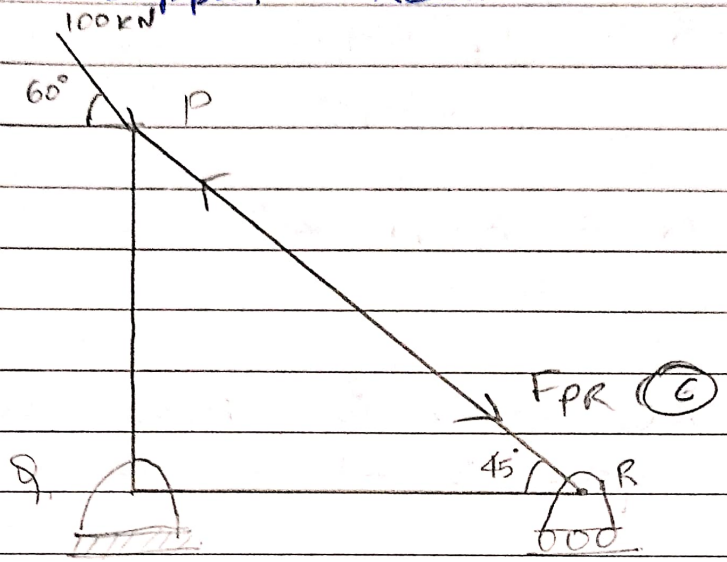
5/11/21

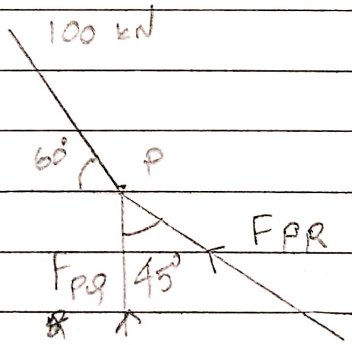
Krishnaraj
Div. 9 . (54)

Module 2 Short Questions

Q.1. For the truss shown in figure, the magnitude of the force in member PR and support Reaction at R are :



let us consider joint P,



Equilibrium equations,

$\Sigma F_x = 0$,

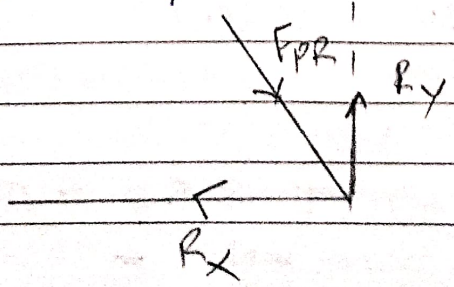
$\Sigma F_y = 0$.

$\Sigma F_x = 0 \Rightarrow$

$100 \cos 60 - F_{PR} \cos 45 = 0$

$F_{PR} = 70.71$ kN (C)

→ Consider joint R.



