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Section : A

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Subject : Structure I

Assignment : 02

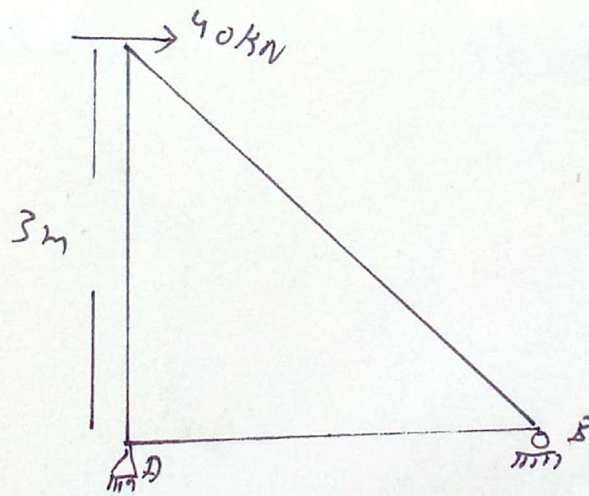
Date : 11 July 2020

Question No 1

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

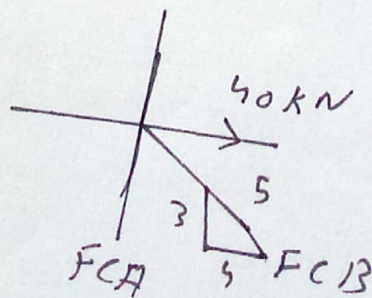
Solution

Given that



First of all we analysis joint C

So,



$$\rightarrow \{ F_x = 0$$

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

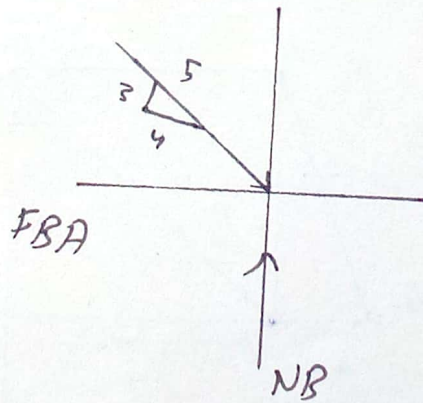
$$F_{CB} = 50.0 \text{ kN (T)}$$

$$+\uparrow \{ F_y = 0$$

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

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

Now we analyse joint (B)



