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Section "B"

Fourth semester

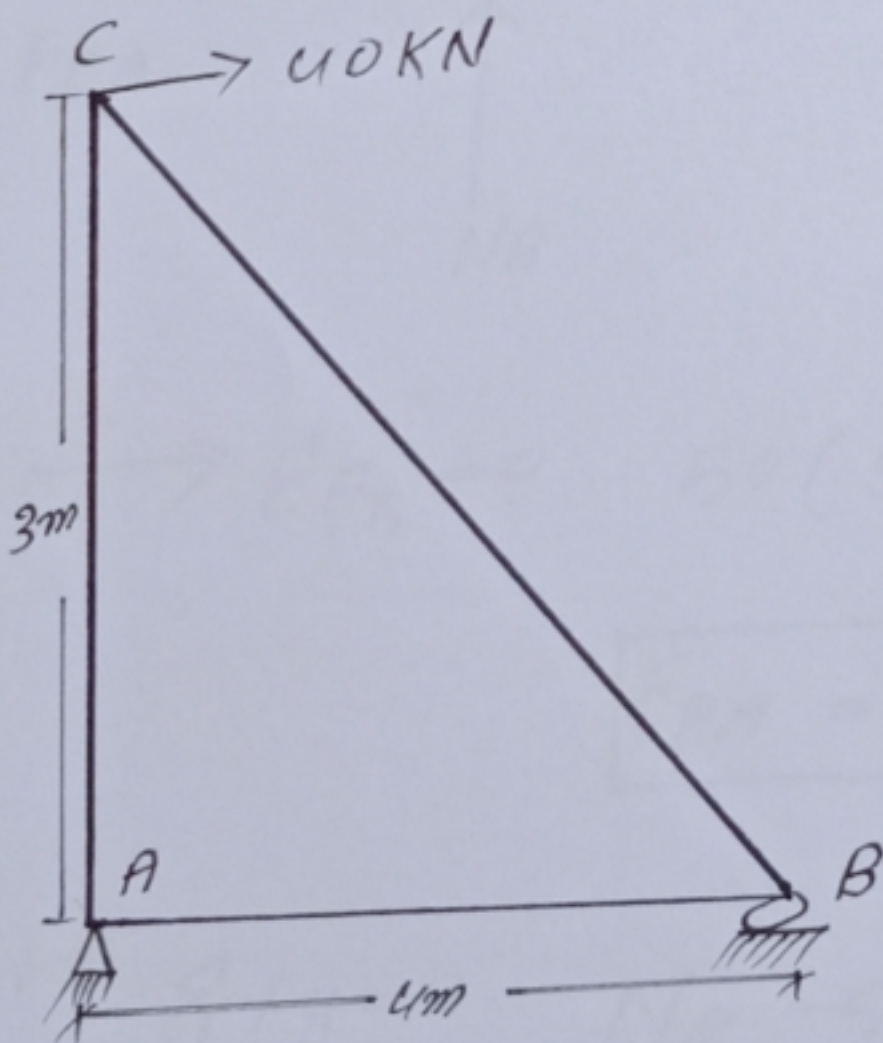
Subject: Structural analysis I

Instructor: Sir Amjad Islam

Department of Civil Engineering

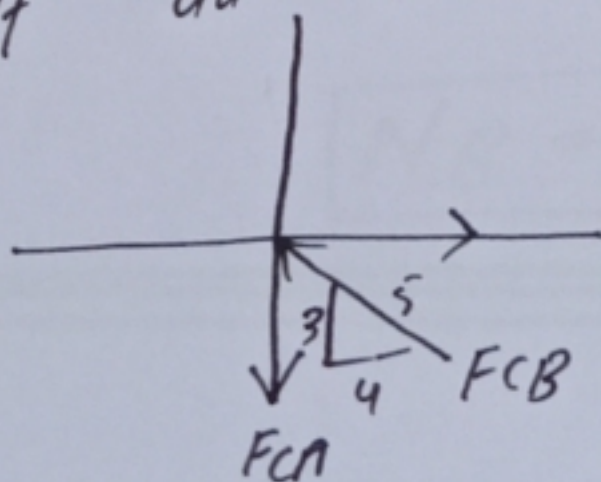
Q No # 01 :: Determine the force in each member of the truss and state whether it is in tension or compression.

