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ID 7274

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Analysis of statically determinate
Trusses

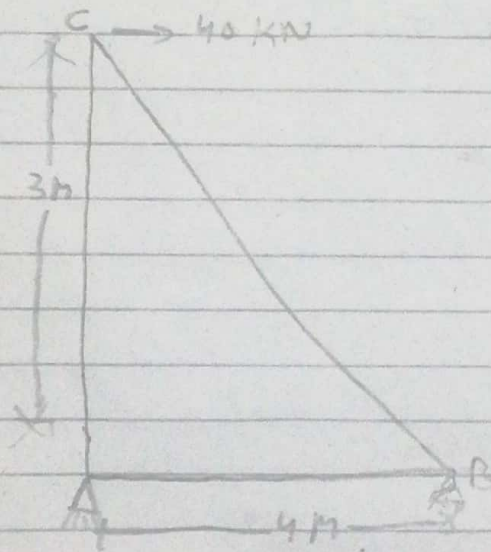
Assignment

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Q1 Determine the force in each member of the truss and state whether it is in tension or compression.

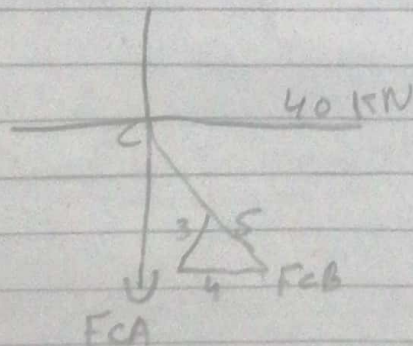
Sol

Give data:



First of all we analyse joint C

So



$$\rightarrow \sum F_x = 0$$

$$40 - F_{CB} \left(\frac{4}{5} \right) = 0$$

$$F_{CB} = 50.0 \text{ kN (C)}$$

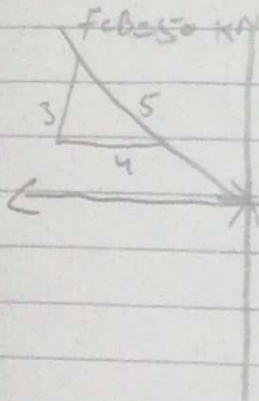
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$$\uparrow \sum F_y = 0$$

$$50 \left(\frac{3}{5} \right) - F_{CA} = 0$$

$$F_{CA} = 30.0 \text{ kN (T)}$$

Now we analyse Joint ③



$$\leftarrow \sum F_x = 0 \quad 50 \left(\frac{4}{5} \right) - F_{BA} = 0$$

$$F_{BA} = 40.0 \text{ kN (T)}$$

$$\uparrow \sum F_y = 0 \quad N_B - 50.0 \left(\frac{3}{5} \right) = 0$$

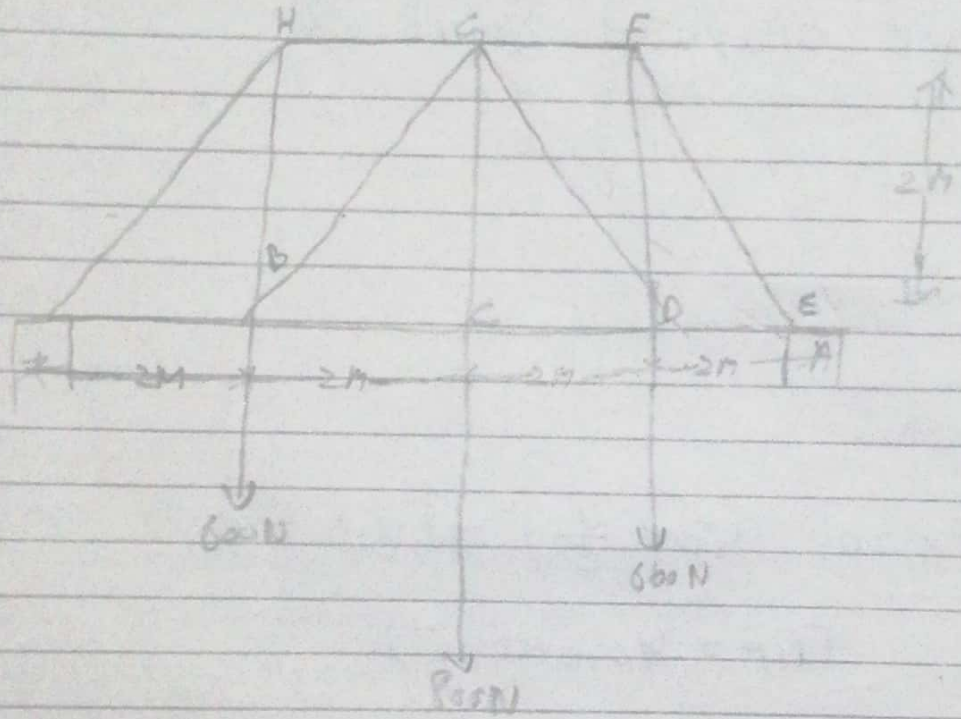
$$N_B = 30.0 \text{ kN}$$

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Q02 Determine the force in each member of the truss.

