Bending Stress	I	Z
Circular	$\frac{\pi d^4}{64}$	$\frac{\pi d^3}{32}$
Rectangular	$\frac{bd^4}{12}$	$\frac{bd^3}{12}$
Savare	$\frac{a^4}{12}$	$\frac{a^3}{6}$
Hollow circular	$\frac{\pi}{4}(d_1^4 - d_2^4)$	$\frac{\pi}{32 d_1}(d_1^4 - d_2^4)$

$$\Rightarrow \sigma_b = \frac{M_b}{Z} \Rightarrow Z = \frac{I}{y}$$

$$\Rightarrow \left[\frac{\sigma_b}{y} = \frac{M_b}{I} \right] \Leftarrow$$

$\sigma_b \Rightarrow$ Bending stress

$I \Rightarrow$ Moment of inertia

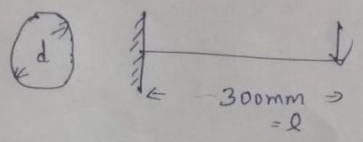
$y \Rightarrow$ Deflection.

$M_b \Rightarrow$ Torque.

Bending Stress

Problems based on Bending Stresses.

(1) A Circular shaft length of 300 mm, and applying its one end fixed at another end. load is 12500 N. acting stress 35 N/mm². find out the diameter of Circular shaft and find out deflection



Gn:

$P = 12500\ N$

$l = 300\ mm$

$\sigma_b = 35\ N/mm^2$

To find: $\Rightarrow$ 'd' = ? y = ?

Sdn:

Bending Moment $(M_B) = P \times l = 12500 \times 300$

$= 3.75 \times 10^6\ N\cdot mm$

Section Modulus $= (Z) = \frac{\pi d^3}{32}$

$\sigma_b = \frac{M_b}{Z} \Rightarrow Z = \frac{I}{y}$

$\frac{\pi d^3}{32} = \frac{M_b}{\sigma_b} \Rightarrow \boxed{d = 103mm}$

$I = \pi d^4 / 64$

$\frac{\sigma_b}{y} = \frac{M_b}{I}$