Solution :-
Given that :-



First of all we analyse joint (C)

So



$$\sum F_x = 0$$

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

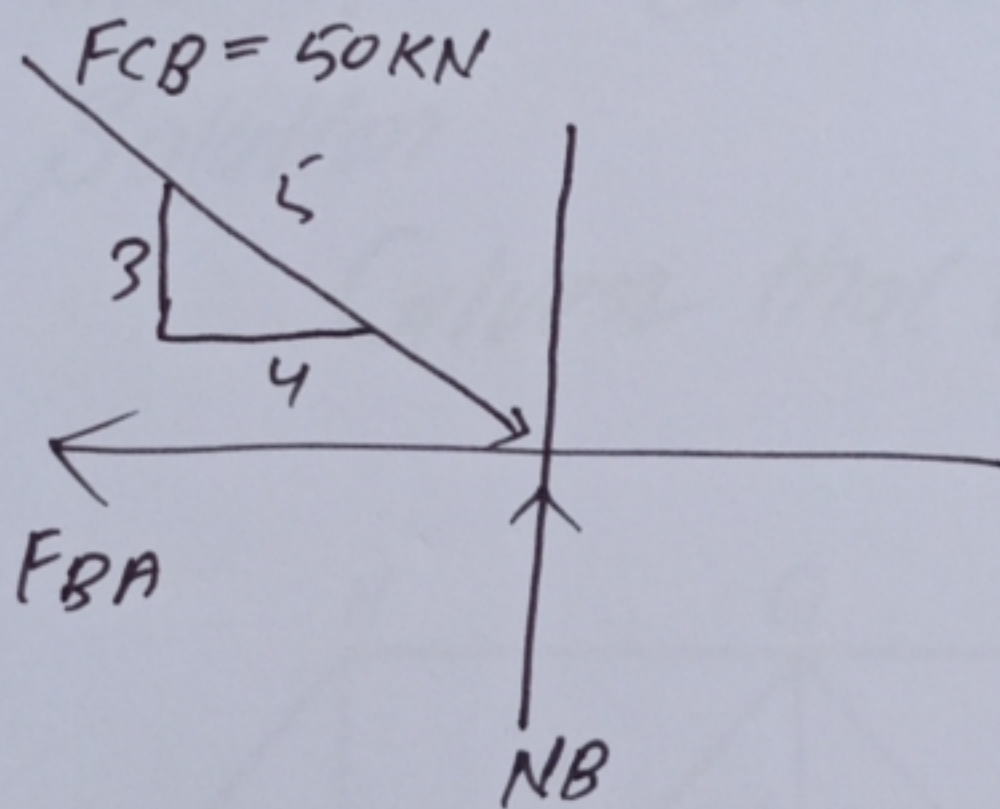
$$F_{CB} = 50.0 \text{ kN (C)}$$

(2)

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

$$50 \left(\frac{3}{5} \right) - F_{CA} = 0 \quad \boxed{F_{CA} = 30.0 \text{ kN (T)}}$$

Now we analyse joint (B)



