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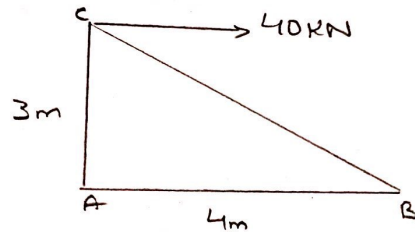
Subject Structural Analysis I

Teacher Engr. Amjad Islam

Assignment Tusses

Q1

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



Solution:-

Joint C:-

$$\rightarrow \sum F_x = 0$$

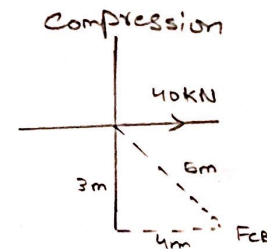
$$40 - F_{CB} \left(\frac{4}{5}\right) = 0$$

$$F_{CB} = 50 \text{ kN}$$

$$\uparrow \sum F_y = 0$$

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

$$F_{CA} = 30 \text{ kN (Tension)}$$



Joint B:-

$$\rightarrow F_x = 0$$

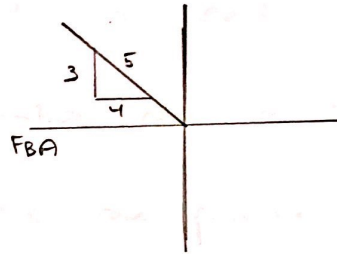
$$50 \left(\frac{4}{5}\right) - F_{BA} = 0$$

$$F_{BA} = 40 \text{ kN (Tension)}$$

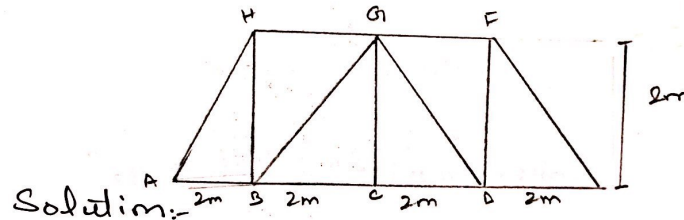
$$+\uparrow \sum f_y = 0$$

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

$$N_B = 30 \text{ kN}$$



Q2 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:-

Find reactions:-

$$\sum M_A = 0 \quad \curvearrowright$$

$$0 = (2 \times 6000) + (4 \times 8000) + (6 \times 6000) - R_E \times 8$$

$$8R_E = 8000$$

$$R_E = \frac{8000}{8} = 1000 \text{ N}$$

As we know that

$$R_A + R_B = 2000 \text{ N}$$

$$R_A + 1000 = 2000 \text{ N}$$

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

Joint E:

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

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

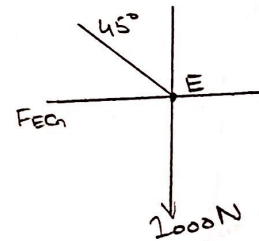
$$0.707 F_{EF} = 1000$$

$$F_{EF} = 1414.42 \text{ (compression)}$$

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

$$1414.42 \cos 45 - F_{ED} = 0$$

$$F_{ED} = 1000.14 \text{ N (Tension)}$$



Joint F:

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

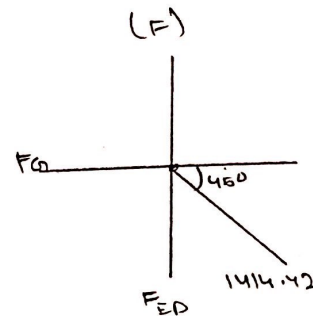
$$F_{FG} - 1414.42 \cos 45 = 0$$

$$F_{FG} = 1000.14 \text{ N (compression)}$$

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

$$1414.42 \sin 45 - F_{ED} = 0$$

$$F_{ED} = 1000.14 \text{ N (Tension)}$$



Joint D

$$\uparrow \sum F_y = 0$$

$$2000 - 600 - F_{DG} \sin 45 = 0$$

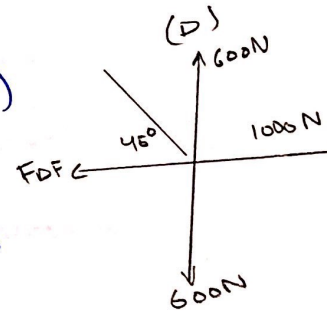
$$F_{DG} = 565.77 \text{ N (compression)}$$

$$\rightarrow \sum F_x = 0$$

$$2000 + 565.77 \cos 45 - F_{DC} = 0$$

$$1400 = F_{DC}$$

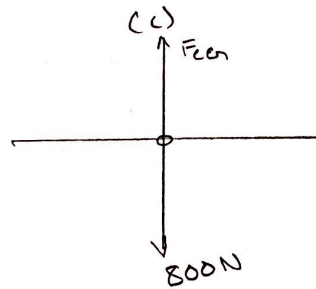
$$F_{DC} = 1400 \text{ N}$$



JOINT C:-

$$\uparrow \sum F_y = 0$$

$$F_{CG} - 800 = 0 = F_{CG} = 800 \text{ N (Tension)}$$



Due to Symmetry

$$F_{BC} = F_{CB} = 1400 \text{ N (Tension)}$$

$$F_{HB} = F_{BH} = 1000.14 \text{ N (Tension)}$$

$$F_{SG} = F_{GS} = 565.77 \text{ N (Tension)}$$

$$F_{HG} = F_{GH} = 1000.14 \text{ N (Compression)}$$



$$F_{AH} = F_{HA} = 1414.42 \text{ N (Compression)}$$

$$F_{AB} = F_{BA} = 1000.42 \text{ N (Tension)}$$