Hassan Zaib Khattak

ID 7958

Section B

Deptt BE(C)

Semester 4th

Assignment No 4

Subject Structure Analysis

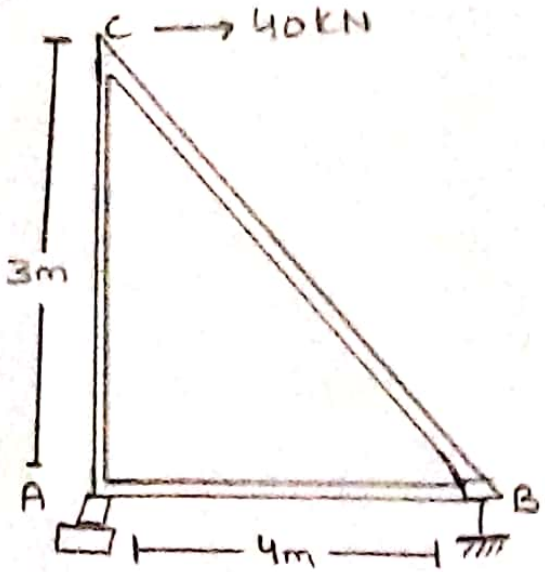
Submitted to Engr Amjad Islam

IQRA National University

Question No. 1

Determine all the forces in each member..... tension or compression.

Given:

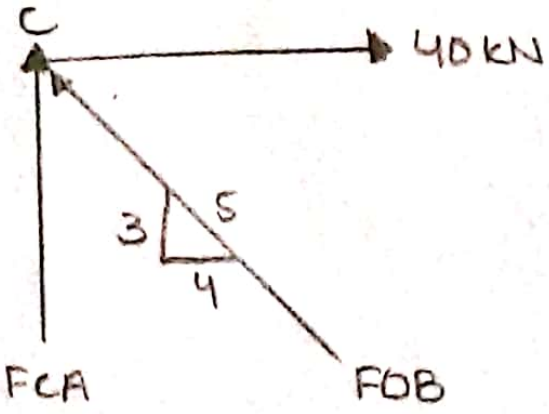


Required:

We have to find all the forces in each members.

Solution:

Joint C



$\Sigma F_x = 0 \xrightarrow{+}$

$40 - F_{CB}(4/5) = 0$

$\Rightarrow \boxed{F_{CB} = 50.\text{kN}}$ (Tension)

Now:

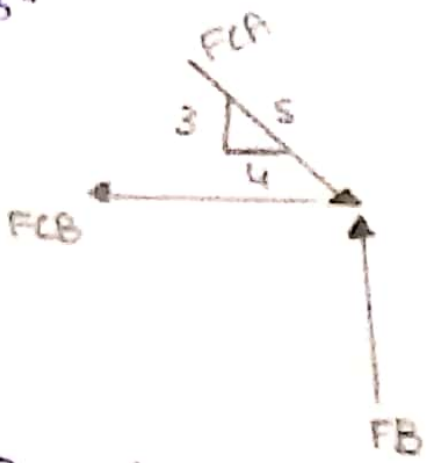
$\Sigma F_y = 0 \quad +\uparrow$

$50(3/5) + F_{CA} = 0$

$\Rightarrow \boxed{F_{CA} = -30.\text{kN}}$ (Compression)

Now:

Joint "B"



