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ID And Section: A (7985)

Subject: Structural Analysis

Assignment # 02

Date: 11 July 2020

Sir Amjad Islam

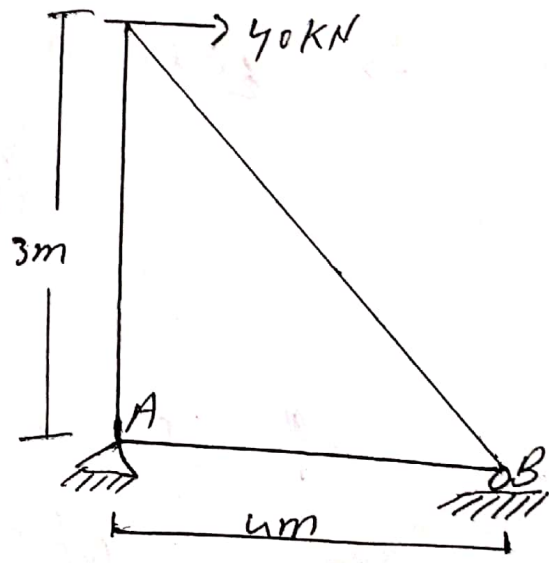
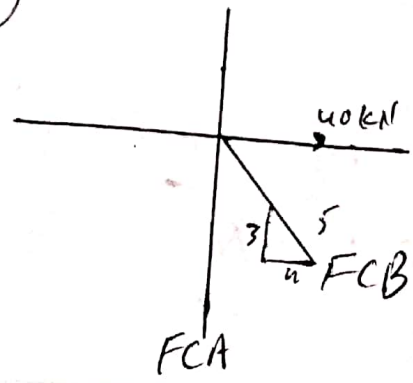
Q# 01

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 analysis joint C

So



(2)

$$\rightarrow \sum F_x = 0$$

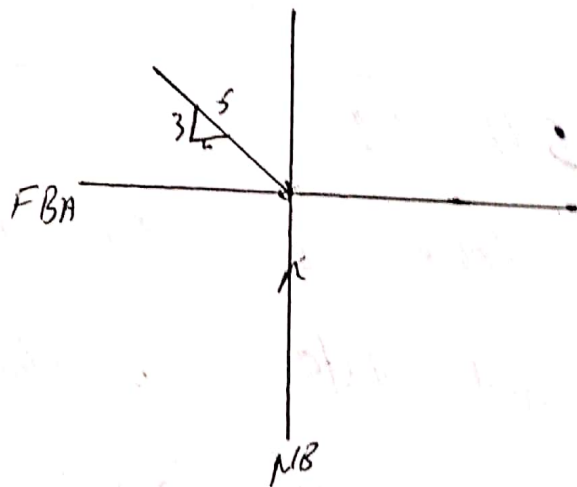
$$40 - F_{CB} \left( \frac{4}{5} \right) = 0$$

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

$$\uparrow \sum F_y = 0$$

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

Now we analysis joint (B)



$$\rightarrow \sum F_x = 0$$

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

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

$$\uparrow \sum F_y = 0$$

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

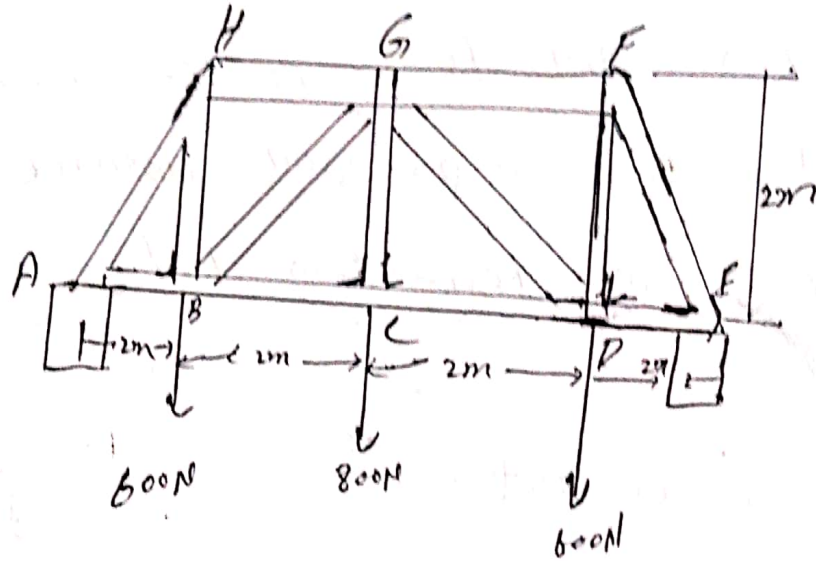
$$N_B = 30.0 \text{ kN}$$

Q#2: Determine the force in each member of the truss. Indicate if the members are in tension or compression. Assume all members are pin-connected.

