Q No 1

Ans :-

load :-

A mass of weight supported by something.

Types of load

i) Dead load, ii) Imposed load, iii) Snow load
iv) ~~Imposed~~ Wind load, v) Earthquake load
vi) special load.

1) Dead load :-

The vertical load that considered dead load. Dead loads are Pemanent loads. which are trasfered to structure throughout life span. Dead load is Primarily due to self weight of structure. member.

Example :- loads of Wall, roofs, beams and columns.

ii) Imposed load:- A vertical load that is considered in design of a structure is live load. live load that are moveable.

Example:- weight of person, furniture, movable thing.

iii) Snow load:-

Snow loads constitute to the vertical loads in the building But these types of loads are considered only in Snow.

$$S = MS_0$$

Example:- Snow load on roof of building.

iv) Wind load:-

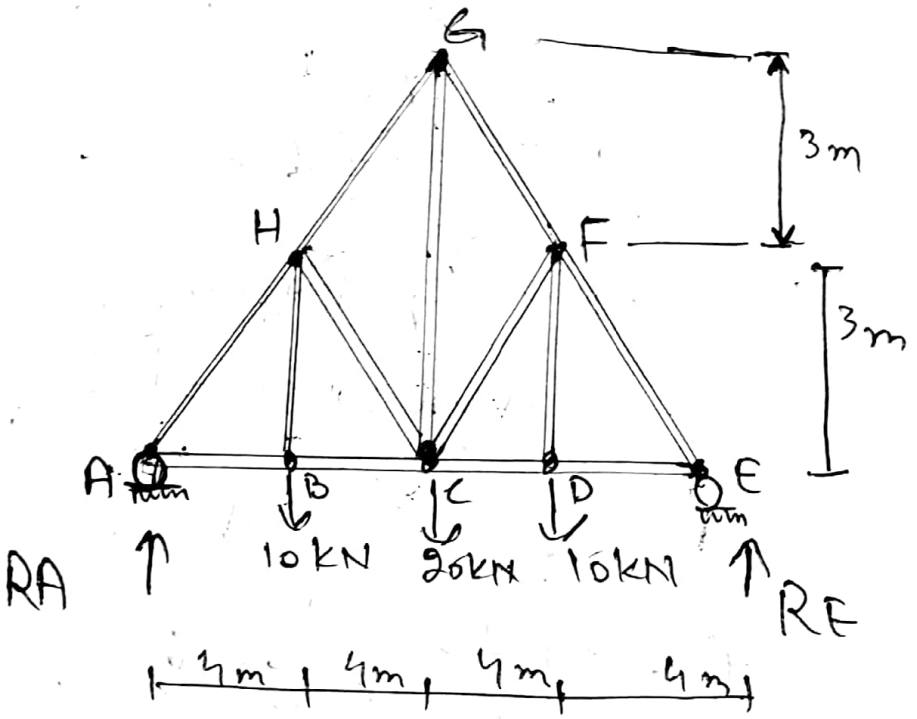
Wind load is primarily horizontal load caused by the moment of air relative to earth.

Example wind load of the building

v) Earthquake loads:- The vertical and horizontal forces on the building. The total viberation caused by earthquake may be resolved into three mutually directions.

Example:- Earth quake cause earth-quake loads

Q No 2



Solution

$j = 8$

$m = 13$

$r = 3$

$S.I = m + r - 2j$

$= 13 + 3 - (2)(8)$

$= 16 - 16 = 0$ Statically determinat

Support reaction.

$\Sigma F_Y = \uparrow + \downarrow -$

$RA + RE - 10 - 10 - 20 = 0$

$RA + RE = 40 \longrightarrow (i)$

$\Sigma M_A = 0$ ↻ +ve ↺ -ve

$(10 \times 4) + (3 \times 8)(10 \times 12) - R_E \times 16 = 0$

$16 R_E = -320$

$R_E = 20$

Put in (1)

$R_A = 20$

forces by joint Method

Joint A :-

$\tan\theta = 3/4$

$\theta = \tan^{-1} 3/4$

$\theta = 36.86$

$\Sigma F_Y = 0$ ↑ + ↓ -

$F_{AH} \sin\theta + 30 = 0$

$F_{AH} \sin(36.86) = -30$

$\boxed{F_{AH} = 33.34}$ compression.

