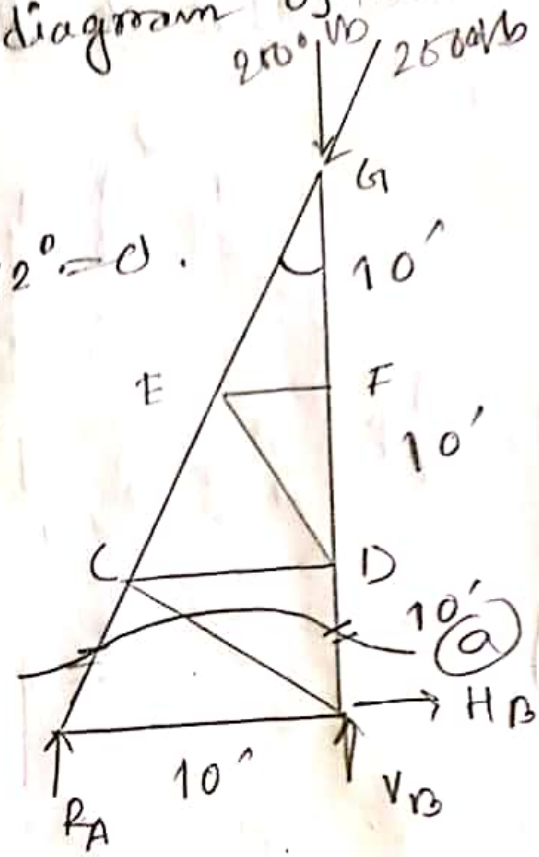
Ans



$GI = 8 + 2 \times 16 \times \tan$

$= 17' 89''$

8.57 Consider the free body diagram of the truss,



$\Sigma M_B = 0$.

$R_A \times 10 - 2000 \times 30 \times \sin 18'42^\circ = 0$.

$R_A = 1895.88$ lb.

$\Sigma F_x = 0$.

$H_B - 2000 \sin 18'42^\circ = 0$.

$\therefore H_B = 632.62$ lb.

$\Sigma F_y = 0$.

$R_A + V_B - 2000 \cos 18'42^\circ = 0$.

$\tan\theta = \frac{3'3}{10}$

$\theta = 18'$

$\Rightarrow 1895.88 + V_B - 2000 \cos 18'42^\circ = 2$

$V_B = 2000$ lb.

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Now consider the lowere portion of section (a-b)

$\Sigma M_B = 0$.

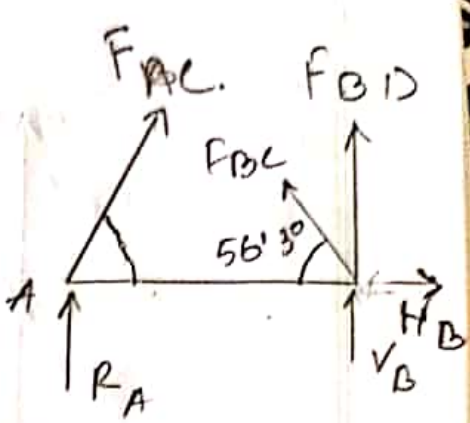
F_{AE}

$\Rightarrow$ $F_{AE} \times 10 \cos \sin 71.51° = 0$.

$+ F_{BD} = 0$.

$\Rightarrow$ $F_{AE} = -2000$ lb.

$= 2000$ lb (C)



$\Sigma F_y = 0$.

$\Rightarrow$ $R_A + F_{AE} \sin 71.57° + F_{BD} + V_B = 0$.

$+ F_{BC} \sin 56.3° = 0$. ← (1)

$\tan\theta = \frac{30}{10}$

$\theta = 71.57°$.

$\tan\varphi = \frac{10}{8.82}$

$\varphi = 56.3°$

$\Rightarrow$

$\Sigma F_x = 0$.

$H_B + F_{AE} \cos 71.57° - F_{BC} \cos 56.3° = 0$.

$632 + 2000 \cos 71.57° - F_{BC} \cos 56.3° = 0$.

$\Rightarrow$ $\therefore F_{BC} = 0.59$ lb (T). Ans

$\therefore F_{BD} = -2000$ lb.

