

Name: Ahmed Musa.

ID # 7944

Section "B"

Fourth Semester

Subject: Structural analysis I

Instructor: Sir Amjad Islam

Department of Civil Engineering

-: Assignment Topic :-

Analysis of statically Determinate

TRUSSES

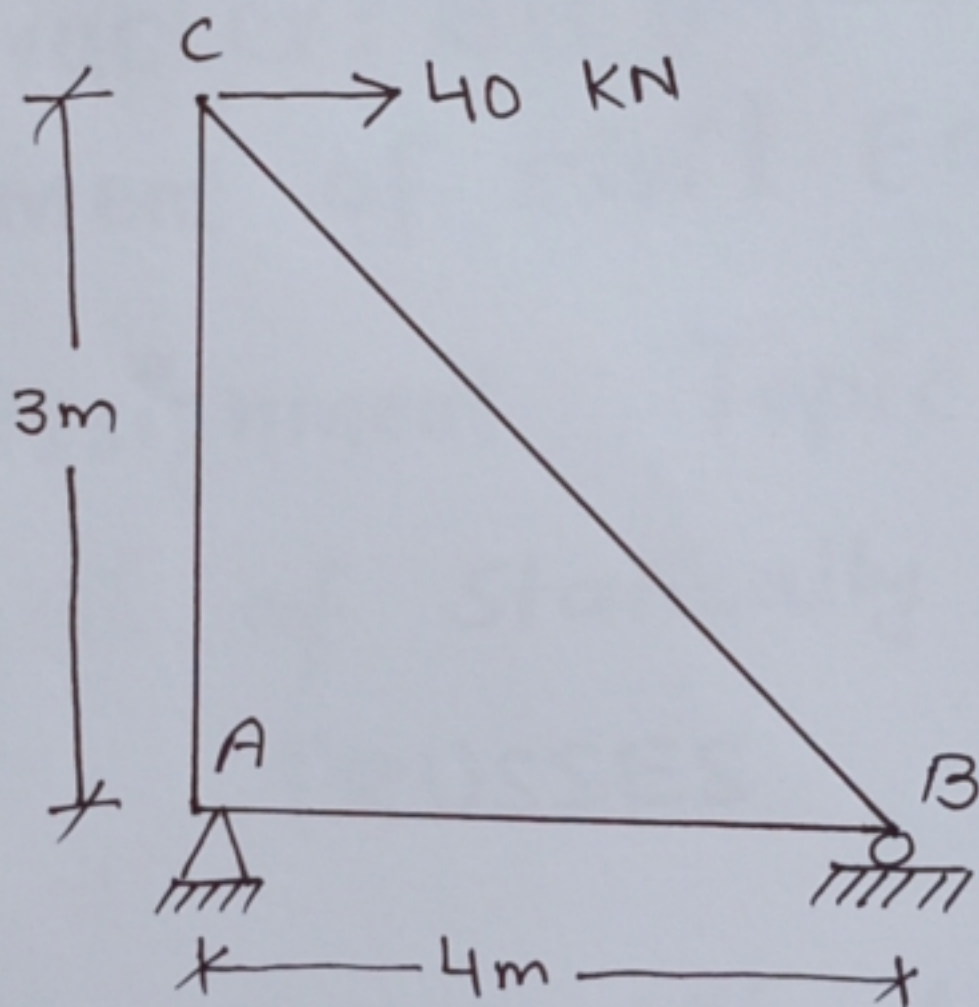
IQRA NATIONAL UNIVERSITY

PESHAWER

Q No #01 Determine the force in each member of the truss and state whether it is in tension or compression.

