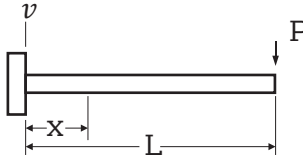
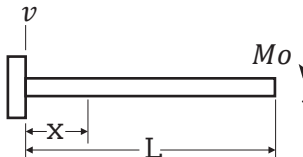
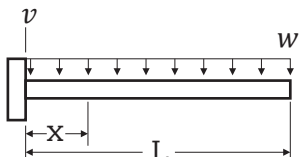
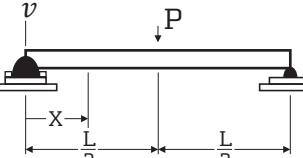
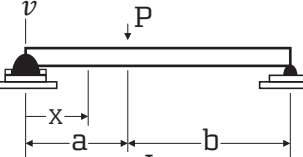
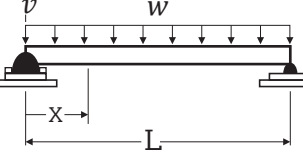
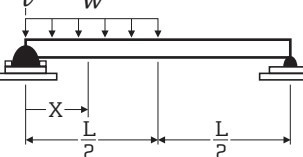
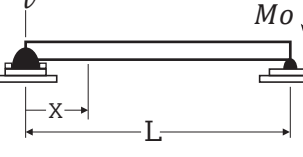


CONDITION	LOADING	$v \uparrow$	$\theta \rightarrow$	EQUATION (+ $\uparrow$ + $\rightarrow$ )
<b>Cantilever Beam</b>  With point loading at free end		$v_{max} = -\frac{PL^3}{3EI}$ at $x=L$	$\theta_{max} = -\frac{PL^2}{2EI}$ at $x=L$	$v = \frac{P}{6EI}(x^3 - 3Lx^2)$
<b>Cantilever Beam</b>  With moment at free end		$v_{max} = \frac{M_oL^2}{2EI}$ at $x=L$	$\theta = \frac{M_oL^2}{EI}$ at $x=L$	$v = \frac{M_o}{2EI}x^2$
<b>Cantilever Beam</b>  With uniform distributed load over full span		$v_{max} = -\frac{wL^4}{8EI}$ at $x=L$	$\theta_{max} = -\frac{wL^3}{6EI}$ at $x=L$	$v = -\frac{w}{24EI}(x^4 - 4Lx^3 + 6L^2x^2)$
<b>Simply Supported</b>  Beam with force at mid span		$v_{max} = -\frac{PL^3}{48EI}$ at $x=L/2$	$\theta_{max} = \pm \frac{PL^2}{16EI}$ at $x=0$ or $x=L$	$v = \frac{P}{48EI}(4x^4 - 3L^2x), 0 \leq x \leq L/2$
<b>Simply Supported</b>  Beam with force at a point other than mid span			$\theta_L = -\frac{Pab(L+b)}{6LEI}$ $\theta = \frac{Pab(L+a)}{6LEI}$	$v = -\frac{P}{6EI}(L^2 - b^2 - x^2)$ $0 \leq x \leq a$
<b>Simply Supported</b>  Beam with uniformly distributed load over full span		$v_{max} = -\frac{5wL^4}{384EI}$ at $x=L/2$	$\theta_{max} = \pm \frac{wL^3}{24EI}$	$v = -\frac{wx}{24EI}(x^3 - 2Lx^2 + L^3)$
<b>Simply Supported</b>  Beam with uniformly distributed load over half span			$\theta_L = -\frac{3wL^3}{128EI}$ $\theta = \frac{7wL^3}{384EI}$	$v = -\frac{wx}{384EI}(9L^3 - 24Lx^2 + 16x^3)$ $0 \leq x \leq L/2$ $v = -\frac{wx}{384EI}(8x^3 - 24Lx^2 + 17L^2x - L^3)$ $L/2 \leq x \leq L$
<b>Simply Supported</b>  Beam with moment at one support		$v_{max} = -\frac{M_oL^2}{9\sqrt{3}EI}$	$v_L = -\frac{M_oL}{6EI}$ $v = \frac{M_oL}{3EI}$	$v = -\frac{M_o x}{6EI}(x^2 - 3Lx + 2L^2)$

**Legends**

$v$  - Vertical deflection  
 $w$  - Uniform distributed load  
 $L$  - Length of Beam  
 $\theta$  - Slope

$P$  - Point load  
 $E$  - Modulus of elasticity  
 $\theta_L$  - Slope at right support

$M_o$  - Moment at point  
 $\theta_{max}$  - Maximum slope  
 $v_{max}$  - Maximum vertical deflection