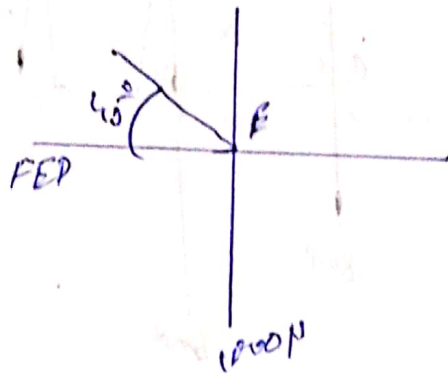
Solution :

(4)

Given that



Now we analyse Joint (E)



$$\sum F_y = 0$$

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

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

$$\sum F_x = 0$$

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

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

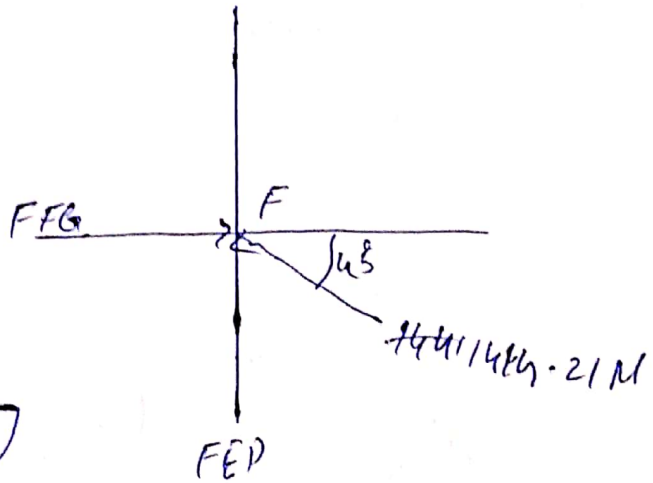
(8)

Joint (F)

$$\rightarrow \sum F_x = 0$$

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

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



$$\uparrow \sum F_y = 0$$

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

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

Joint (D)

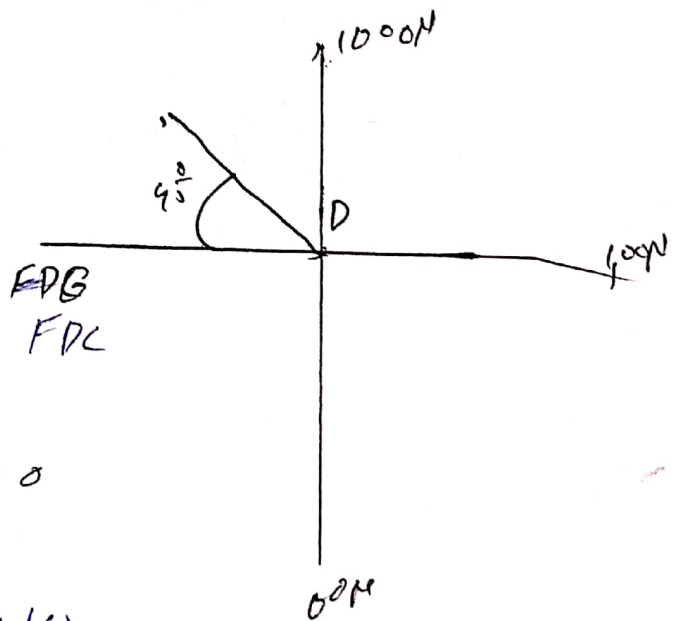
$$\uparrow \sum F_y = 0$$

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

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

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

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

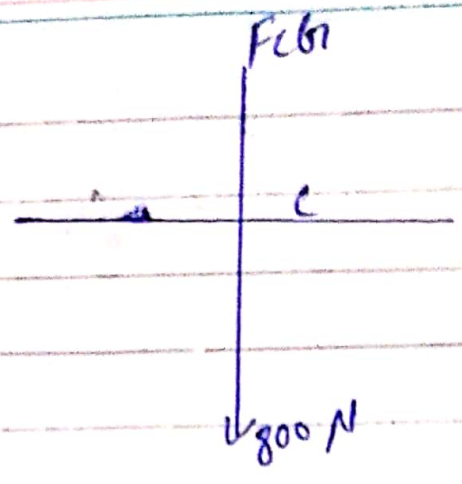


(b)

$$+\vee \sum F_y = 0$$

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

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



Due to symmetry

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

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

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

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

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

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



The End :.