

NAME:

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ID:

7395

SUBJECT:

STRUCTURAL ANALYSIS

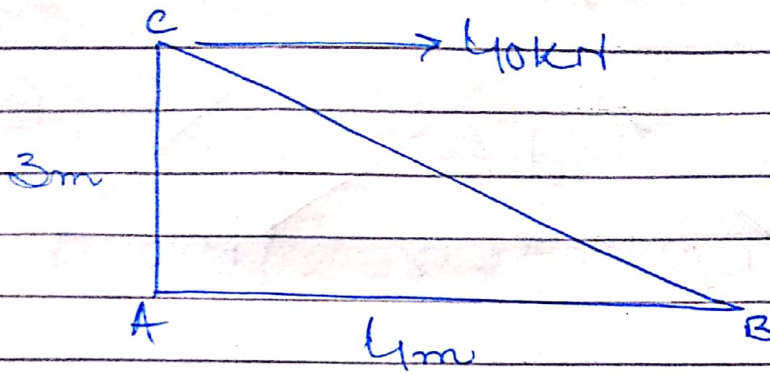
INSTRUCTOR:

SIR ANJAD-ISLAM

DATE:

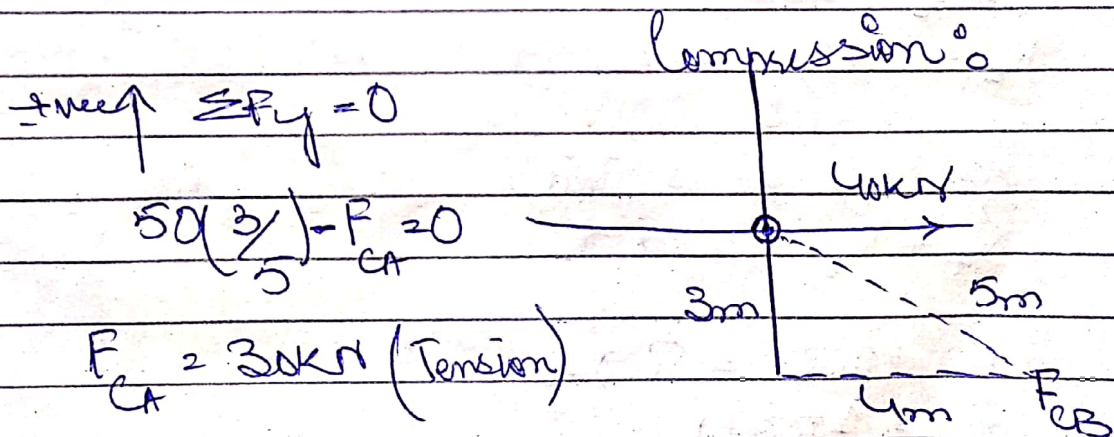
11th - July - 2020

Question No 1:



Ans
 First we will start from joint C

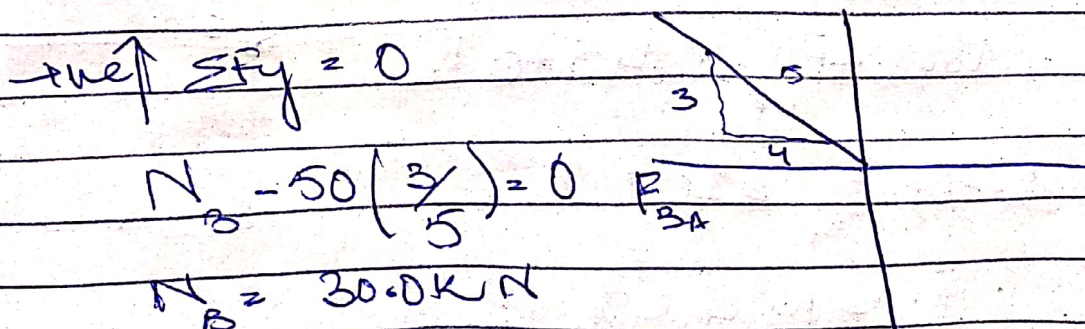
$$\begin{aligned} \text{+ve} \rightarrow \sum F_x &= 0 \\ 40 - F_{CB} \left(\frac{4}{5}\right) &= 0 \\ F_{CB} &= 50 \text{ kN} \end{aligned}$$



$$\begin{aligned} \text{+ve} \uparrow \sum F_y &= 0 \\ 50 \left(\frac{3}{5}\right) - F_{CA} &= 0 \\ F_{CA} &= 30 \text{ kN (Tension)} \end{aligned}$$