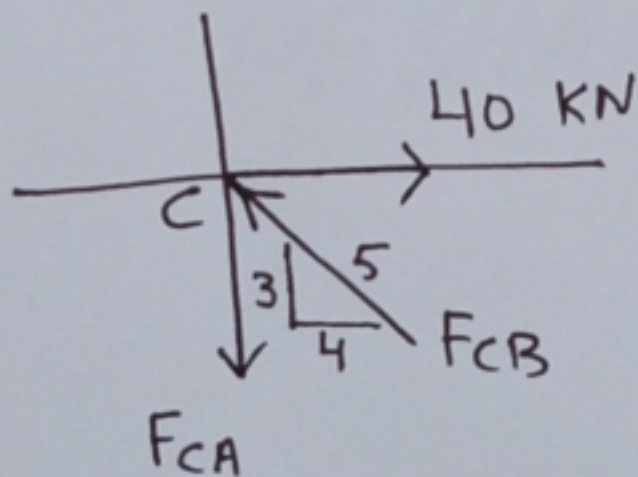
Solution \rightarrow

Given that:



First of all we analyse Joint C

So



$$\rightarrow \sum F_x = 0$$

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

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

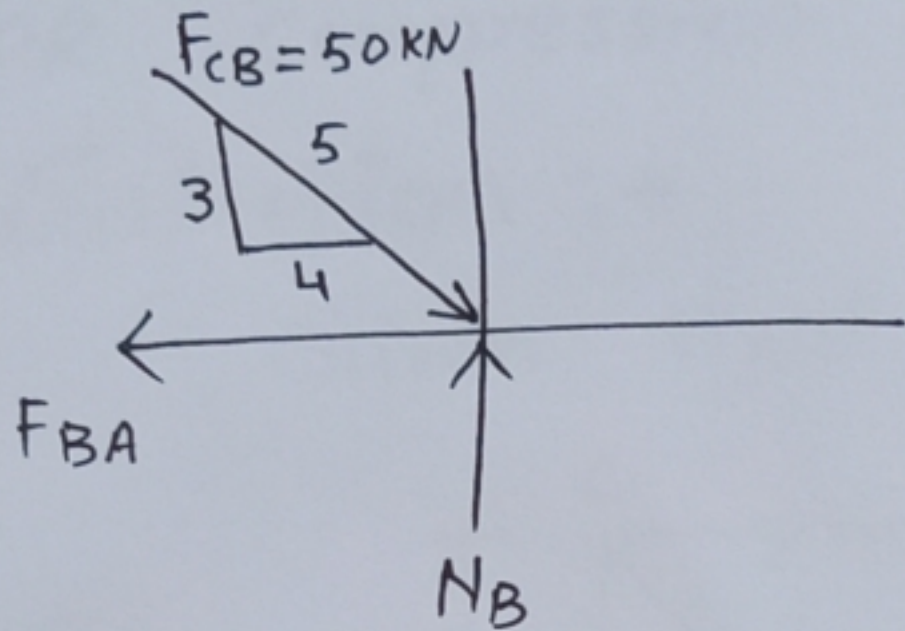
(2)

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

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

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

Now we analyse Joint (B)