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

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

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

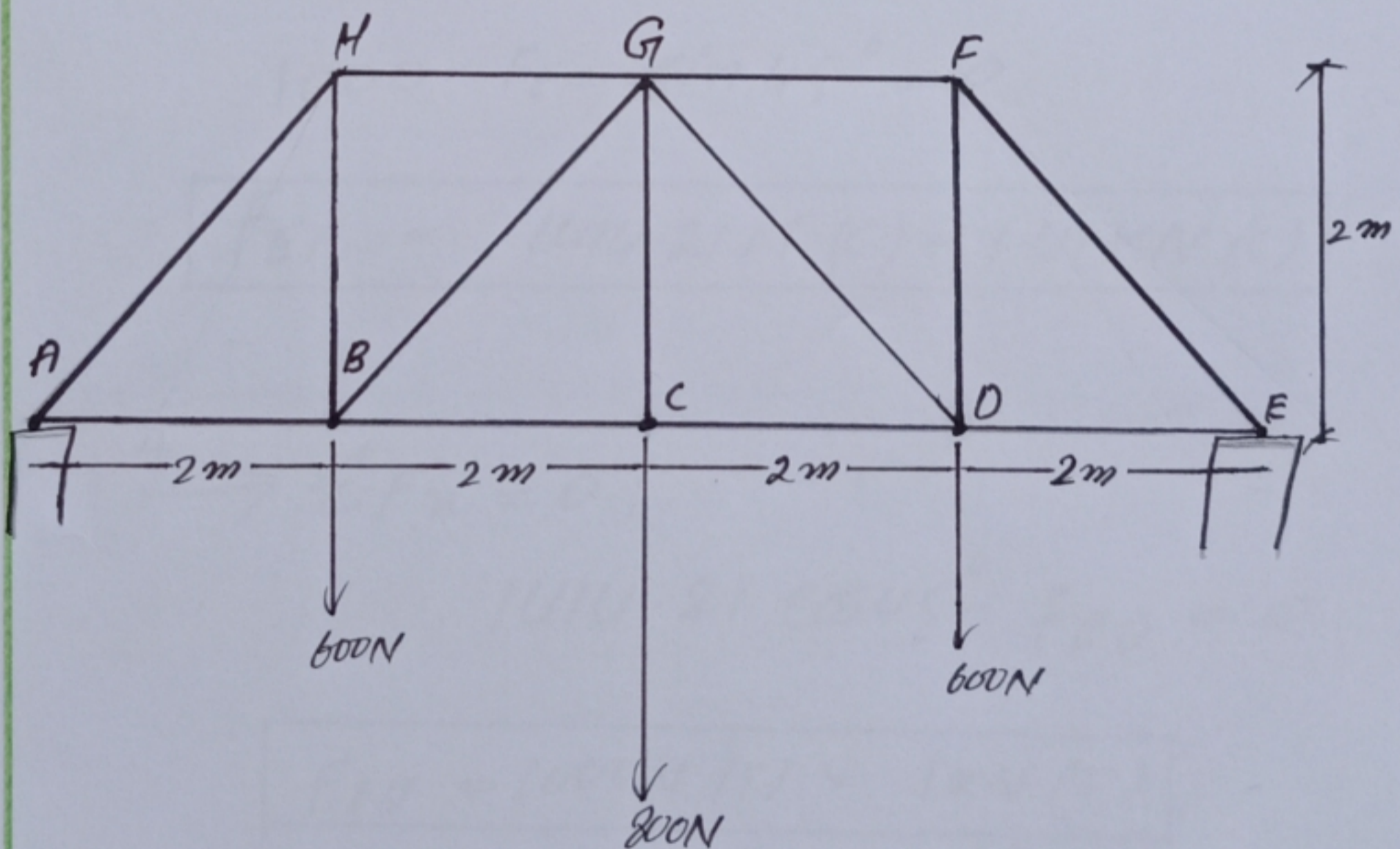
$$\boxed{N_B = 30.0 \text{ kN}}$$

③

Q No #02 Determine the force in each member of the truss. Indicate if the member is in tension or compression. Assume all members are pin connected.

