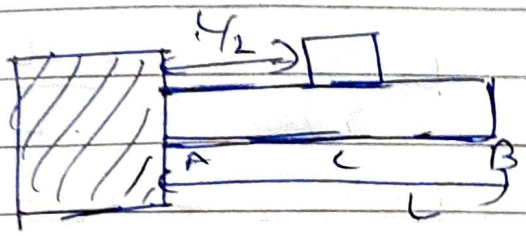
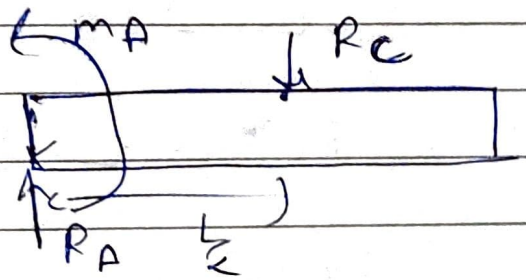
Roll No :- 19NA10011
Name :- Kavita

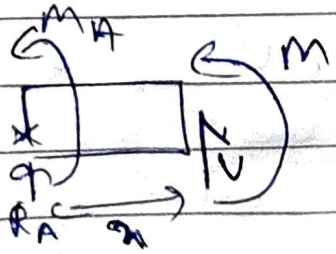
Q.1





$R_A = R_C$

$M_A = (R_C)\left(\frac{L}{2}\right)$



$V = -R_A = -R_C$

$M_A + Vx + M = 0$

$M = -Vx - M_A$

$= R_C x - R_C\left(\frac{L}{2}\right)$

$$M = R_C\left(x - \frac{L}{2}\right)$$

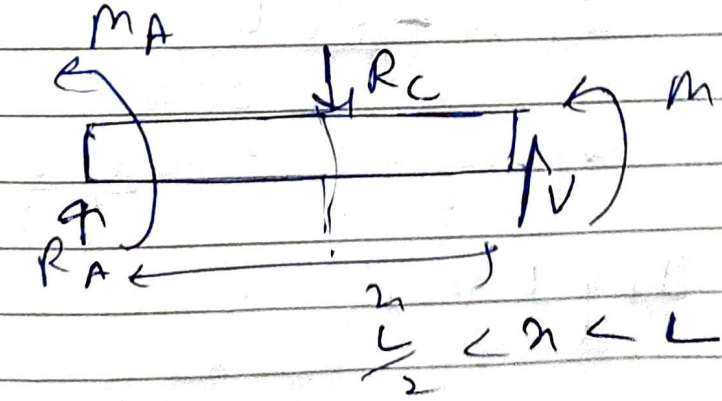
$$EIV'' = R_C x - R_C\frac{L}{2}$$

$$EIV' = \frac{R_C x^2}{2} - \frac{R_C L x}{2} + C_1$$

$$EIV = \frac{R_C x^3}{6} - \frac{R_C L x^2}{4} + C_1 x + C_2$$

$$V(0) = 0$$
$$V'(0) = 0$$
$$C_2 = 0$$
$$C_1 = 0$$

$$EIV = \frac{R_C x^3}{6} - \frac{R_C L x^2}{4} \quad (1)$$



$$\frac{L}{2} < x < L$$

$$V + R_A = R_C$$
$$V = R_C - R_A$$
$$V = 0$$
$$M = 0$$
$$EIV'' = 0 \quad (2)$$
$$EIV = D_1 x + D_2$$
$$EIV' = D_1$$

By eq (1) and (2)

$$V'\left(\frac{L}{2}+\right) = V\left(\frac{L}{2}-\right)$$

$$V\left(\frac{L}{2}+\right) = V\left(\frac{L}{2}-\right)$$

$$D_1 = \frac{R_c}{2}\left(\frac{L}{2}\right)^2 - \frac{R_c L}{2}\left(\frac{L}{2}\right)$$

$$= \frac{R_c}{2} \times \frac{L^2}{4} - \frac{R_c L^2}{4}$$

$$= \frac{R_c L^2}{4}\left(\frac{1}{2} - 1\right)$$

$$= -\frac{R_c L^2}{8}$$

$$V\left(\frac{L}{2}+\right) = V\left(\frac{L}{2}-\right)$$

$$D_1\left(\frac{L}{2}\right) + D_2 = \frac{R}{6}\left(\frac{L}{2}\right)^3 - \frac{R_c L}{4}\left(\frac{L}{2}\right)^2$$

$$\left(-\frac{R_c L^2}{8}\right)\frac{L}{2} + D_2 = -\frac{R_c L^3}{8 \times 3}$$

$$D_2 = -\frac{R_c L^3}{8 \times 3} + \frac{R_c L^3}{8 \times 2}$$

$$= \frac{R_c L^3}{8}\left[-\frac{1}{3} + \frac{1}{2}\right]$$

$$D_2 = \frac{R_c L^3}{8} \times \left(\frac{1}{6}\right)$$

So slop at tip

$$EI\,V' = P_1$$

$$V'(L) = \frac{P_1}{EI}$$

$$= -\left(\frac{R_c L^2}{6}\right)\frac{1}{EI}$$

$$R_c = mg$$

m → mass

$$\boxed{V'(L) = -\frac{mgL^2}{6EI}}$$

→ defelactia at tip

$$EI\,V' = P_1 x + P_2$$

$$EI\,V(L) = P_1 L + P_2$$

$$EI\,V(L) = \left(-\frac{R_c L^2}{6}\right)L + \frac{R_c L^3}{6\times 6}$$

$$EI\,V(L) = \frac{R_c L^3}{6}\left[-1 + \frac{1}{6}\right]$$

$$= \frac{R_c L^3 \times (-5)}{6\times 6}$$

$$R_c = mg$$

$$\boxed{V(L) = -\frac{5}{40}\times\left(\frac{mgL^3}{EI}\right)}$$