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Section : B

Department : BS civil

Subject : Structural Analysis

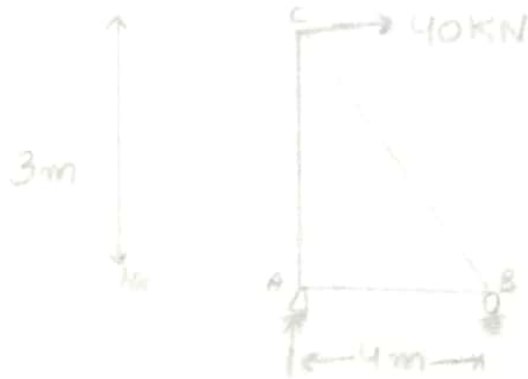
Assignment NO : 02

Submitted To : Engr. Amjed Islam

①

TRUSS ASSIGNMENT

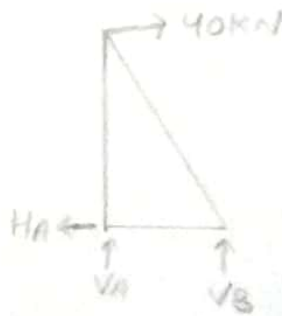
Pb 1:



$$\sum F_x = 0$$

$$-H_A + 40 = 0$$

$$H_A = 40 \text{ kN}$$



$$\sum M_A = 0$$

$$-V_B \times 4 + 40 \times 3 = 0$$

$$V_B = \frac{120}{4}$$

$$V_B = 30 \text{ kN}$$

$$\sum M_B = 0$$

$$V_A \times 4 + 40 \times 3 = 0$$

$$V_A = -30 \text{ kN}$$
 so our assuming direction was wrong

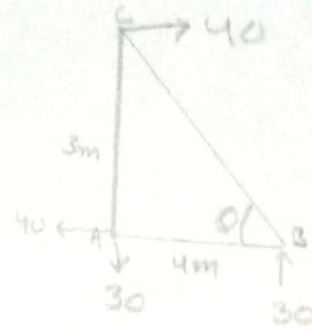
②

For angle Q

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

$$Q = \tan^{-1} \left(\frac{3}{4} \right)$$

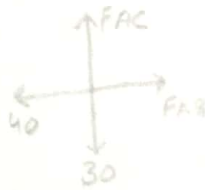
$$Q = 36.87^\circ$$



By joint analysis:-

Consider:-

Joint A:-



$$\sum F_x = 0$$

$$F_{AB} - 40 = 0$$

$$F_{AB} = 40 \text{ KN Tension}$$

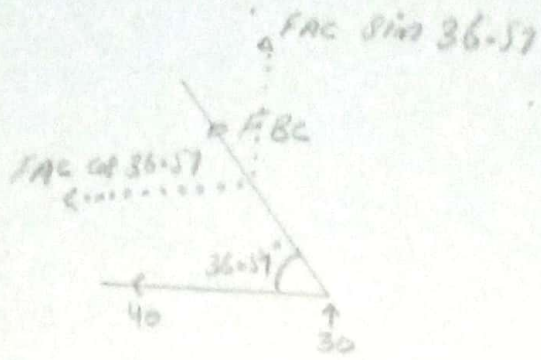
$$\sum F_y = 0$$

$$F_{AC} - 30 = 0$$

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

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Joint B:-



$$\sum F_y = 0$$

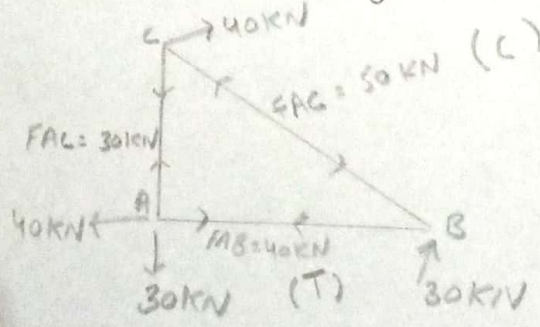
$$30 + F_B \sin 36.87^\circ = 0$$

$$F_{BC} = \frac{-30}{\sin 36.87^\circ}$$

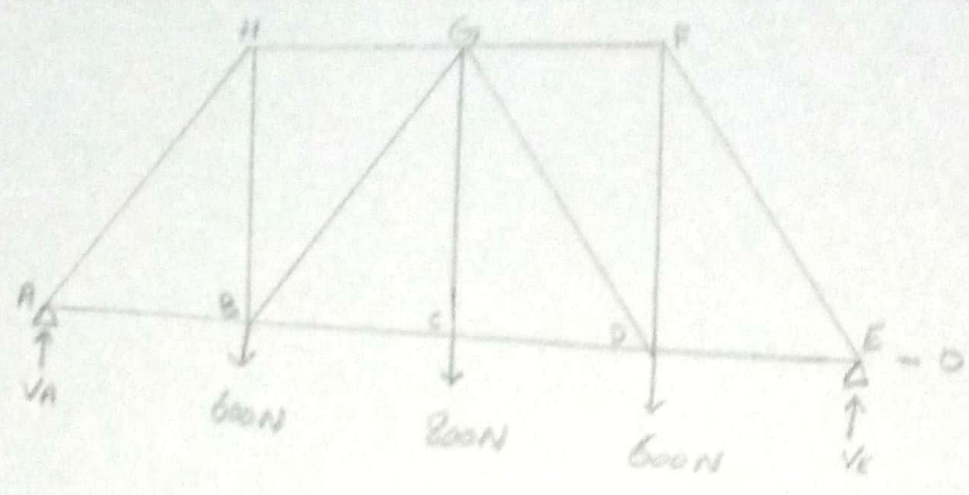
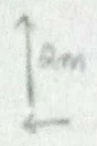
$$F_{BC} = -50 \text{ KN}$$

So our assuming direction was wrong & F_{BC} is compressive force

Final Diagram:-



Pb 2:-



As there is no external horizontal force therefore H_A & H_E is equal to zero.

For V_A & V_E :-

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

$$V_A + V_E - 600 - 800 - 600 = 0$$

$$V_A + V_E = 2000 \text{ N}$$