Sol:

Give data

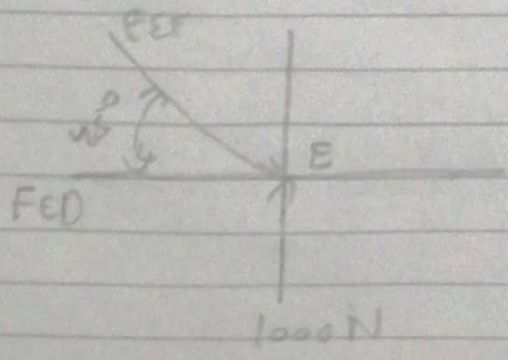


$$\sum \text{EMA} = 0 \quad \sum y (8) - 600(2) - 800(4) - 600$$

$$(6) = 0$$

$$\boxed{E_y = 1000 \text{ N}}$$

Now we analyse joint E



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$$\uparrow \Sigma F_y = 0$$

$$1000 - FEF \sin 45^\circ = 0$$

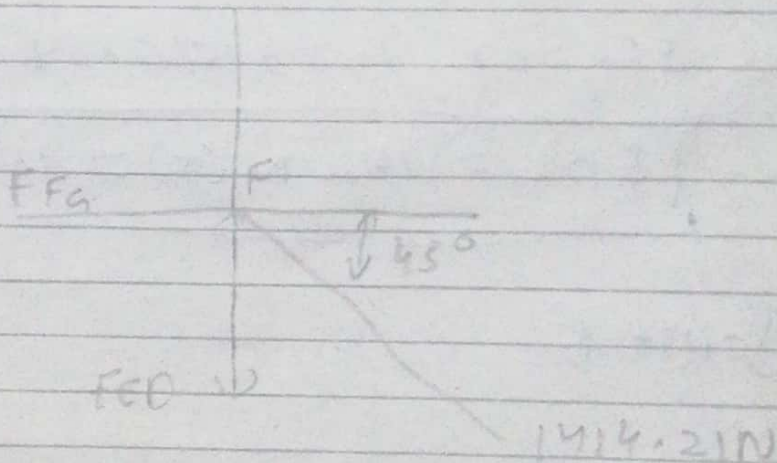
$$FEF = 1414.21 \text{ N (C)} = 1.41 \text{ kN (C)}$$

$$\rightarrow \Sigma F_x = 0$$

$$1414.21 \cos 45^\circ - FED = 0$$

$$FED = 1000 \text{ N (T)} = 1 \text{ kN (T)}$$

Joint (F)



$$\rightarrow \Sigma F_x = 0$$

$$FFG - 1414.21 \cos 45^\circ = 0$$

$$FFG = 1000 \text{ N (C)} = 1 \text{ kN (C)}$$

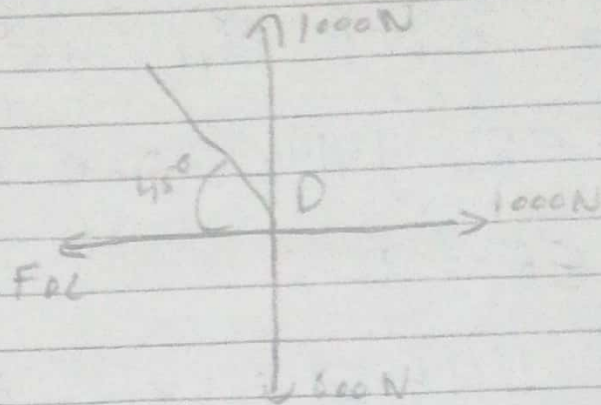
$$\uparrow \Sigma F_y = 0$$

$$1414.21 \sin 45^\circ - FED = 0$$

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$$F_{FD} = 1000 \text{ N (T)} = 1 \text{ kN (T)}$$

Joint D



$$+\uparrow \Sigma F_y = 0?$$

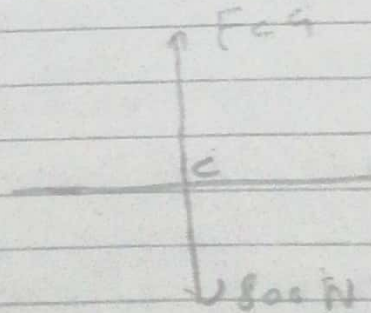
$$1000 - 600 - F_{DC} \sin 45^\circ = 0$$

$$F_{DC} = 565.69 \text{ N (C)} = 566 \text{ N (C)}$$

$$\rightarrow \Sigma F_x = 0? \quad 1000 + 565.69 \cos 45^\circ - F_{DC} = 0$$

$$F_{DC} = 1400 \text{ N (T)} = 1.4 \text{ kN (T)}$$

Joint C



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

$$F_{CD} - 800 = 0$$

$$F_{CD} = 800 \text{ N (T)}$$

Due to symmetry:

$$F_{BC} = F_{DC} = 1.4 \text{ kN (T)}$$

$$F_{HB} = F_{FD} = 1.0 \text{ kN (T)}$$

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$$F_{BG} = F_{DG} = 566 \text{ N (T)}$$

$$F_{HG} = F_{FG} = 1.0 \text{ kW (C)}$$

$$F_{AH} = F_{EH} = 1.41 \text{ kW (C)}$$

$$F_{AB} = F_{ED} = 1.0 \text{ kW (T)}$$