Solution

Given that :-

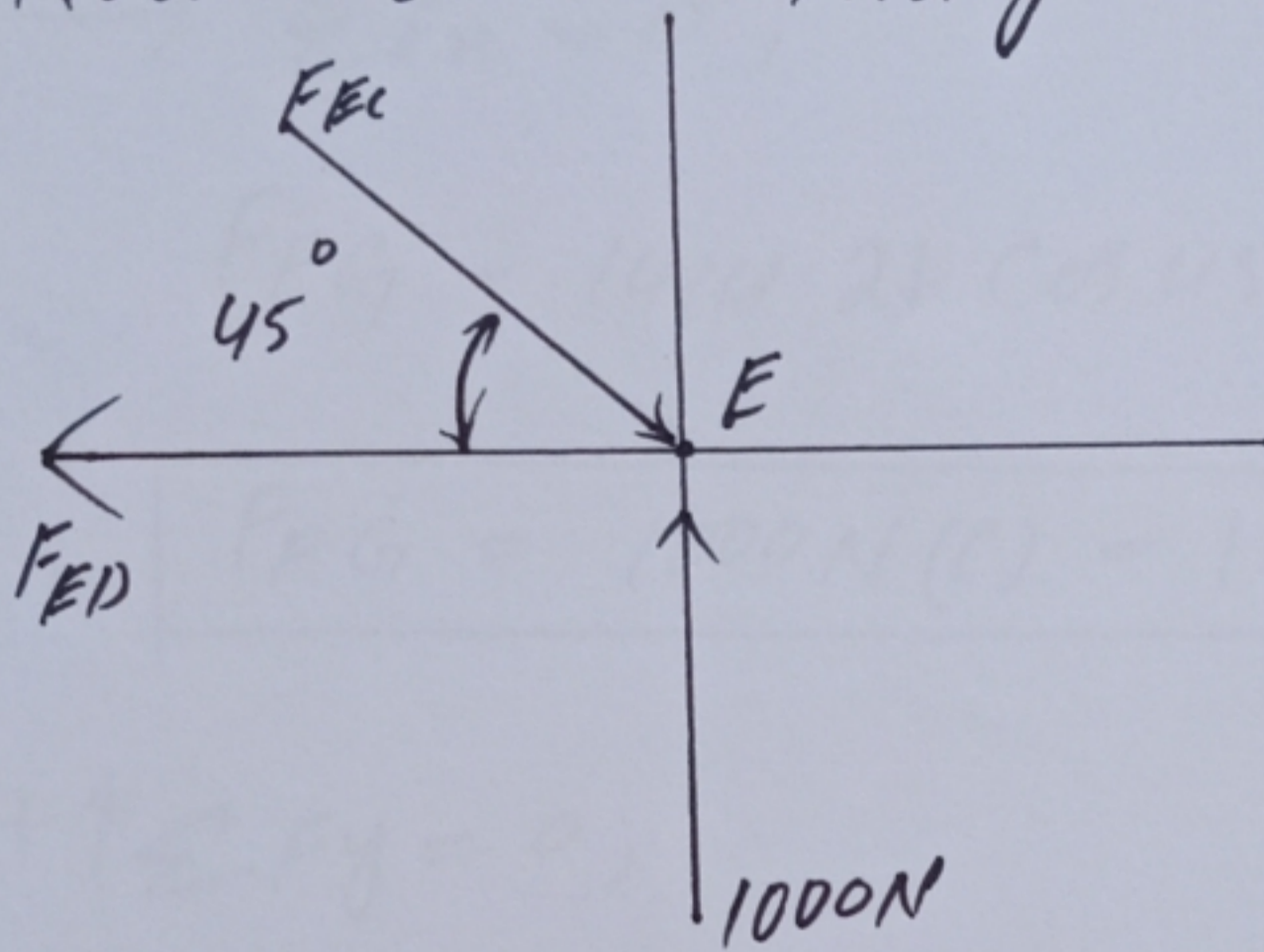


$$\sum M_A = 0 \quad E_y(8) - 600(2) - 800(4) - 600(6) = 0$$

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

(4)

NOW we analyse joint (E)



