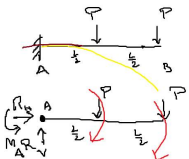
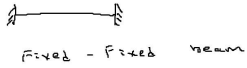


$$\sum F_i = 0$$

$$\sum M_{o,i} = 0$$

Examples

Cantilever beam

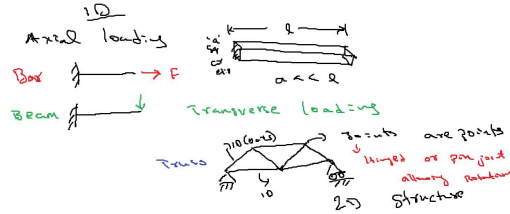


Constraints for Fixed end

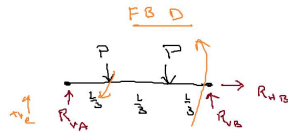
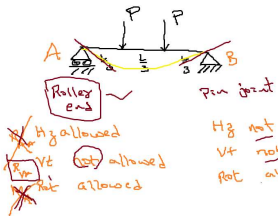
- No vt translation (R_v)
- No Hg translation (R_H)
- No Rotation (M_A)

Beam is in Equilibrium

$$\begin{aligned} \sum F_x = 0 & \Rightarrow R_H = 0 \\ \sum F_y = 0 & \Rightarrow R_V - P - P = 0 \Rightarrow R_V = 2P \\ \sum M_{BA} = 0 & \Rightarrow R_V \times L - P \times \frac{L}{2} - P \times L + M_A = 0 \\ & \Rightarrow -\frac{3PL}{2} + M_A = 0 \\ & \Rightarrow M_A = \frac{3PL}{2} \end{aligned}$$



Example - 2



Beam is under Equilibrium

$$\begin{aligned} \sum F_x = 0 & \Rightarrow R_{HB} = 0 \\ \sum F_y = 0 & \Rightarrow R_{VA} - P - P + R_{VB} = 0 \\ \sum M_A = 0 & \Rightarrow R_{VB} \times L - P \times \frac{L}{2} - P \times L = 0 \end{aligned}$$

$$\begin{aligned} R_{HA} &= 0 \\ R_{VA} + R_{VB} &= 2P \Rightarrow R_{VA} = P \\ R_{VB} \times L &= P \times L \Rightarrow R_{VB} = P \end{aligned}$$