SNS COLLEGE OF TECHNOLOGY

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DEPARTMENT OF AEROSPACE ENGINEERING

SECTION MODULUS

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SECTION MODULUS

1. *Rectangular Section*

Moment of inertia of a rectangular section about an axis through its C.G. (or through N.A.) is given by,

$$I = \frac{bd^3}{12}$$

Distance of outermost layer from N.A. is given by,

$$y_{max} = \frac{d}{2}$$

∴ Section modulus is given by,

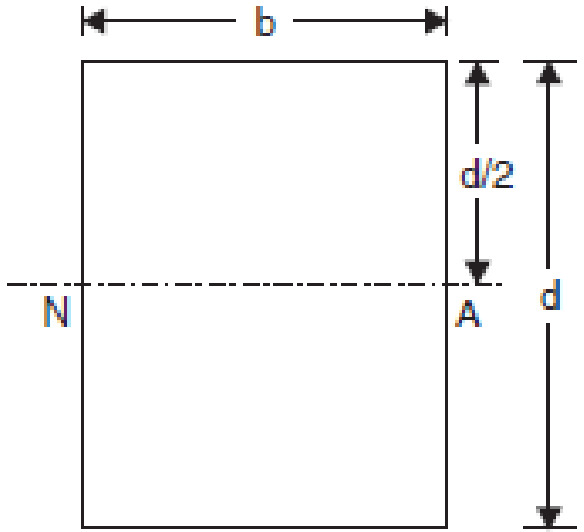

Fig. 7.7

$$Z = \frac{I}{y_{max}} = \frac{bd^3}{12 \times \left(\frac{d}{2}\right)} = \frac{bd^3}{12} \times \frac{2}{d} = \frac{bd^2}{6}$$

SECTION MODULUS

2. *Hollow Rectangular Section*

Here $$I = \frac{BD^3}{12} - \frac{bd^2}{12}$$

$$= \frac{1}{12}[BD^3 - bd^3]$$

$$y_{max} = \frac{D}{2}$$

$$\therefore \quad Z = \frac{I}{y_{max}}$$

$$= \frac{\frac{1}{12}[BD^3 - bd^3]}{\left(\frac{D}{2}\right)}$$

$$= \frac{1}{6D}[BD^3 - bd^3] \quad \ldots(7.8)$$

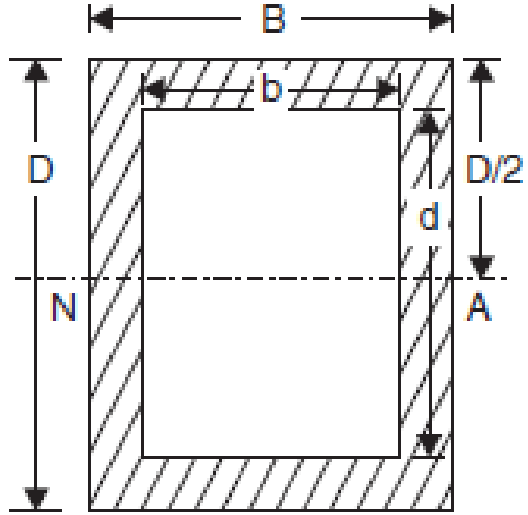

Fig. 7.8

SECTION MODULUS

3. *Circular Section*

For a circular section,

$$I = \frac{\pi}{64} d^4 \quad \text{and} \quad y_{max} = \frac{d}{2}$$

$$\therefore \quad Z = \frac{I}{y_{max}} = \frac{\frac{\pi}{64} d^4}{\left(\frac{d}{2}\right)} = \frac{\pi}{32} d^3$$

SECTION MODULUS

4. *Hollow Circular Section*

Here $$I = \frac{\pi}{64}\,[D^4 - d^4]$$

$$y_{max} = \frac{D}{2}$$

$$\therefore \quad Z = \frac{I}{y_{max}} = \frac{\frac{\pi}{64}[D^4 - d^4]}{\left(\frac{D}{2}\right)}$$

$$= \frac{\pi}{32D}\,[D^4 - d^4] \qquad ...(7.10)$$

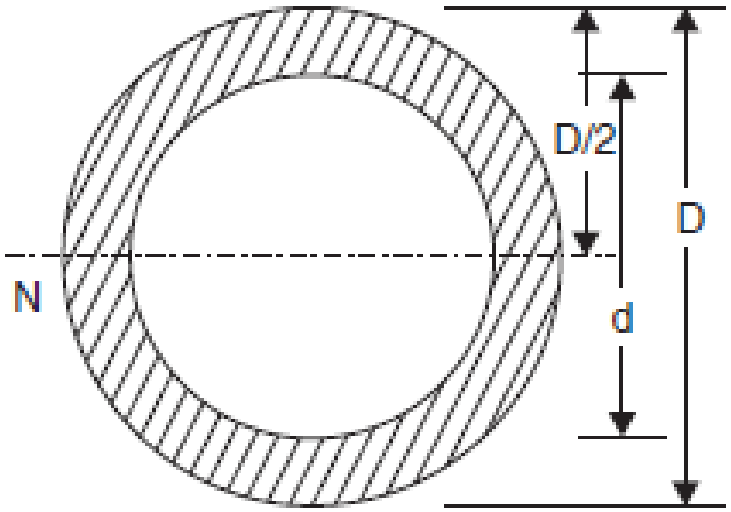

Fig. 7.9


Thank You