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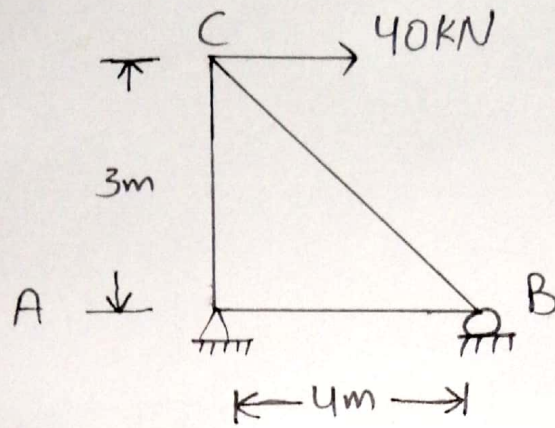
Semester : 12 (Batch-14)

Assignment : "02" Trusses

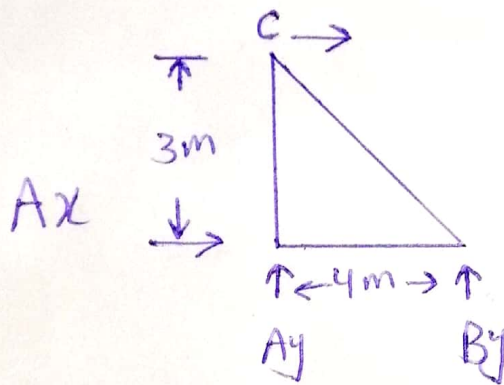
section : A

Submitted To : Engr. Amjad Islam

Q # 01.



Sol: Free body diagram.



$$\sum M_A = 0$$

$$B_y \times 4 - 40 \times 3 = 0$$

$$B_y \times 4 = 40 \times 3$$

$$4B_y = 120 \Rightarrow B_y = \frac{120}{4} = 30 \text{ kN}$$

$$\sum F_y = 0$$

$$A_y + B_y = 0$$

$$A_y = -B_y = -30 \text{ kN}$$

Now forces in horizontal direction.

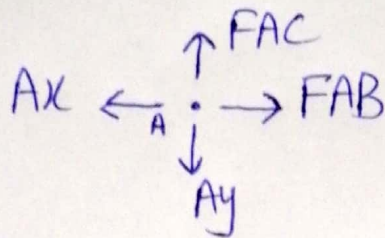
$$\sum F_x = 0$$

$$A_x + 40 = 0$$

$$A_x = -40 \text{ kN}$$

consider Joint A.





$$\sum F_x = 0$$

$$F_{AB} + A_x = 0$$

$$F_{AB} = -A_x$$

$$F_{AB} = -(-40) = 40 \text{ kN (T)}$$

consider  $\sum F_y = 0$

Force acting in vertical direction.

$$\sum F_y = 0$$

$$A_y + F_{AC} = 0$$

$$F_{AC} = -A_y$$

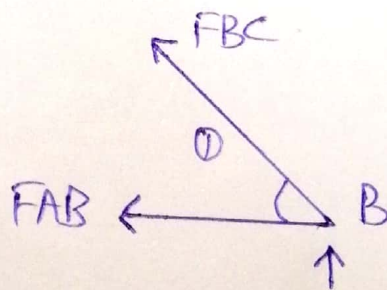
$$F_{AC} = -(-30 \text{ kN}) = 30 \text{ kN} \text{ --- } \textcircled{1} \text{ Tension}$$

consider Joint (B)

calculate angle

$$\tan(\theta) = 3/4$$

$$\theta = \tan^{-1}(3/4) = 36.86^\circ$$



considering forces acting along vertical direction.

$$B_y + F_{BC} \sin 36.86 = 0$$

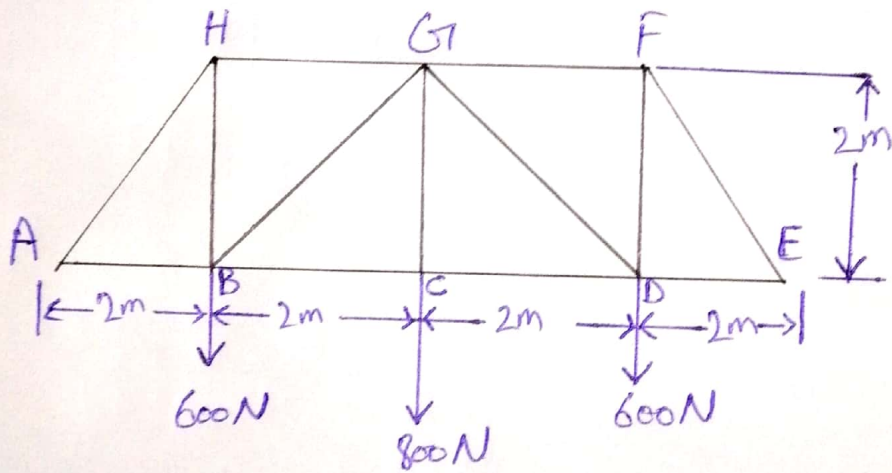
$$F_{BC} = -B_y / \sin 36.86 = -30 / \sin 36.86$$

