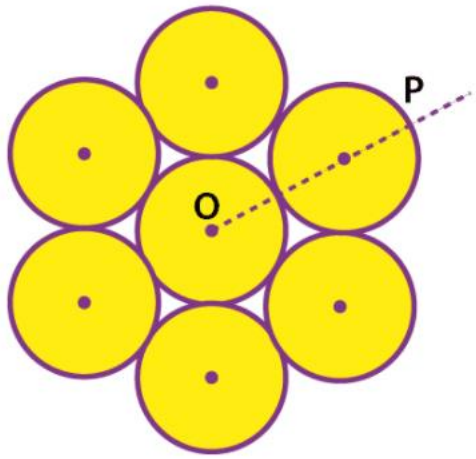
Q14: Seven identical circular planar disks, each of mass M and radius R are welded symmetrically as shown. The moment of inertia of the arrangement about the axis normal to the plane and passing through the point P is



1. $(55/2)MR^2$
2. $(73/2)MR^2$
3. $(181/2)MR^2$
4. $(19/2)MR^2$

Solution

$I_0 = I_{cm} + md^2$

$I_0 = (7MR^2/2) + 6(M \times (2R)^2) = 55MR^2/2$

$I_p = I_0 + md^2$

$I_p = 55MR^2/2 + 7M(3R)^2 = (181/2)MR^2$

Answer: (3) $(181/2)MR^2$