$$\rightarrow \{ F_x = 0$$

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

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

$$+\uparrow \sum E_y = 0$$

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

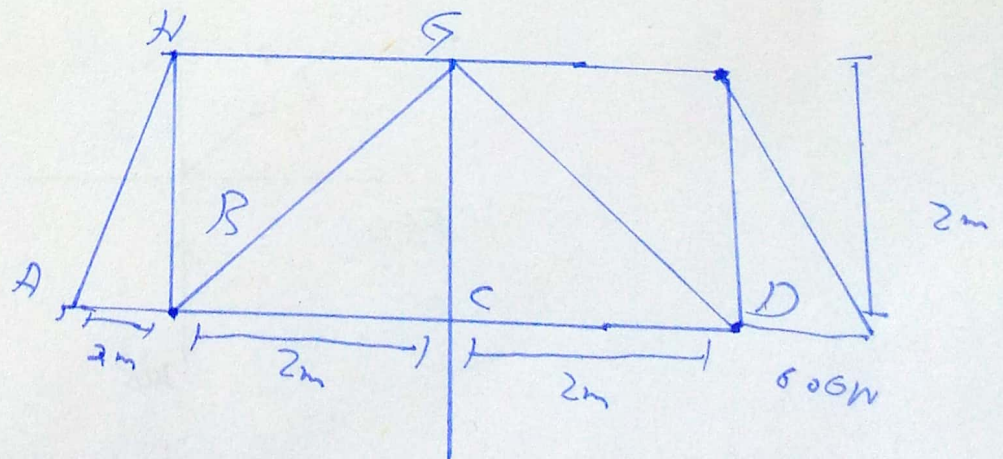
$$N_B = 30.0 \text{ kN.}$$

Question # 02

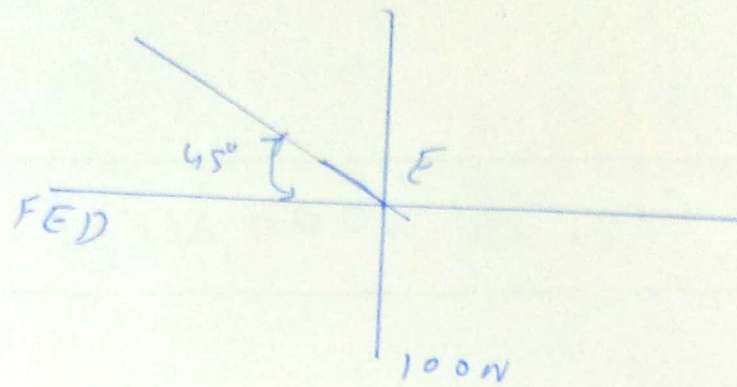
Determine the force in each member of the truss. Indicate if the member are in tension or compression. Assume all members are pin connected.

Solution,

Given that:



Now we analyse Joint (E)



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

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

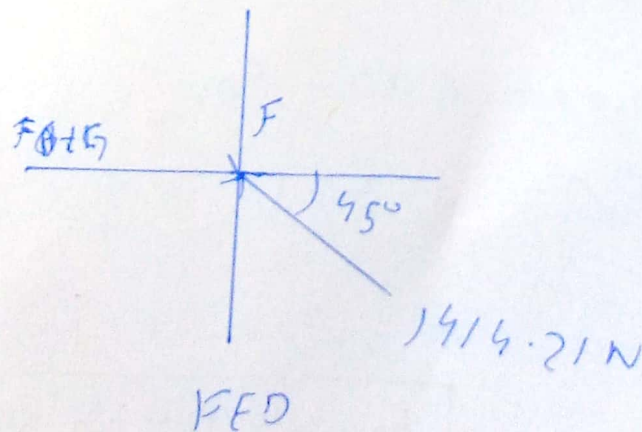
$$F_{EF} = 1414.21 \text{ N (C)} = 1.41 \text{ kN (C)}$$

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

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

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

Joint B (F)



$$\rightarrow \{ \sum F_x = 0$$

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

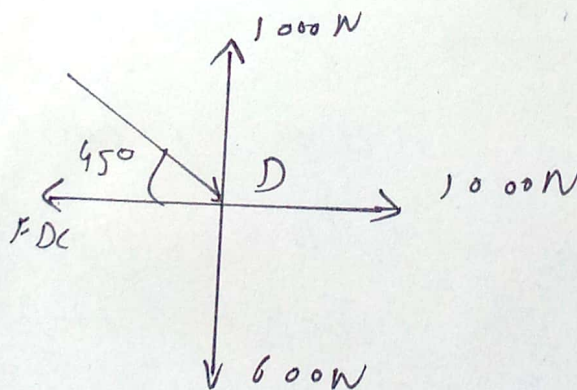
$$F_{FG} = 1000 \text{ N (C)} = 1 \text{ kN (C)}$$

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

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

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

Joint ①



$$\uparrow \sum F_y = 0$$

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

$$F_{DG} = 565.59 \text{ N (C)} = 566 \text{ N (C)}$$

$$\rightarrow \{ \sum F_x = 0; \quad 1000 + 565.59 \cos 45^\circ - F_{DC} = 0$$

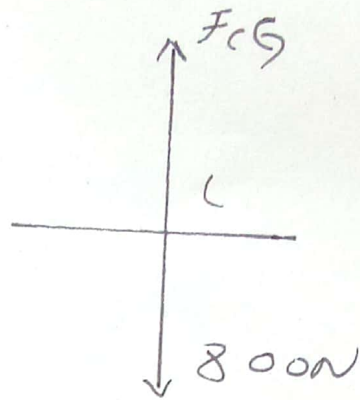
$$F_{DC} = (1400 \text{ N (T)}) = 1.4 \text{ kN (T)}$$

Joint (C)

$$\uparrow \sum F_y = 0$$

$$F_{CG} - 700 = 0$$

$$F_{CG} = 700 \text{ N (T)}$$



Due to Symmetry

$$F_{BC} = F_{DC} = (-4 \text{ kN (T)})$$

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

$$F_{BG} = F_{DG} = 5.66 \text{ N (T)}$$

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

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

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