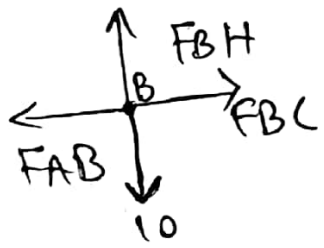
$\Sigma F_x = 0 \rightarrow +\leftarrow$

$F_{AB} + F_{AH}\cos(36.86) = 0$

$F_{AB} = 26.67\,KN$ (Tension)

Joint "B"

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



$F_{BH} - 10 = 0$

$F_{BH} = 10\,KN$ (Tension)

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

$F_{BC} - F_{AB} = 0$

$F_{BC} - 26.67 = 0$

$F_{BC} = 26.67$ (Tension)

Joint "E"

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

$F_{EF}\sin(36.86) + 20$

$F_{EF} = 33.34\,KN$ (compression)

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

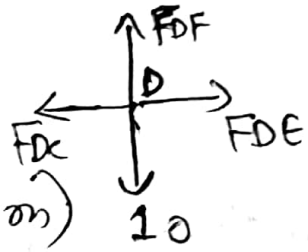
$F_{DE} + F_{EF}\cos(36.86) = 0$

$F_{DE} = 26.67$ (Tension)

Joint D:-

$\Sigma F_Y = 0 \uparrow + \downarrow -$

$F_{DE} = 10\,kN$ (Tension)



$\Sigma F_X = 0 \rightarrow + \leftarrow -$

$F_{DC} = 26.67$ (Tension)

Joint F:-

$\tan\theta = 4/3$

$\theta = \tan^{-1} 4/3$

$\Sigma F_Y = 0 \downarrow + \uparrow -$

$F_{FC} + F_{FD} \sin(53.13)$

$F_{FC} = 7.99\,kN$ (compression)

$\Sigma F_X = 0 \rightarrow + \leftarrow -$

$F_{EF} + F_{FD} \cos(53.13) - F_{GF} = 0$

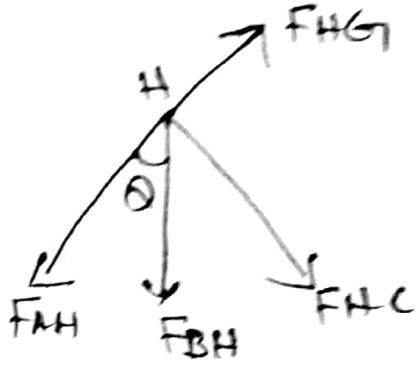
$-33.34 + 10\cos(53.13) - F_{GF} = 0$

$-27.34 = F_{GF}$

$F_{GF} = 27.34$ compression

Joint "H" :-

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



$F_{HC} + F_{BH} \sin(53.13) = 0$

$F_{HC} + 10 \sin(53.13) = 0$

$F_{HC} = -7.99\ kN$ (compression)

$\Sigma F_y = 0 \uparrow \downarrow^-$

$F_{AH} + F_{BH} \cos(53.13) - F_{HG} = 0$

$-33.34 + 10 \times \cos(53.13) = F_{HG}$

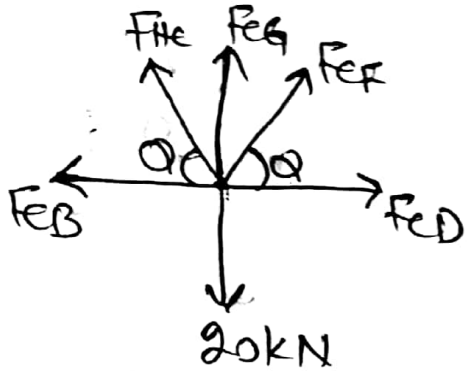
$F_{HG} = 27.34$ (compression)

Joint C :-

$\tan\theta = 3/4$

$\theta = \tan^{-1} 3/4$

$\theta = 36.86$

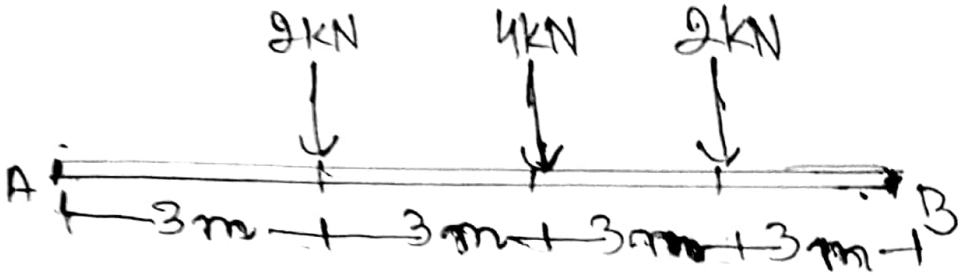


$\Sigma F_y = 0 \uparrow \downarrow^-$

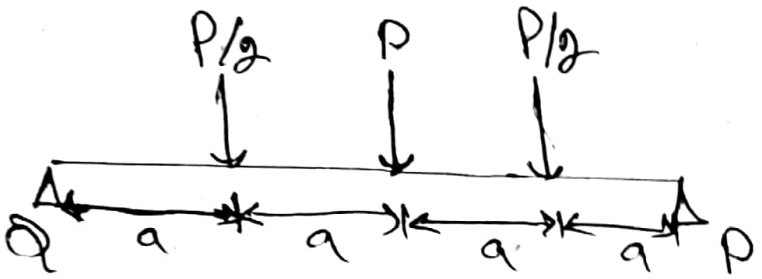
$F_{CG} + F_{CH} \sin(36.86) + F_{CF} \sin(36.86) - 20 = 0$

