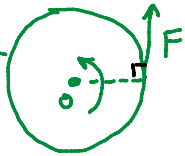


$$a_r = 16 \text{ cm/s}^2$$

Ex 4:

Disc



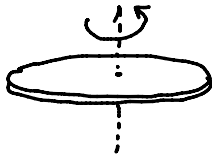
$$R = 20 \text{ cm}, M = 10 \text{ kg}, \rightarrow R = 0.2 \text{ m}$$

$$F = 10 \text{ N}$$

(1) $\alpha = ?$

(ii) if at $t=0$, $\omega_0 = 0$ find value of ω at $t = 5 \text{ sec}$.

(iii) KE of disc at $t = 5 \text{ sec}$



Sol:

$$\tau = I\alpha$$

$$\tau = R \cdot F \cdot \sin\theta \Rightarrow \tau = 0.2 \times 10 \times \sin 90^\circ$$

$$\tau = 2 \text{ Nm}$$

$$I = \frac{MR^2}{2} \Rightarrow I = \frac{10 \times (0.2)^2}{2} = \frac{10 \times 0.04}{2}$$

$$I = 0.2 \text{ kgm}^2$$

$$\alpha = \frac{\tau}{I} \Rightarrow \alpha = \frac{2}{0.2} \Rightarrow \alpha = 10 \text{ rad/s}^2$$

(ii) $\omega = \omega_0 + \alpha t \Rightarrow \omega = 0 + 10 \times 5$

$$\omega = 50 \text{ rad/s}$$

$$K = \frac{1}{2} m v^2$$

$$\downarrow \quad \downarrow$$

$$I \quad \omega^2$$

(iii) $K_{\text{rot}} = \frac{1}{2} I \omega^2$

$$= \frac{1}{2} \times 0.2 \times (50)^2$$

$$= 0.1 \times 2500$$

$$K_{\text{rot}} = 250 \text{ J}$$