$\Sigma F_x = 0 \quad \xrightarrow{+}$

$50(4/5) - F_{BA} = 0$

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

$+ F_y = 0 \quad +\uparrow$

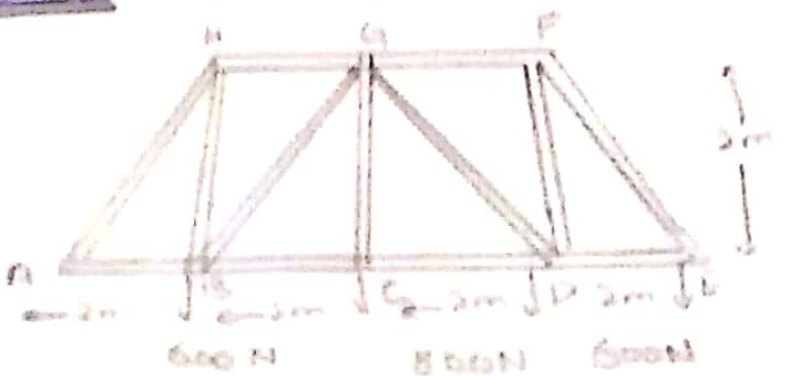
$\Rightarrow F_B - 50(3/5) = 0$

$\Rightarrow \boxed{F_B = 30\,\text{kN}}$ (Tension)

Question No. 2

Determine the forces in each ..... members are pin connected.

Given data:



Required data:

We have to find forces in all the members.

Solution:

$$\Sigma M_A = 0 \quad + (a$$

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

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

$$A_y - 400 - 800 - 600 + 500 = 0$$

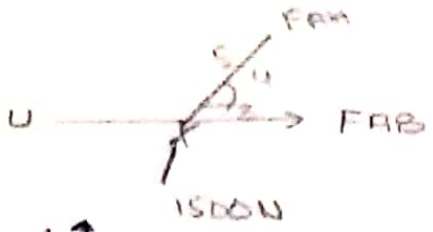
$$\Rightarrow A_y = 1500\ N$$

$$\Sigma F_x = 0 \quad + \longrightarrow$$

$$A_x = 0$$

Now

Joint A



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

$\Rightarrow 1500 - F_{AH}(4/5) = 0$

$\Rightarrow F_{AH} = 1875\ N$

Now

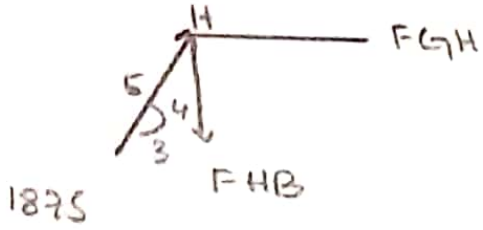
$\Sigma F_x = 0 \quad +\rightarrow$

$\Rightarrow 0 + F_{AB} - 1875(3/5) = 0$

$\rightarrow F_{AB} = 1125\ N$

Now

Joint H



$+\rightarrow \Sigma F_x = 0$

$\Rightarrow (3/5)\ 1875 - F_{GH} = 0$

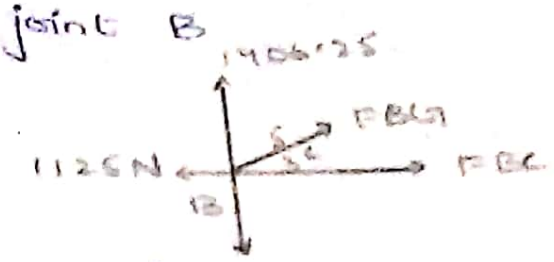
$\Rightarrow F_{GH} = 1125\ N$

$F_y = 0 \quad +\uparrow$

$\Rightarrow -F_{HB} + (3/4)1875 = 0$

$\Rightarrow F_{HB} = 1406.25$

Now joint B



$\Sigma F_y = 0 \uparrow +$

$\Rightarrow 1406.25 - 600 + (4/5) F_{BG} = 0$

$\Rightarrow F_{BG} = 604.68$

$\Sigma F_x = 0 \quad + \rightarrow$

$\Rightarrow (3/5)\, 604.68 - 1125 + F_{BC} = 0$

$\Rightarrow F_{BC} = 762.192$

Now

Joint G

So $F_{GF} = 762.192$

$F_{GD} = 604.68$

Now the truss are symetrical So

$F_{AH} = F_{EF} = 1875N$ (Tension)

$F_{AB} = F_{ED} = 1125\,N$ (Tension)

$F_{GH} = F_{GF} = 1125N$ (Tension)

$F_{HB} = F_{AD} = 1406.25\ N$ (Tension)

$F_{BG} = F_{DG} = 604.68$ (Tension)

$F_{BC} = F_{DC} = 762.192$ (Tension)