

ID # 7510

Subject # Structural Analysis

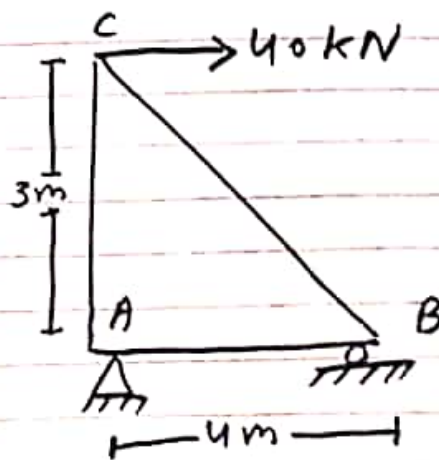
Teacher # Amjad Islam

Q No # 1

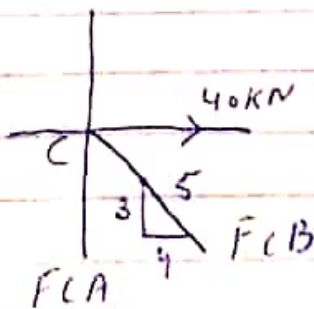
Determine the forces in each member of the truss and state whether it is tension OR compression.

Sol:-

Given data:-



First of all we analyse Joint C So



$$\rightarrow \sum F_x = 0$$

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

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

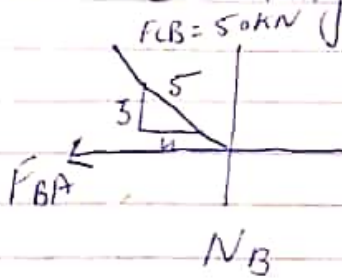
2

$$+\uparrow \cdot \sum F_y = 0$$

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

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

Now we analyse Joint (B)



$$+\rightarrow \sum F_x = 0$$

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

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

$$+\uparrow \sum F_y = 0$$

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

$$N_B = 30$$

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

Ans



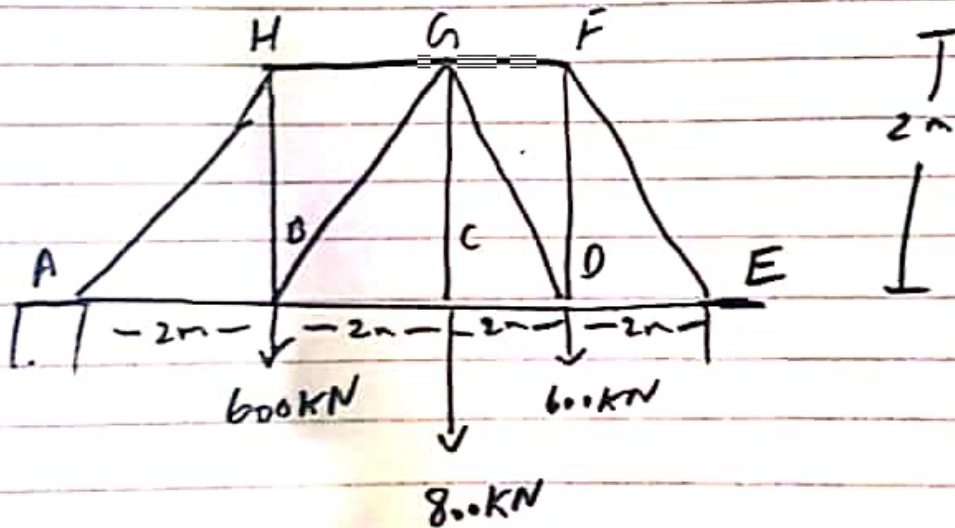
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QUSTN # 2

Determine the forces in each member of the truss. indicate if the member are in tension OR compression. Assume all member are pin connected.

Sol:-

Given data:-

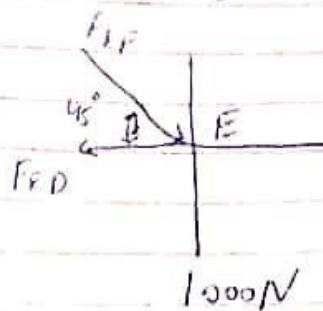


$$\sum M_A = 0 \quad \sum Y (8) - 600(1) - 800(4) - 600(6) = 0$$

$$\sum Y = 1000 \text{ N}$$

4

Now we analyse Joint (E)



$$+\uparrow \sum F_y = 0 ;$$

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

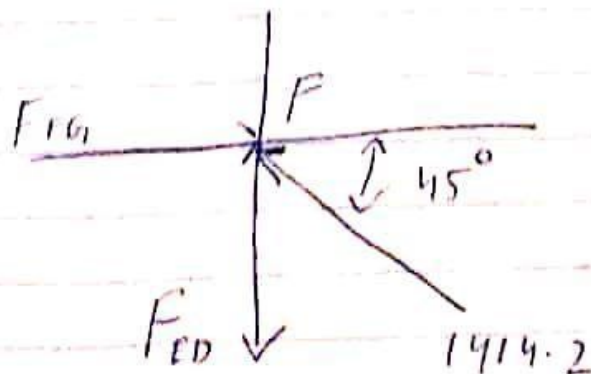
$$F_{EF} = 1414.21 \text{ N (C)} = 1.41 \text{ kN (C)}$$

$$\rightarrow \sum F_x = 0 ;$$

$$1414.21 \cos 45^\circ - F_{ED} = 0$$

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

Joint (F)



(5)

$$\rightarrow \sum F_x = 0;$$

$$F_{FD} - 1414.21 \cos 45^\circ = 0$$

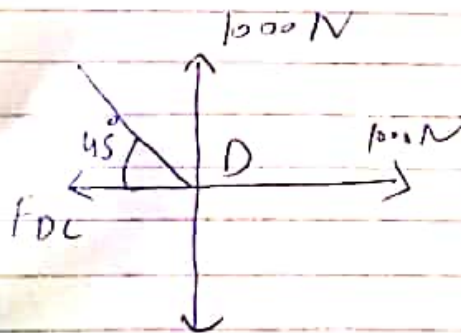
$$\boxed{F_{FD} = 1000 \text{ N (C)} = 1 \text{ kN (C)}}$$

$$\uparrow \sum F_y = 0;$$

$$1414.21 \sin 45^\circ - F_{FD} = 0$$

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

Joint (D)



$$\uparrow \sum F_y = 0$$

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

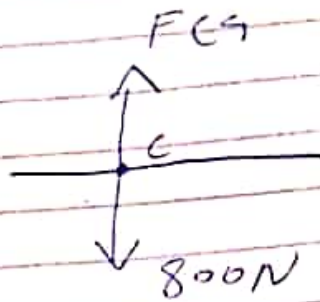
$$\boxed{F_{DG} = 565.69 \text{ N (C)} = 566 \text{ N (C)}}$$

$$\rightarrow \sum F_x = 0; \quad 1000 + 565.69 \cos 45^\circ$$

$$- F_{DC} = 0$$

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

Joint C



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

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

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

Due to symmetry:

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

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

$$F_{BCG} = F_{DCG} = 566 \text{ N (T)}$$

$$F_{HCG} = F_{HCG} = 1.0 \text{ kN (C)}$$

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

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