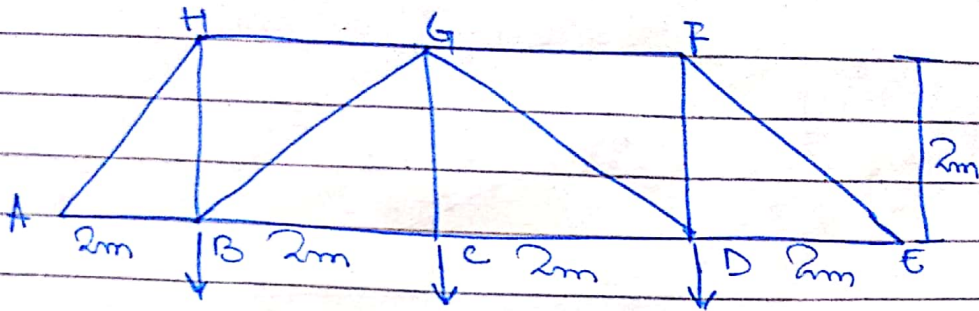
Now joint B

$$\begin{aligned} \text{+ve} \rightarrow \sum F_x &= 0; \quad 50 \left(\frac{4}{5}\right) - F_{BA} = 0 \\ F_{BA} &= 40 \text{ kN (Tension)} \end{aligned}$$



$$\begin{aligned} \text{+ve} \uparrow \sum F_y &= 0 \\ N_B - 50 \left(\frac{3}{5}\right) &= 0 \\ N_B &= 30 \text{ kN} \end{aligned}$$

Question No 2:



Sol:

Now finding reactions

$$\sum M_A = 0 \quad \left. \begin{array}{l} \rightarrow +ve \\ \leftarrow -ve \end{array} \right\}$$

$$0 = (2 \times 600) + (4 \times 800) + (6 \times 600) - R_E \times 8$$

$$8R_E = 8000$$

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

As we know that,

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

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

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

Joint E:

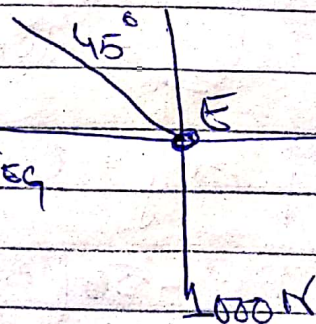
First we will start from joint E

$$\uparrow \sum F_y = 0$$

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

$$0.707 F_{EF} = 1000$$

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



$$\rightarrow +ve, \sum F_m = 0$$

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

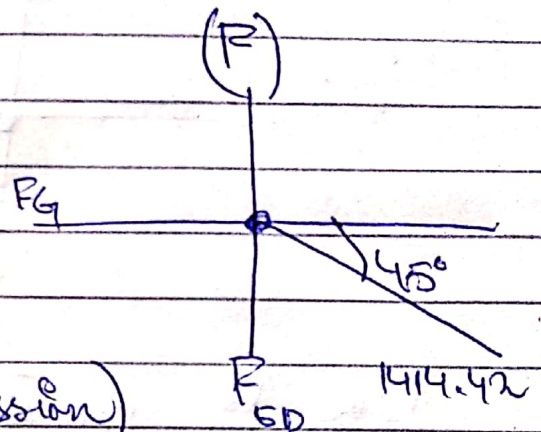
$$F_{ED} = 1000.14 \text{ N (Tension)}$$

Joint F:

$$\rightarrow +ve, \sum F_m = 0$$

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

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



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

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

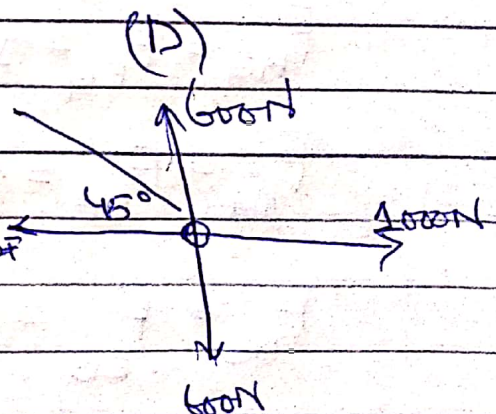
$$F_{ED} = 1000.14 \text{ N (Tension)}$$

Joint D:

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

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

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



$$\rightarrow +ve, \sum F_m = 0$$

$$1000 + 565.77 \cos 45^\circ - F_{DC} = 0$$

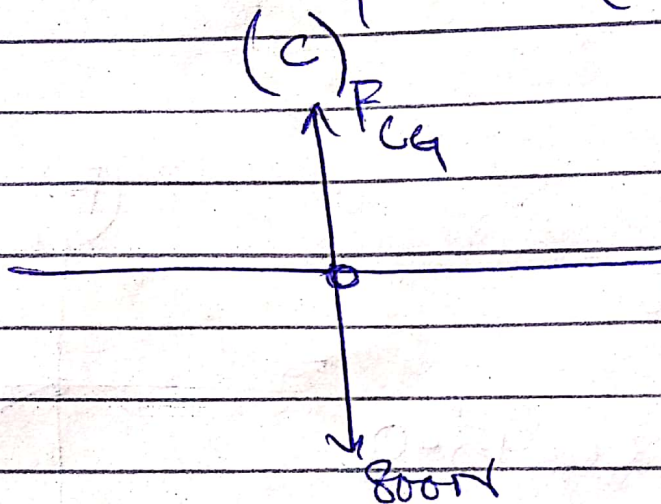
$$1400 = F_{DC}$$

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

Joint C:

$$\sum F_y = 0$$

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



Due to symmetry

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

$$F_{HB} = F_{FD} = 1000 \cdot 14 \text{ N (Tension)}$$

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

$$F_{HG} = F_{FG} = 1000 \cdot 14 \text{ N (Compression)}$$

$$F_{AH} = F_{EF} = 14 \cdot 14.42 \text{ (compression)}$$

$$F_{AB} = F_{ED} = 1000 \cdot 14.42 \text{ N (Tension)}$$