$\Sigma F_x = 0$

$\Sigma M_R = 0$

$\Sigma F_y = 0$

rainbow

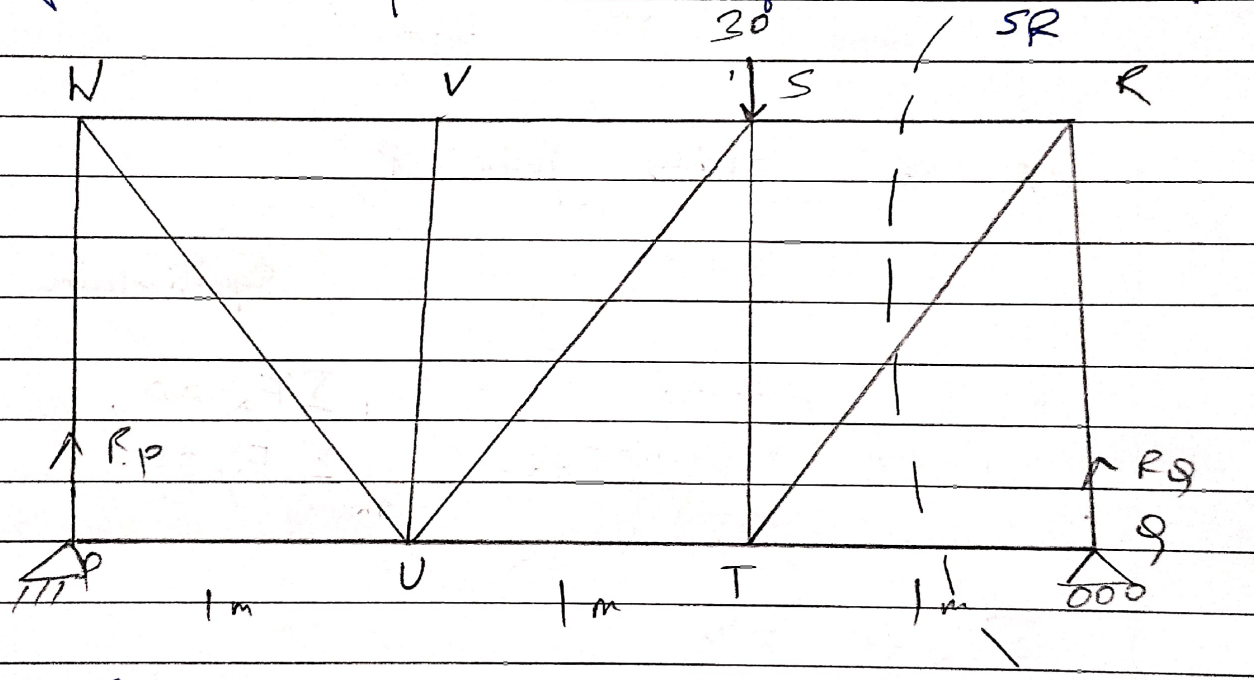
By $\Sigma F_y = 0$,

$$R \sin 45 - F_{RR} \cos 45 = 0$$

$$R = \frac{F_{RR} \cos 45}{\sin 45}$$

$$R = 70.71 \text{ KN}$$

Q. 2. For the truss shown in figure, magnitude of member force in KN of member PE is ?



Considering entire truss equilibrium,

$$\Sigma F_y = 0$$

$$R_p + R_q - 30 \text{ KN} = 0$$

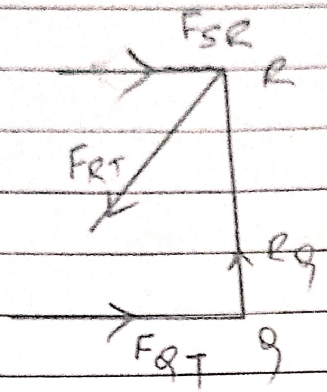
$$R_p + R_q = 30 \quad (1)$$

$$\Sigma M_p = 0 \Rightarrow$$

$$-30(+2) + 3R_q = 0$$

$$R_q = 60/3 = 20 \text{ KN} \leftarrow$$

Consider section RQ



$\Sigma F_y = 0$;

$R_Q - F_{RT}\cos 45 = 0$

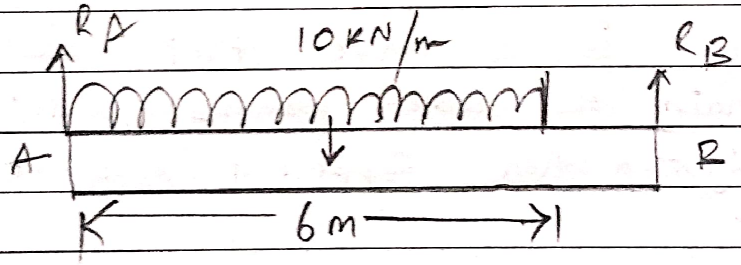
$\therefore \quad F_{RT}\cos 45 = 20$

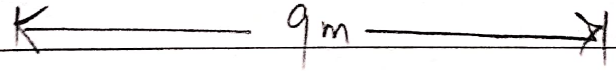
$\Sigma M_Q = 0 \Rightarrow$

$-F_{SR} + F_{RT}\cos 45 = 0$

$\therefore \quad F_{SR} = 20$ KN

Q.3 A simply supported beam AB of length 9m carries a uniformly distributed load of 10 KN/m for a distance of 6m from left end. Find reaction at A and B.





Uniformly distributed load = 10 KN/m.

Total load = 10 × 6 = 60 KN

distance = $\ell/2 = 6/2 = 3$ m. (from A)

Considering equilibrium equations,

$\Sigma M_A = 0$; $-(60)(3) + R_B(9) = 0$

$R_B = \frac{180}{9} = 20$ KN ↑

inbow

Also,

$\Sigma F_y = 0$

$R_A + R_B - 60 = 0$

$R_A + 20 - 60 = 0$

$R_A = 40 \text{ kN} \uparrow$

Q.4. Define funicular system and catenary in cables.

→ (1) Funicular System:

Is a type of cable railway system which connects points along a railway track laid on a steep slope.