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

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

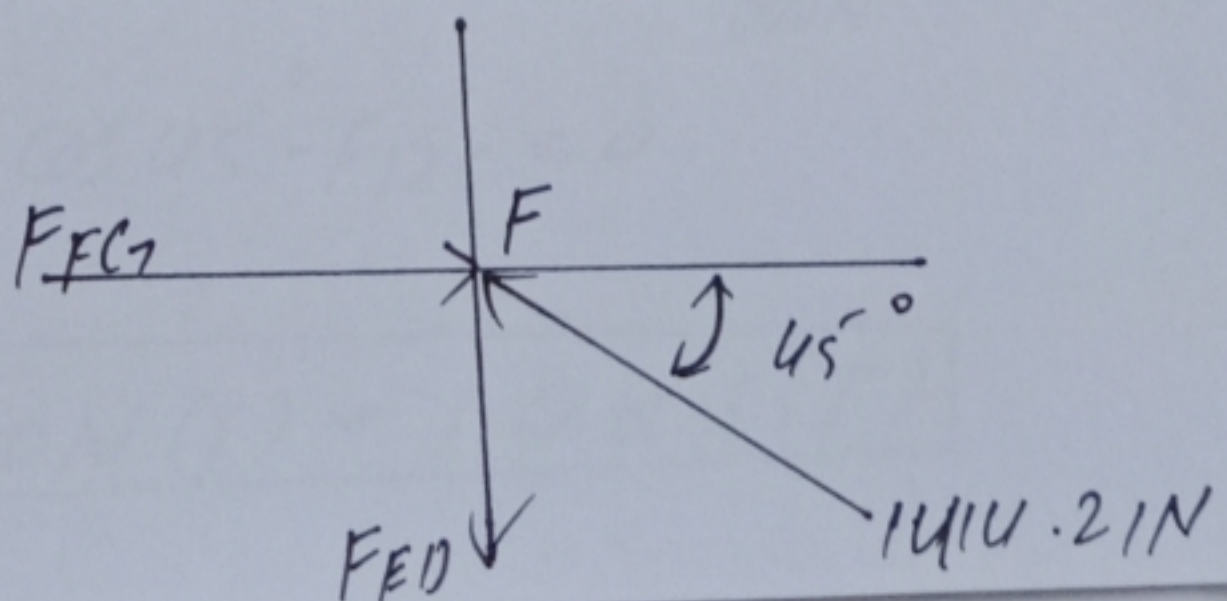
$$F_{EC} = 1414.21 \text{ N (C)} = 1.41 \text{ kN (C)}$$

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

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

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

Joint (F)



6)

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

$$F_{FG} - 1414 \cdot 21 \cos 45^\circ = 0$$

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

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

$$1414 \cdot 21 \sin 45^\circ - F_{FD} = 0$$

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

Joint (D)

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

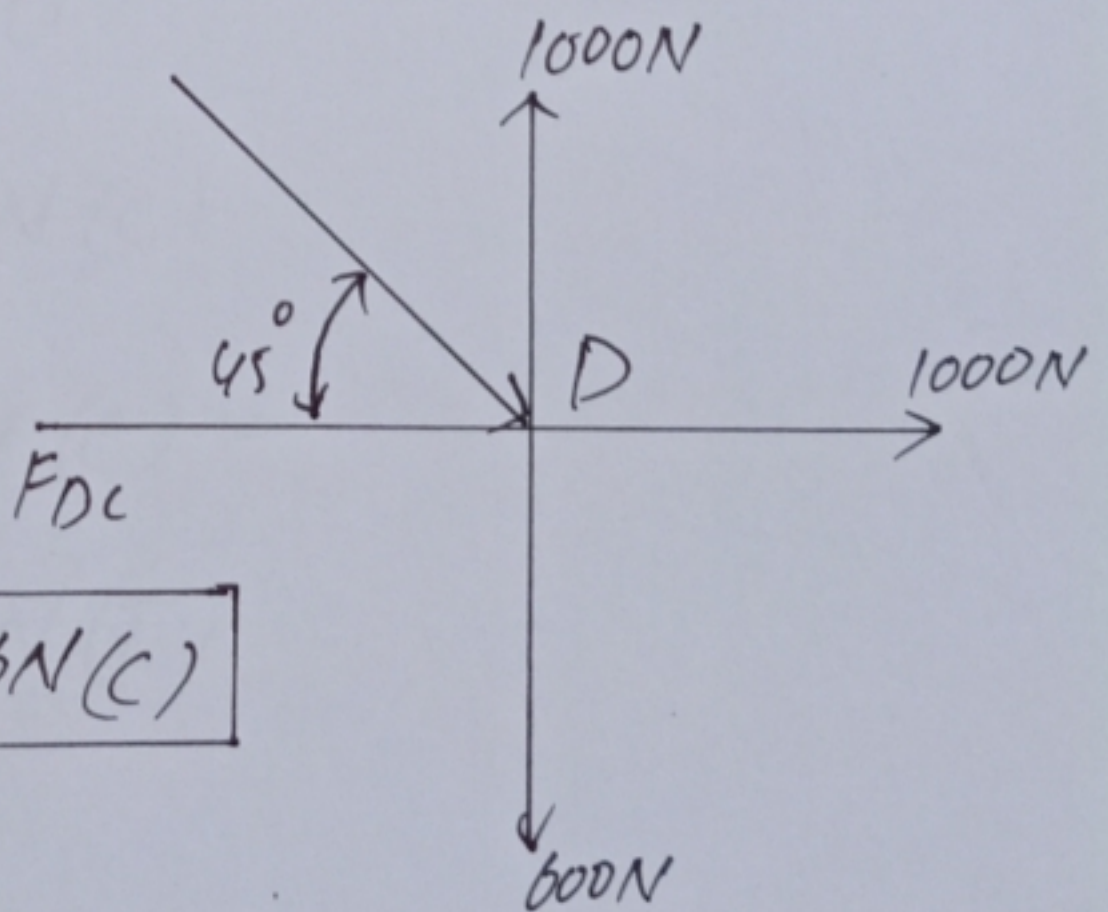
$$1000 - 600 - F_{DG} \sin 45^\circ = 0$$