As truss is symmetrical

$$V_A = V_E$$

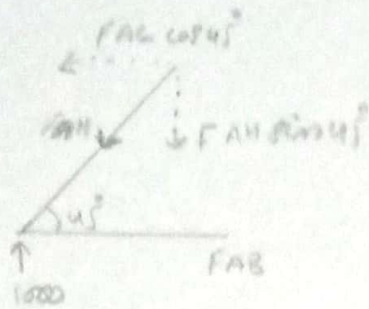
Therefore $2V_A = 2000$

$$V_A = 1000 \text{ N} \quad \& \quad V_E = 1000 \text{ N}$$

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Consider :-

Joint A :-



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

$$1000 - F_{AH} \sin 45^\circ = 0$$

$$F_{AH} = \frac{1000}{\sin 45^\circ}$$

$$F_{AH} = 1414.2 \text{ N (C)} \quad (\text{Compression})$$

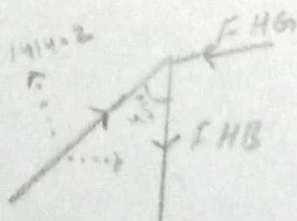
$$\leftarrow \rightarrow \sum F_x = 0$$

$$F_{AB} - F_{AH} \cos 45^\circ = 0$$

$$F_{AB} = 1414.21 \times \cos 45^\circ$$

$$F_{AB} = 1000 \text{ N (T)}$$

Joint H :-



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$$\Rightarrow \sum F_x = 0$$

$$-F_{HG} + 1414.2 \sin 45^\circ = 0$$

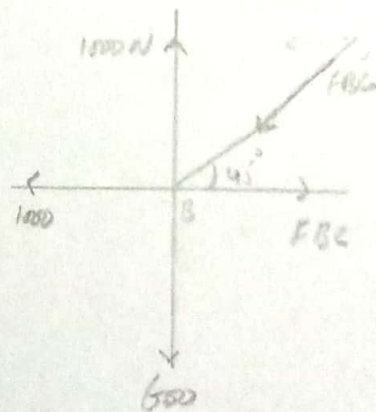
$$F_{HG} = 1000 \text{ N (C)}$$

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

$$F_{HB} - 1414.2 \cos 45^\circ$$

$$F_{HB} = 1000 \text{ N (T)}$$

Joint B



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

$$-600 - F_{BG} \sin 45^\circ + 1000 = 0$$

$$F_{BG} = 565.7 \text{ N (C)}$$

(7)

$$\sum F_x = 0$$

$$F_{BC} - 1000 - 565.7 \cos 45^\circ = 0$$

$$F_{BC} - 1000 - 4000 = 0$$

$$F_{BC} = 14000 \text{ N (T)}$$

Joint C:-

$$\sum F_x = 0$$

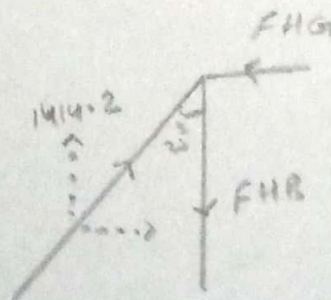
$$F_{CD} = 1400 \text{ N (T)}$$



$$\sum F_y = 0$$

$$F_{CG} = 800 \text{ (T)}$$

Joint H:-



$$\sum F_x = 0$$

$$-F_{HG} + 1414.2 \sin 45^\circ = 0$$

$$F_{HG} = 1000 \text{ N (C)}$$

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$$\uparrow \downarrow \Sigma F_y = 0$$

$$F_{HB} - 1414.2 \cos 45^\circ$$

$$F_{HB} = 1000 \text{ N (T)}$$

Joint B:-