$F_{CG} = 27.58k$ (Tension)

Q No3:-



Solution



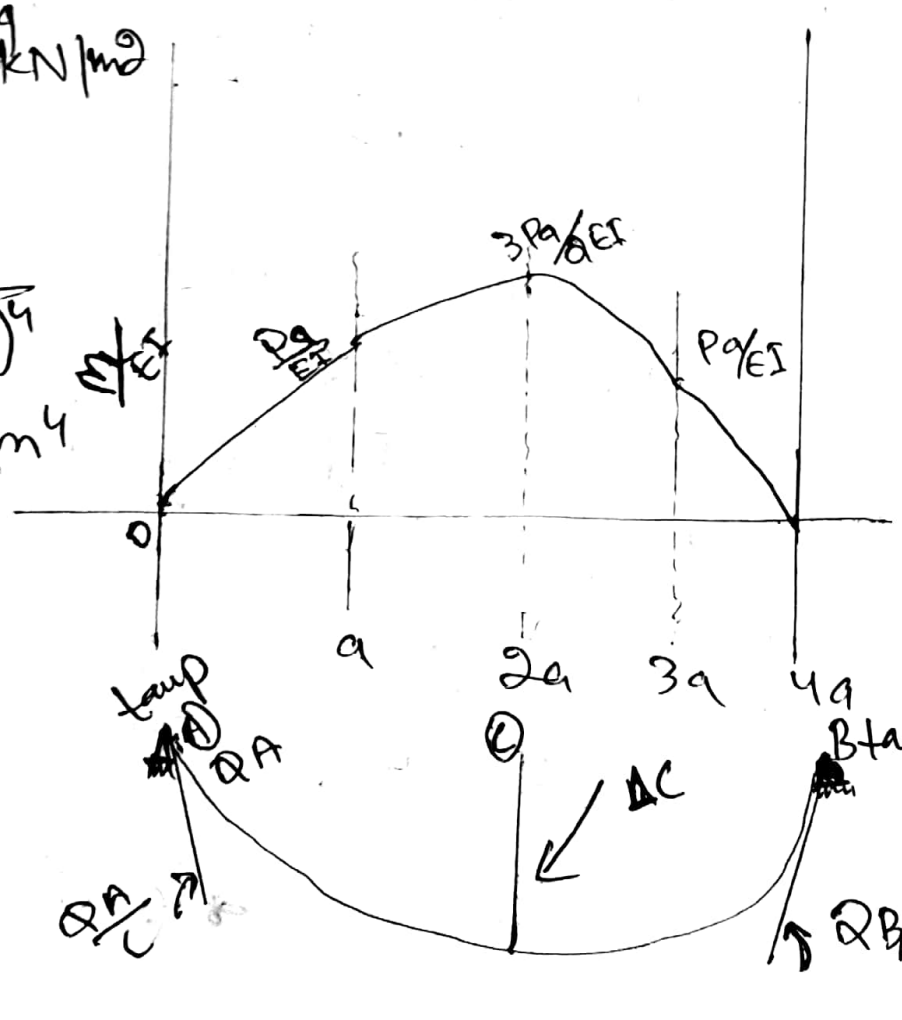
$P = 41 KN$

$E = 200 \times 10^9 kN/m^2$

$I = 6(10)^6$

$= \frac{6 \times 10^6}{(1000)^4}$

$I = 6 \times 10^{-6} m^4$



$$\theta_{A/C} = \tfrac{1}{2}\left(\frac{Pa}{EI}\right)(a) + \left(\frac{Pa}{EI}\right)(a) + \tfrac{1}{2}\left(\frac{Pa}{2EI}\right)(a) = \frac{7Pa^2}{4EI}$$

$$t_{A/C} = \left[\tfrac{1}{2}\left(\frac{Pa}{EI}\right)a\right]\left[\tfrac{2}{3}a\right] + \left[\frac{Pa}{EI}(a)\right]\left[a + \tfrac{1}{2}a\right]$$

$$+ \left[\tfrac{1}{2}\left(\frac{Pa}{2EI}\right)(a)\right]\left[a + \tfrac{2}{3}a\right]$$

$$= \frac{9Pa^3}{4EI}$$

Then $\theta_A = \theta_{A/C} = \dfrac{7Pa^2}{4EI}$ and $\Delta_C = t_{A/C} = \dfrac{9Pa^3}{4EI}$

Here is the Problem

$$P = 4\,kN$$

then

$$\Rightarrow \theta_A = \frac{7(4)^2(3)^2}{4 \times 200 \times 10^9 \times 6 \times 10^{-6}}$$

$$= 2.1 \times 10^{-4}\ rad$$

And

$$\Delta_C = \frac{9(4)(3)^3}{4 \times 200 \times 10^9 \times 6 \times 10^{-6}}$$

$$= 2.025 \times 10^{-4}\ m$$