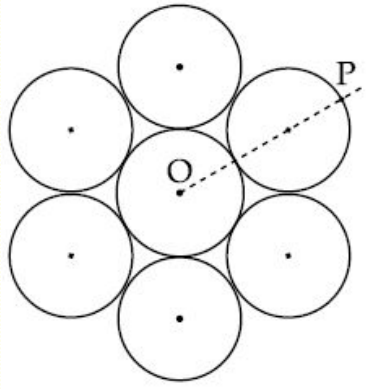


Seven identical circular planar disks, each of mass  $M$  and radius  $R$  are welded symmetrically as shown. The moment of inertia of the arrangement about the axis normal to the plane and passing through the point  $P$  is:



- (1)  $\frac{19}{2}MR^2$
- (2)  $\frac{55}{2}MR^2$
- (3)  $\frac{73}{2}MR^2$
- (4)  $\frac{181}{2}MR^2$

Let us first find moment of inertia of the system about  $O$ .

$$I_O = \frac{MR^2}{2} + 6\{I_{CM} + M(2R)^2\}$$

$$\therefore I_O = \frac{MR^2}{2} + 6\left(\frac{MR^2}{2} + 4MR^2\right)$$

$$\therefore I_O = \frac{MR^2}{2} + 27MR^2 = \frac{55}{2}MR^2$$

Now, for this system of  $7M$  the moment of inertia about  $P$  can be obtained using the parallel axes theorem.

$$\therefore I_P = I_O + 7M(3R)^2$$

$$\therefore I_P = \frac{55}{2}MR^2 + 63MR^2 = \frac{181}{2}MR^2$$

Hence, Option (4).

Based on JEE Main 2018 - [123IITJEE](#)