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

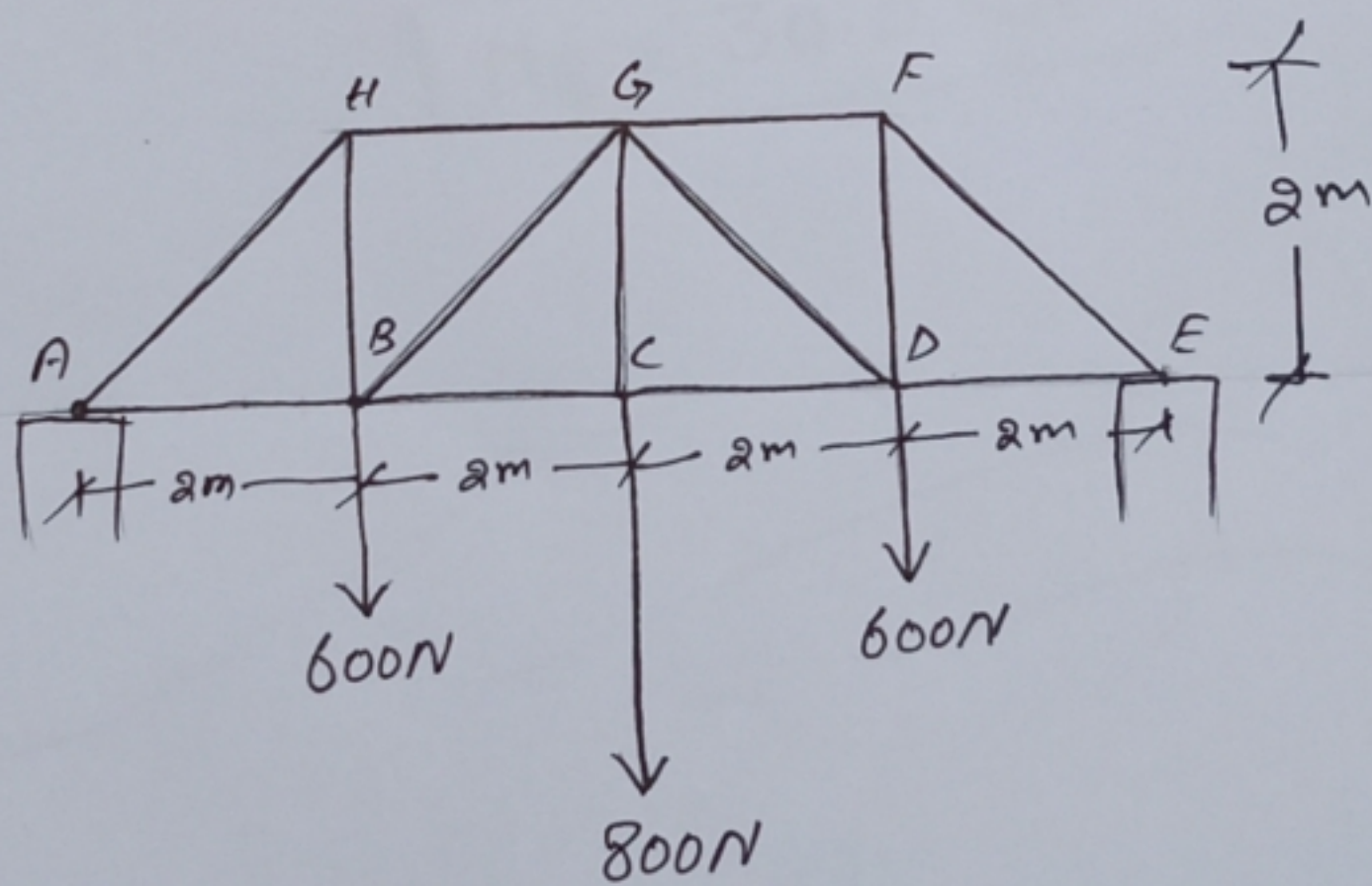
$$F_{BA} = 40.0 \text{ kN (T)}$$

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

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

Q NO # 02 Determine the force in each member of the truss. Indicate if the member are in tension OR compression. Assume all members are pin connected.

Solution:
Given that:

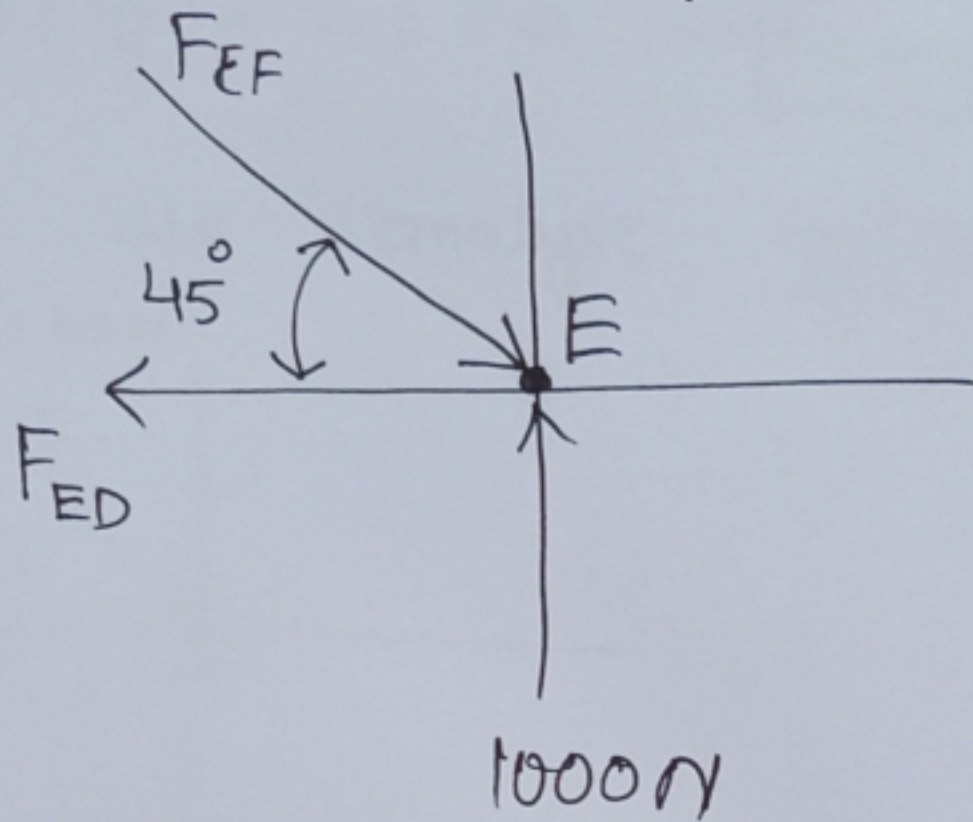


$$\sum M_A = 0 \quad E_y(8) - 600(2) - 800(4) - 600(6) = 0$$

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

(4)

Now we analyse Joint (E)



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

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

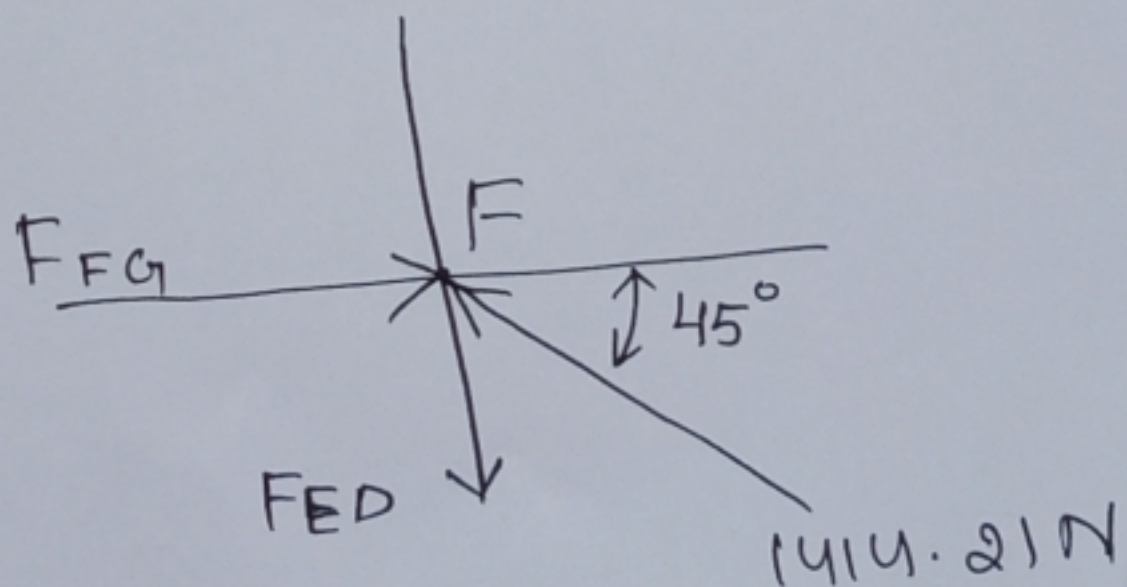
$$F_{EF} = 1414.21 \text{ N (C)} = 1.41 \text{ kN (C)}$$

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

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

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

Joint (F)



(5)