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

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

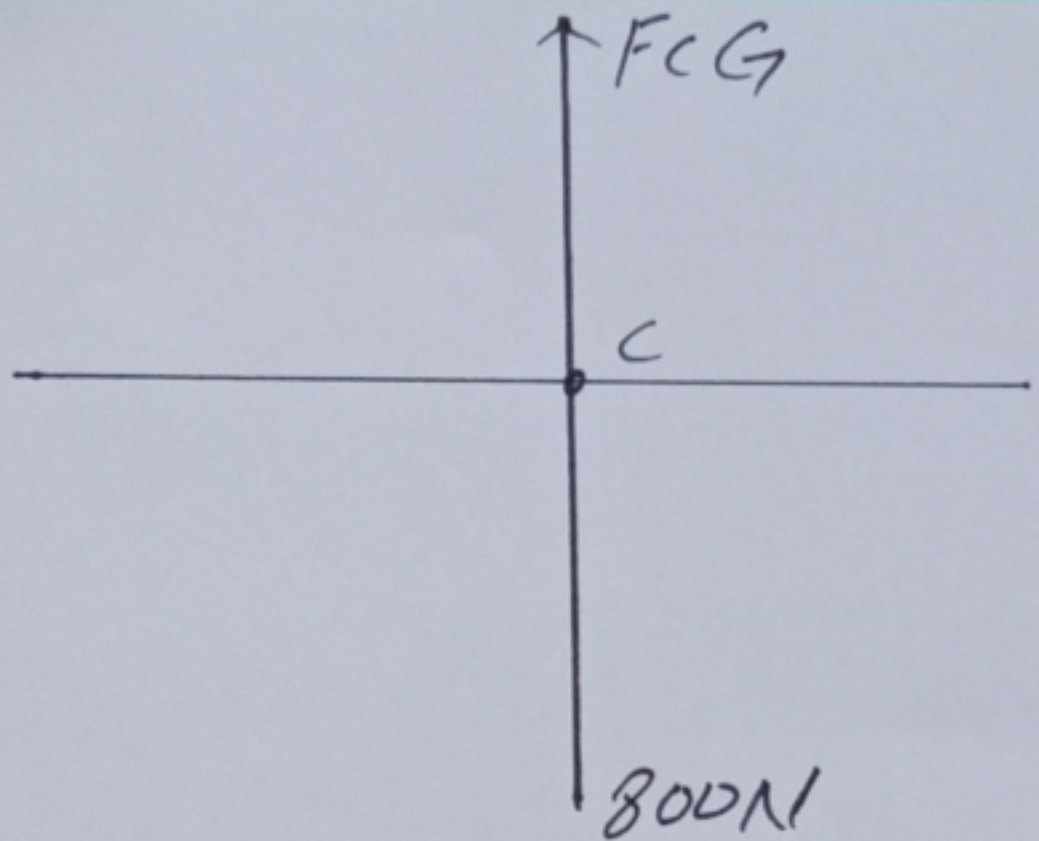
$$1000 + 565.69 \cos 45^\circ - F_{DC} = 0$$

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



6

Joint (C)



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

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

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

Due to the symmetry:

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

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

$$F_{BG} = F_{DG} = 500 \text{ N (T)}$$

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

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

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