

### Section-3

Pr. 10 given  $d = 300 \text{ mm}$  or  $r = 150 \text{ mm} = 0.15 \text{ m}$

$m = 5 \text{ kg}$   $l = 600 \text{ mm} = 0.6 \text{ m}$

$N = 300 \text{ rpm}$  or  $\omega = 2\pi \times 300/60 = 31.42 \text{ rad/s}$

We know that the mass moments of inertia of the disc about an axis through its center of gravity and perpendicular to plane of disc.

$$I = \frac{mr^2}{2} = \frac{5 \cdot (0.15)^2}{2} = 0.056 \text{ kg-m}^2$$

and couple due to mass of disc.

$$C = mg \cdot l = 5 \times 9.81 \times 0.6 = 29.43 \text{ N-m}$$

Let

we know that couple (C)

$$29.43 = I \omega \omega_p = 0.056 \times 31.42 \times \omega_p$$
$$= 1.76 \omega_p$$

$$\omega_p = 29.43/1.76 = 16.72 \text{ rad/s Ans}$$