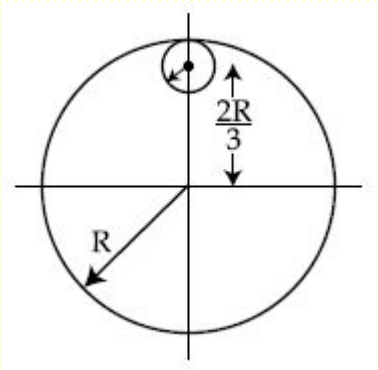
From a uniform circular disc of radius R and mass 9 M, a small disc of radius R/3 is removed as shown in the figure. The moment of inertia of the remaining disc about an axis perpendicular to the plane of the disc and passing through centre of disc is:



(1) $4MR^2$

(2) $\frac{40}{9}MR^2$

(3) $10MR^2$

(4) $\frac{37}{9}MR^2$

Let m be the mass of the cut portion,

Required $I = I_{9M} + I_{-m}$

$$m = 9M \times \frac{(R/3)^3}{R^2} = M$$

Now,

$$I = \frac{9MR^2}{2} + \left\{ \frac{-m(R/3)^2}{2} + (-m)\left(\frac{2R}{3}\right)^2 \right\}$$

Where parallel axes theorem has been used for I_{-m}.

$$I = \frac{9MR^2}{2} - M\left(\frac{R^2}{18} + \frac{4R^2}{9}\right)$$

$$\therefore I = \frac{9MR^2}{2} - \frac{MR^2}{2} = 4MR^2$$

Hence, option (1).

Based on JEE Main 2018 - 123IITJEE