$$= 50 \text{ kN (C)}$$

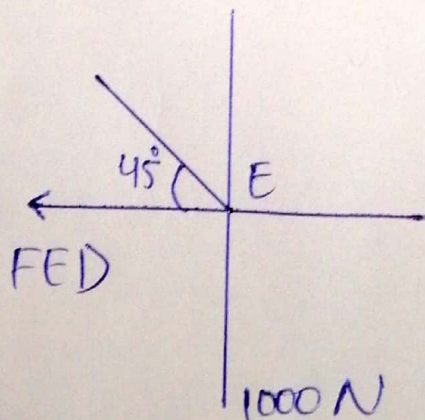
Member AB = 40 kN (T)  
 Member AC = 30 kN (T)  
 Member BC = 50 kN (C)

X ————— X ————— X ————— X

Q2:-



Now we analyse Joint (E)



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

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

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

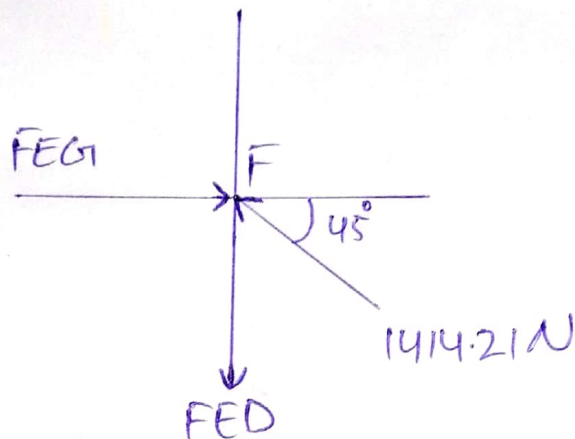


$$\rightarrow \sum F_x = 0$$

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

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

Joint (F)



$$\rightarrow \sum F_x = 0$$

$$FEG1 - 1414.21 \cos 45^\circ = 0$$

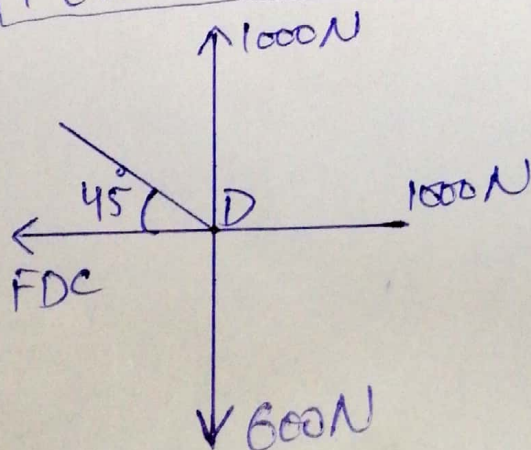
$$FEG1 = 1000 \text{ N (C)} = 1 \text{ kN (C)}$$

$$\uparrow \sum F_y = 0$$

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

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

Joint (D)



$$\uparrow \Sigma F_y = 0$$

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

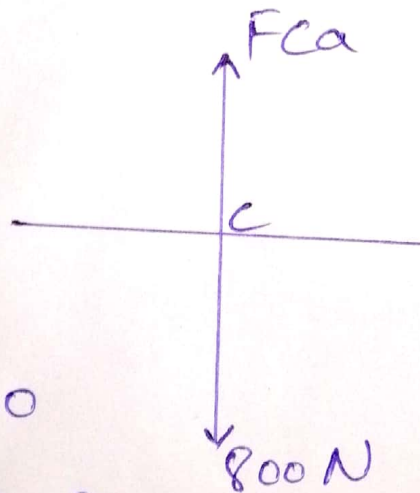
$$F_{DG} = 565.69 \text{ N (C)} = 560 \text{ N (C)}$$

$$\rightarrow \Sigma F_x = 0$$

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

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

Joint (c)



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

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

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

Due to symmetry

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

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

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

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

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

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