(2) Catenary:

A catenary is a curve that an idealised chain or cable assumes under its own weight when supported only at its ends.

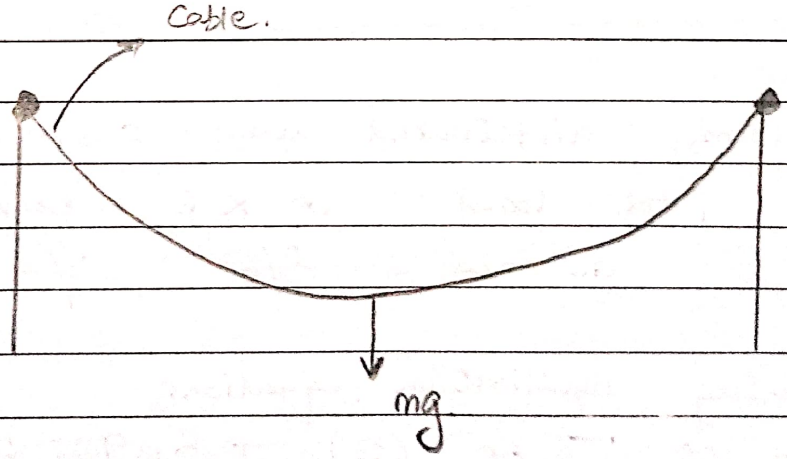
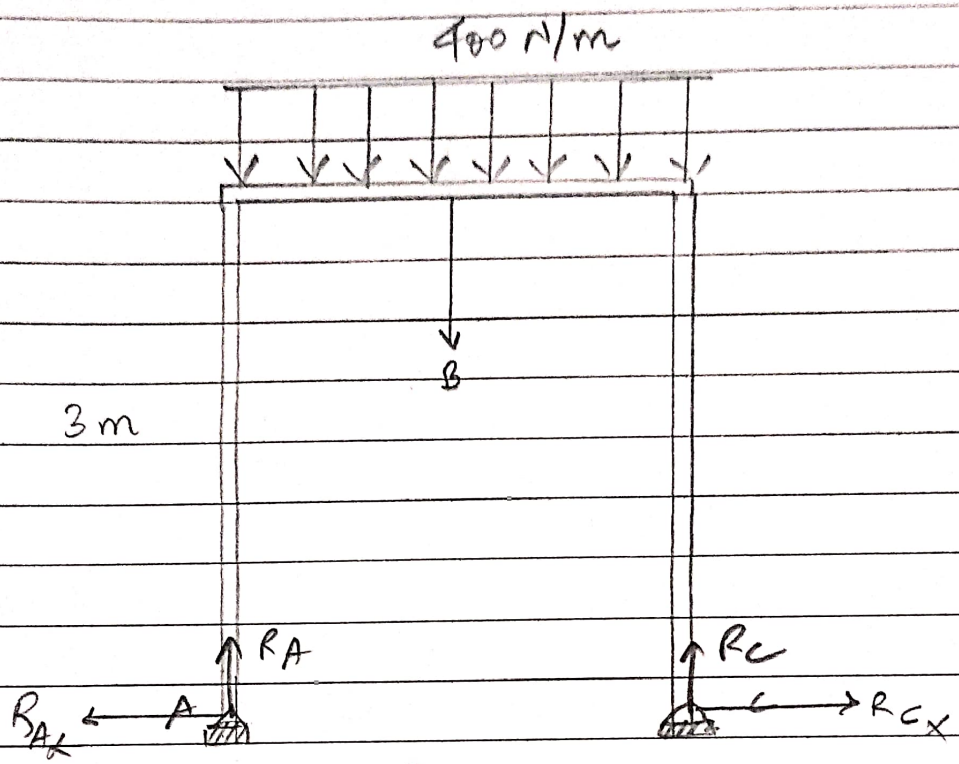


Fig: Catenary curve.

Q.5. Determine the components of reactions at A and C.



→ Using Uniformly distributed load
= 400 N/m.

Total load = 400 × 3 = 1200 N

l = 3/2 = 1.5 m from A.

Using equilibrium conditions,

$\Sigma F_x = 0$

$R_{Ax} = R_{Cx} = 0$.

$\Sigma F_y = 0$

$R_{Ay} + R_{Cy} - B = 0$

$R_{Ay} + R_{Cy} = 1200$ N — (1)

$\Sigma M_A = 0$; $-(1200)(1.5) + R_C(3) = 0$

$R_C = 600$ N. $= R_{Ay}$