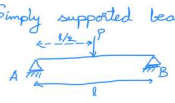
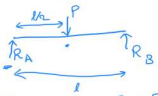
Simply supported beam.

BC's: R_A, $M=0$

1)



FBD

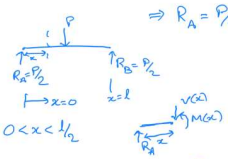


$\Sigma F_y = 0 \Rightarrow R_A + R_B = P$

$\Sigma M = 0$ @A $\Rightarrow -\frac{Pl}{2} + R_B l = 0$

$R_B = \frac{P}{2}$

$\Rightarrow R_A = P/2$



$0 < x < l/2$

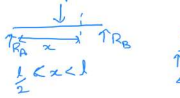
$\Sigma F_y = 0 \Rightarrow V(x) - R_A = 0$

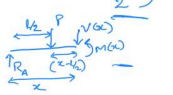
$\Rightarrow V(x) = R_A = \frac{P}{2}$

$\Sigma M = 0 \Rightarrow M(x) - R_A x = 0$

$M(x) = R_A x = \frac{Px}{2}$

$0 < x < l/2$





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

$\Sigma F_y = 0 \Rightarrow V(x) + P - R_A = 0$

$V(x) = R_A - P$

$= P/2 - P$

$= -P/2$ $\quad l/2 < x < l$

$\Sigma M = 0 \Rightarrow M(x) + P(x - l/2) - R_A x = 0$

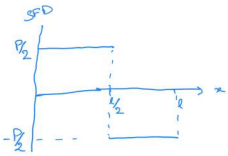
$M(x) = R_A x - P(x - l/2)$

$= \frac{Px}{2} - Px + \frac{Pl}{2}$

$= \frac{P}{2}(l - x) = -\frac{P}{2}(x - l)$

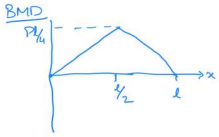
$l/2 < x < l$

SFD



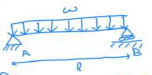
$$V = \begin{cases} P/2 & 0 < x < l/2 \\ -P/2 & l/2 < x < l \end{cases}$$

BMD

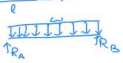


$$M = \begin{cases} \frac{Px}{2} & 0 < x < l/2 \\ \frac{P}{2}(l - x) & l/2 < x < l \end{cases}$$

2)



FBD:

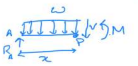


$\Sigma F_y = 0 \Rightarrow R_A + R_B = \omega L$

$\Sigma M = 0$ @A $\Rightarrow -\omega l\left(\frac{l}{2}\right) + R_B l = 0$

$R_B = \frac{\omega l}{2}$

$\Rightarrow R_A = \frac{\omega l}{2}$



$\Sigma F = 0 \Rightarrow V + \omega x - R_A = 0$

$V = R_A - \omega x$

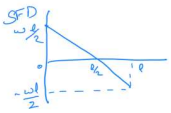
$= \omega\left(\frac{l}{2} - x\right)$

$\Sigma M = 0$ @P $\Rightarrow M + \omega x \frac{x}{2} - R_A x = 0$

$M = R_A x - \frac{\omega x^2}{2}$

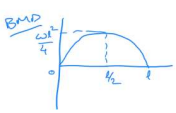
$= \omega \frac{x}{2}(l - x)$

SFD



$V = \omega\left(\frac{l}{2} - x\right)$

BMD



$M = \omega \frac{x}{2}(l - x)$