$$\rightarrow \sum F_x = 0;$$

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

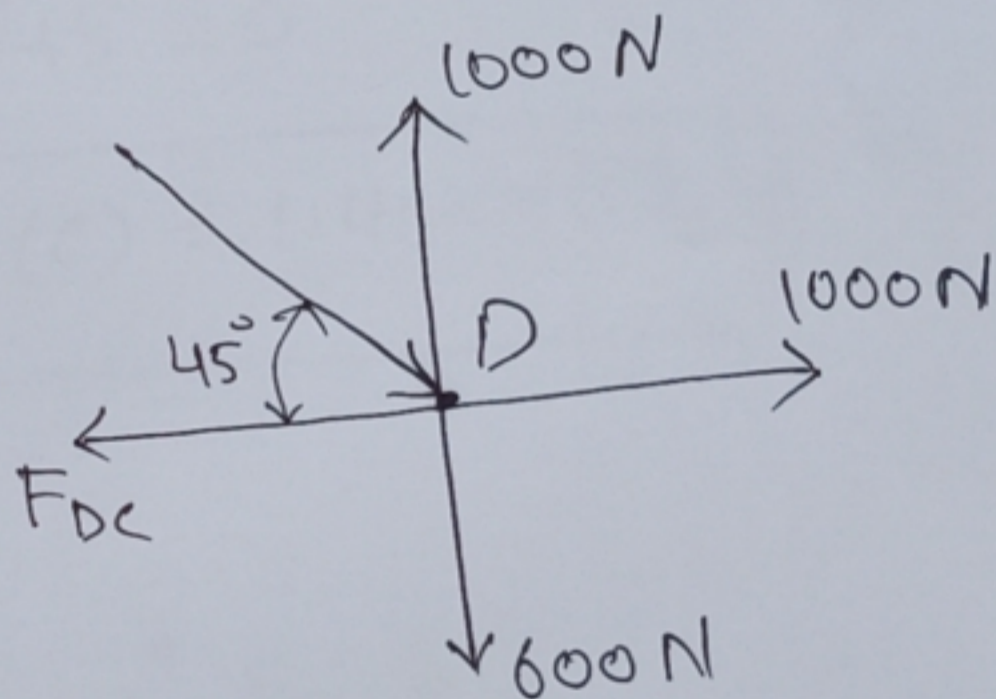
$$F_{FG} = 1000 \text{ N (C)} = 1 \text{ kN (C)}$$

$$\uparrow \sum F_y = 0;$$

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

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

Joint (D)



$$\uparrow \sum F_y = 0;$$

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

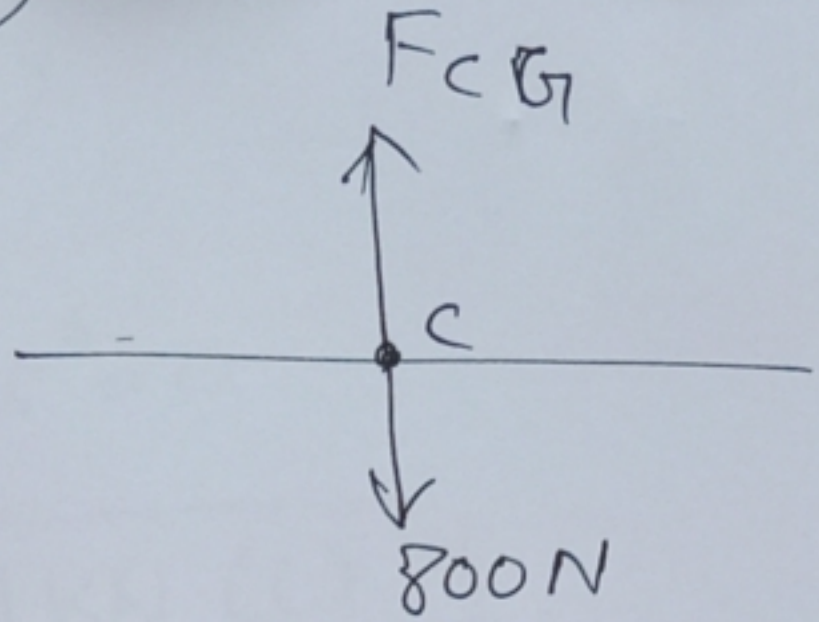
$$F_{DG} = 565.69 \text{ N (C)} = 566 \text{ N (C)}$$

$$\rightarrow \sum F_x = 0; \quad 1000 + 565.69 \cos 45^\circ - F_{DC} = 0$$

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

Joint (C)

(6)



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

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

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

Due to symmetry:

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

$$F_{HB} = F_{FD} = 1.0 \text{ kN (T)}$$

$$F_{BG} = F_{DG} = 566 \text{ N (T)}$$

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

$$F_{AH} = F_{EF} = 1.41 \text{ kN (C)}$$

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