$\therefore F_{BD} = 2000$ lb (C). (Ans)

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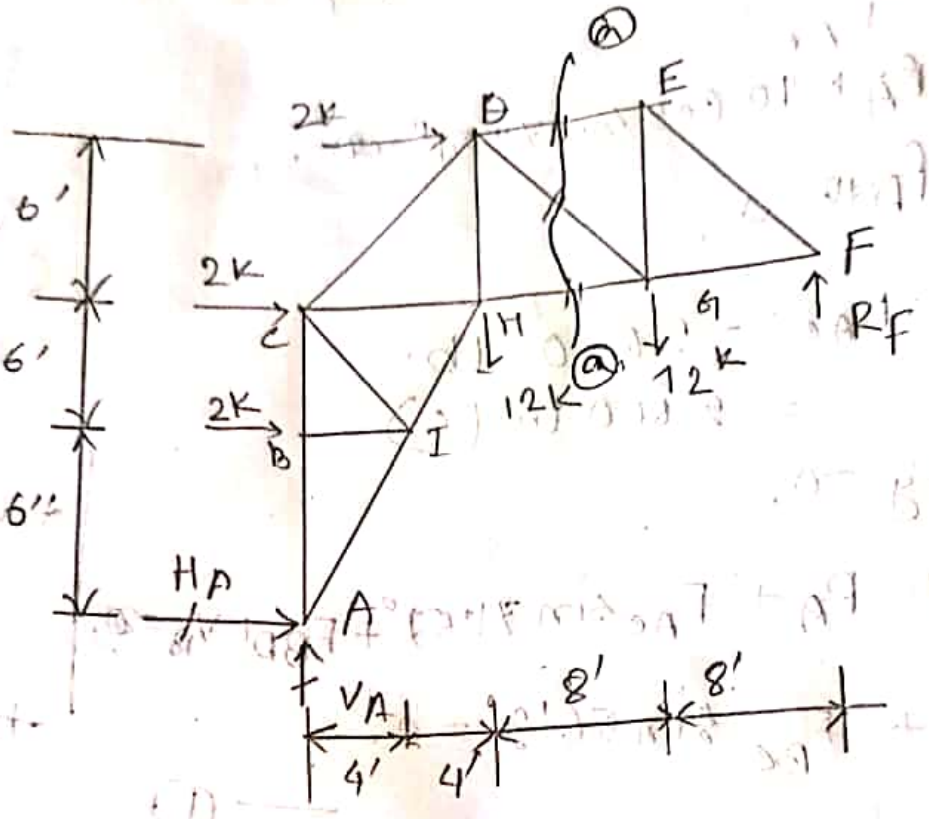
896 Consider the free body diagram of the truss



$\Sigma M_A = 0$.

$2 \times 6 + 2 \times 12 + 12 \times 8 + 12 \times 16 + 2 \times 18 - R_F \times 24 = 0$

$\Rightarrow R_F = 15$ K

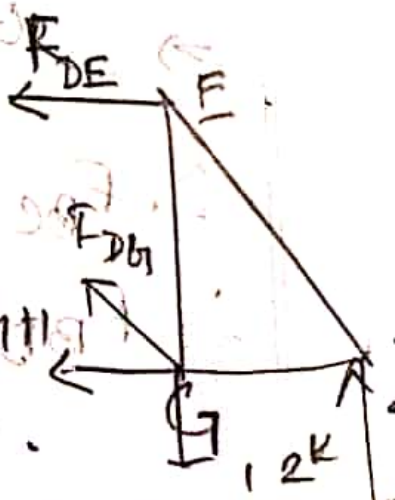
Consider the right portion of section (a-a),

$\Sigma M_G = 0$

$-8 \times R_F - F_{DE} \times 6 = 0$

$\Rightarrow f_{DE} = \frac{-8 \times 15}{6}$

$= -20$ K $= 20$ K (C) (Ans).



$\Sigma F_y = 0.$

$R_F + F_{DG} \sin 36'87^\circ - 12 = 0.$

$\tan\theta = \frac{6}{8}$

$\theta = 36'87^\circ.$

$\Rightarrow F_{DG} = \frac{12 - 15}{\sin 36'87^\circ}.$

$\therefore F_{DG} = -5^K = 5^K (C).$ (Ans)

$\Sigma F_x = 0.$

$- F_{GH} - F_{DE} - F_{DG} \cos 36'87^\circ = 0.$

$\Rightarrow F_{GH} = $ ~~$(20 + 5$~~

$= 20 + 5 \cos 36'87^\circ$

$= 24^K . (T).$ (Ans)