Types of support

(a). Simple support or knife edge support

(b) Roller support

(c) Pin joint (hinged) support

(d) Smooth surface support

(e) Fixed or built in support

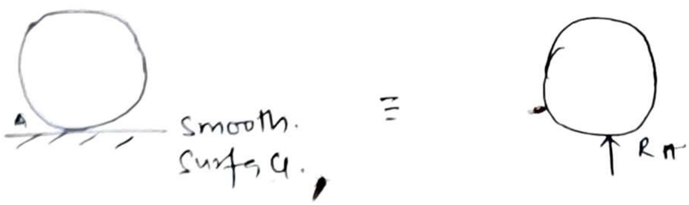
(a)

(b)

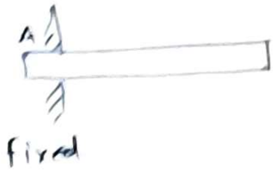
(c)

— Reaction at hinged end may be either vertical or inclined depending upon the type of loading.

(d)



(e)



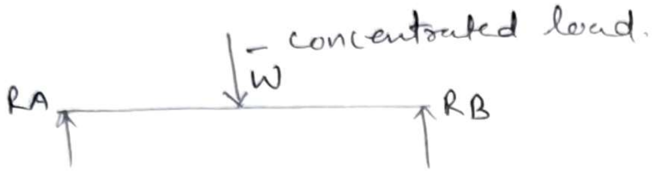
— The reaction can be inclined. Also the fixed support will provide a couple.

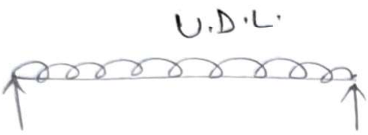
Types of loading →

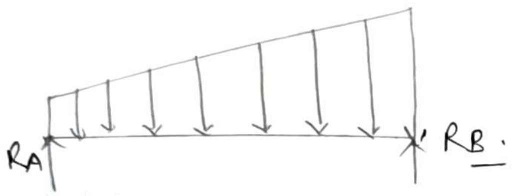
(a) Concentraded or point load

(b) Uniform distributed load

(c) uniform varying load.

(a) 

(b) 

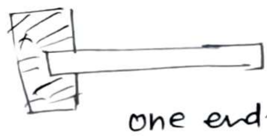
(c) 

Total load = Area of load diagram

Position of load → C.G. of load diagram.

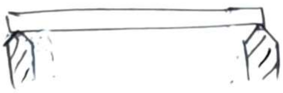
Types of beam :-

(a) Cantilever beam :.



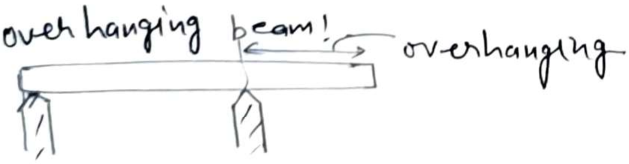
one end fixed. other end free.

(b) Simply supported beam :

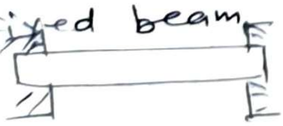


supported freely at its both ends.

(c) overhanging beam :



(d) Fixed beam

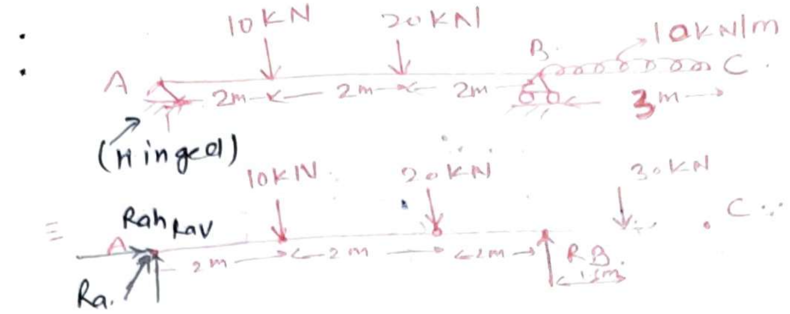


both ends are fixed or built in walls.

(e) Continuous beam :.

Provided more than two (two) Supports.

Q. Determine the reactions at A and B.



Condition of equilibrium - $\Sigma M = 0$, $\Sigma F_x = 0$, $\Sigma F_y = 0$

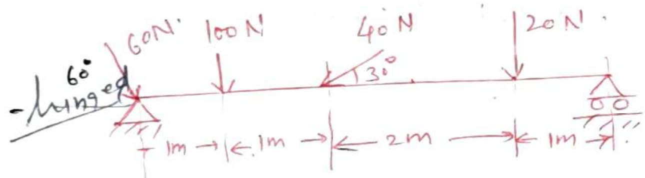
taking moment about point A - $10 \times 2 + 20 \times 4 - (R_b \times 6) + 30(7.5) = 0$

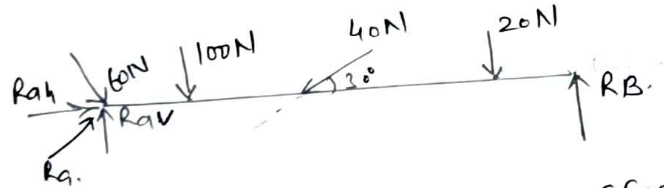
$\boxed{R_b = 54.17 KN.}$

$\Sigma F_x = 0$, $\boxed{R_{ah} = 0}$ no other horizontal force.

$\Sigma F_y = 0$ $R_{av} = 10 + 20 - R_b + 30 = 60 - 54.17 = \boxed{5.83 KN}$

Q. Determine the reactions at A and B for the beam as shown in figure.





condition of equilibrium:- $\Sigma M = 0$, $\Sigma F_x = 0$, $\Sigma F_y = 0$

Taking Moment about point A. $\Rightarrow 100 \times 1 + (40 \sin 30° \times 2) + (20 \times 4) - R_b \times 5 = 0$.

$R_b = 44 N$.

$\Sigma F_x = 0$, $R_{ah} + 60 \cos 60 - 40 \cos 30 = 0$

$R_{ah} = 4.64 N$.

$\Sigma F_y = 0$ $R_{av} - 60 \sin 60 - 100 - 40 \sin 30 - 20 - R_B = 0$

$R_{av} = 60 \sin 60 + 100 + 40 \sin 30 + 20 - 44$

$= 51.96 + 100 + 20 + 20 - 44 = 147.96 N$.

Total Reaction at hinge support $R_a = \sqrt{R_{ah}^2 + R_{av}^2} = \sqrt{(4.64)^2 + (147.96)^2} = 148 N$, $\theta = \tan^{-1} \frac{R_{av}}{R_{ah}} = 88.20°$