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Subject : Structure Analysis

Assignment : 01

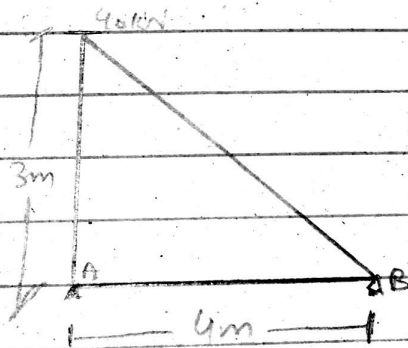
Submitted to: Engr Amjad  
Aslam

Q No: 1

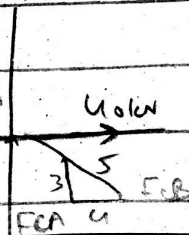
Determine the force in each member of the truss and state whether it is in tension or compression.

Sol:

Given that



First of all we will analyze joint C so



$$\rightarrow \sum F_x = 0$$

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

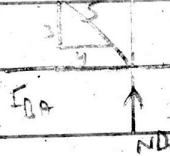
$$F_{CB} = 50.0 \text{ kN (C)}$$

$$\uparrow \sum F_y = 0$$

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

$$F_{CA} = 30.0 \text{ kN (T)}$$

Now we analysis Joint CB)



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

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

$$+\uparrow \sum F_v = 0 \quad N_B - 50.0 \left(\frac{3}{5}\right) = 0$$

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

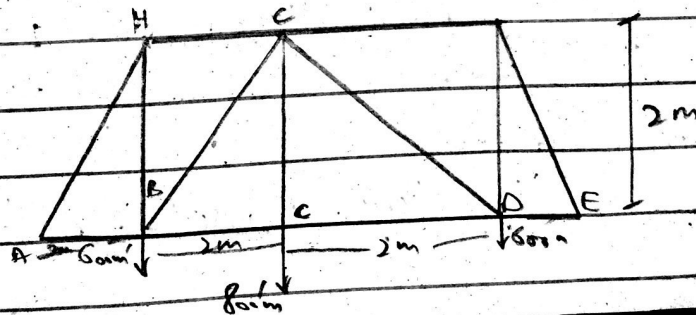


Q No: 2.

Determine the force in each member of the truss. Indicate if the member are in tension or compression. Assume all member are pin connected.

Sol:-

Given that



Now we analyse Joint (E).

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

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

$$F_{EF} = 1414.21 \text{ N (C)} = 1.411 \text{ kN (C)}$$

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

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

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

Joint (F)

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

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

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

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

$$1414.21 \sin 45^\circ - F_{FD} = 0$$

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

Joint D

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

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

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

$$\rightarrow \sum F_x = 0$$

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

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

Joint (C)

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

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

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

Due to Symmetry

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

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

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

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

$$F_{AH} = F_{EH} = 14.1 \text{ kN (C)}$$

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

