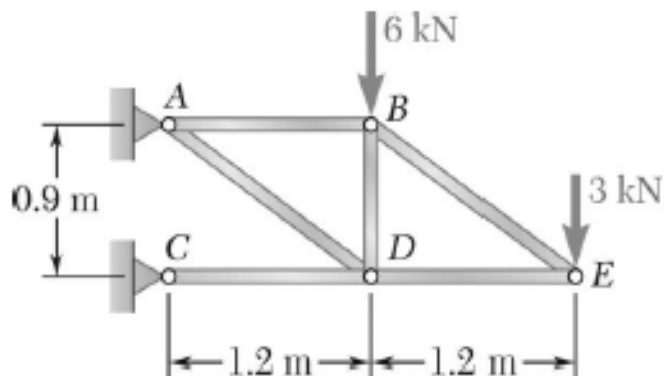


## ES 221 MECHANICS I (STATICS) RECITATION VII

Q1)

Using the method of joints, determine the force in each member of the truss shown. State whether each member is in tension or compression.

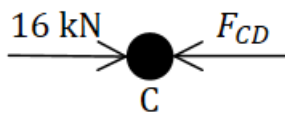
**Answer to Q1**

$$\circlearrowleft \sum M_A = 0$$

$$-6 \text{ kN} \times 1.2 \text{ m} - 3 \text{ kN} \times 2.4 \text{ m} + C_x \times 0.9 \text{ m} = 0$$

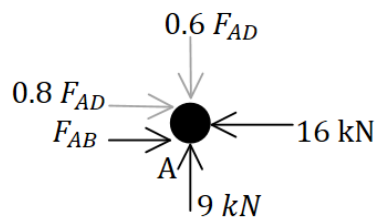
$$C_x = 16 \text{ kN} \rightarrow$$

$$A_x = 16 \text{ kN} \leftarrow, A_y = 9 \text{ kN} \uparrow$$

Joint C:

$$F_{CD} = 16 \text{ kN (C)}$$

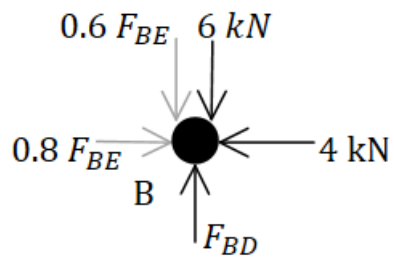
Joint A:



$$F_{AD} = 15 \text{ kN (T)}$$

$$F_{AB} = 4 \text{ kN (T)}$$

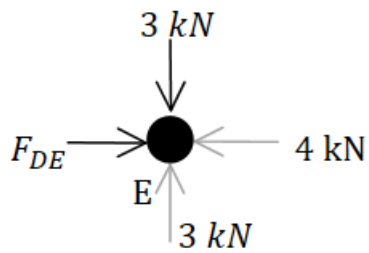
Joint B:



$$F_{BE} = 5 \text{ kN (T)}$$

$$F_{BD} = 9 \text{ kN (C)}$$

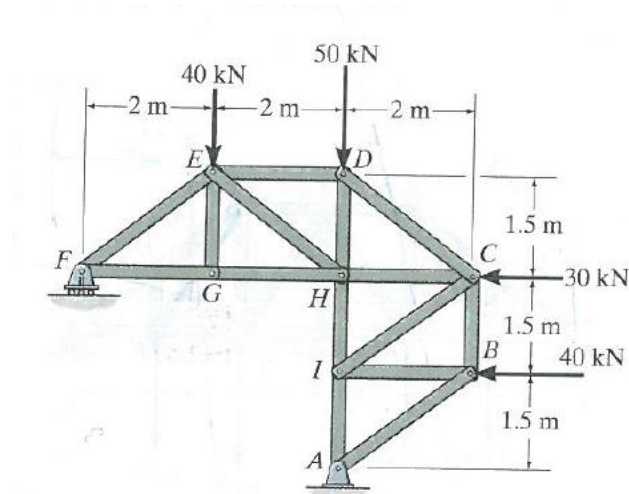
Joint E:



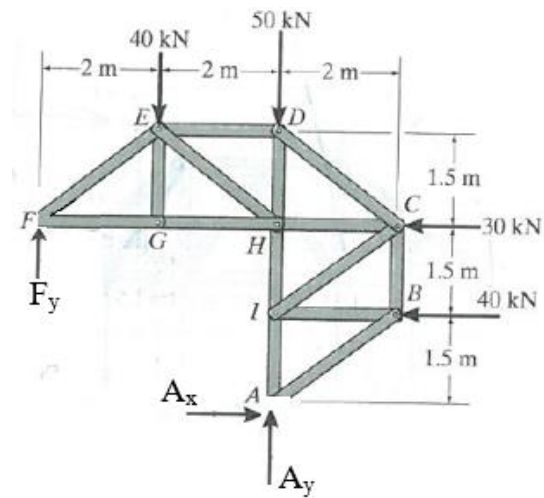
$$F_{DE} = 4 \text{ kN (C)}$$

Q2)

Determine the force in members ED, EH and GH of the truss and state if the members are in tension or compression.



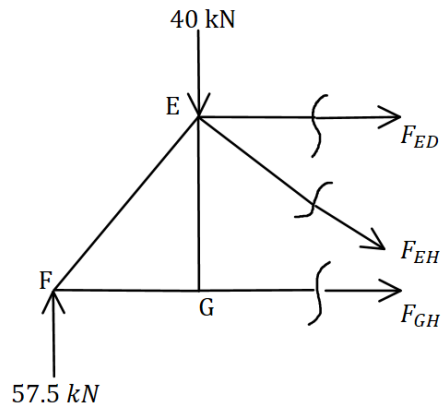
**Answer to Q2**



$$\sum M_A = 0$$

$$40 \text{ kN} \times 2 \text{ m} + 30 \text{ kN} \times 3 \text{ m} + 40 \text{ kN} \times 1.5 \text{ m} - F_y \times 4 \text{ m} = 0$$

$$F_y = 57.5 \text{ kN} \uparrow$$



$$\circlearrowleft \sum M_H = 0$$

$$-57.5 \text{ kN} \times 4 \text{ m} + 40 \text{ kN} \times 2 \text{ m} - F_{ED} \times 1.5 \text{ m} = 0$$

$$F_{ED} = -100 \text{ kN}$$

$$F_{ED} = 100 \text{ kN (C)}$$

$$\circlearrowleft \sum M_E = 0$$

$$-57.5 \text{ kN} \times 2 \text{ m} + F_{GH} \times 1.5 \text{ m} = 0$$

$$F_{GH} = 76.7 \text{ kN (T)}$$

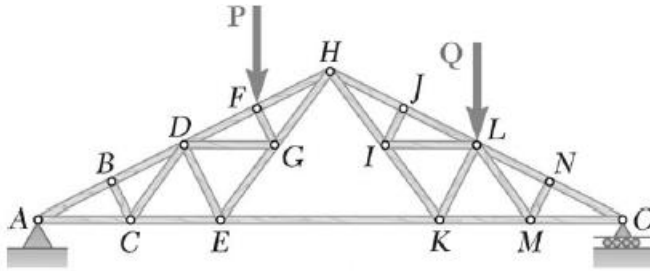
$$\uparrow \sum F_y = 0$$

$$57.5 \text{ kN} - 40 \text{ kN} - F_{EH} \times 0.6 = 0$$

$$F_{EH} = 29.2 \text{ kN (T)}$$

Q3)

For the given loading, determine the zero-force members in the truss shown.



$$F_{BC} = F_{CD} = F_{MN} = F_{LM} = F_{IJ} = F_{IL} = 0$$

The zero-force members: **BC, CD, MN, LM, IJ, IL**