11. (2)

$I_{tangent} = I_{diameter} + MR^2$

$= \frac{2}{5}MR^2 + MR^2 = \frac{7}{5}MR^2$

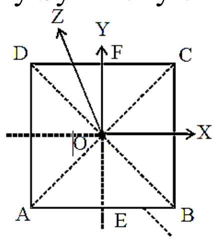
12. (4)

By the theorem of perpendicular axes,

$I = I_{EF} + I_{GH}$

Here, I is the moment of inertia of square lamina about an axis through O and perpendicular to its plane.

$\therefore I_{EF} = I_{GH}$ (By Symmetry of Figure)



$\therefore I_{EF} = \frac{I}{2}$ … (i)

Again, by the same theorem,

$I = I_{AC} + I_{BD} = 2I_{AC}$

($\because I_{AC} = I_{BD}$ by symmetry of the figure)

$\therefore I_{AC} = \frac{I}{2}$ … (ii)

From (i) and (ii), we get, $I_{EF} = I_{AC}$

13. (1)

The moment of inertia of solid sphere A about its diameter $I_A = \frac{2}{5}MR^2$

The moment of inertia of a hollow sphere B about its diameter $I_B = \frac{2}{3}MR^2$

$\therefore I_A < I_B$

14. (2)

15. (4)

16. (4)

17. (3)

The moment of inertia of a disc of radius R about an axis perpendicular to the disc and passing through the centre is given by

$I = \frac{1}{2}MR^2 = \frac{1}{2}\times 0.4\times 1^2 = 0.2\ \text{kg}\,\text{m}^2$

18. (2)

$I = \left(\frac{m_1 m_2}{m_1 + m_2}\right)r^2 = \frac{3}{4}mr^2$

19. (3)

$Y_{CM} = \frac{m_1y_1 + m_2y_2 + m_3y_3}{m_1 + m_2 + m_3} = \frac{0 + 0 + 2(\sqrt{3})}{6} = \frac{1}{\sqrt{3}}$

20. (1)

$MK^2 = \frac{ML^2}{12} \Rightarrow K = \frac{L}{\sqrt{12}}$