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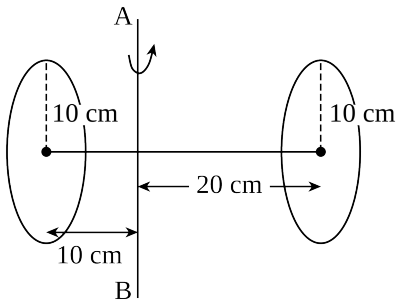
JEE MAIN SYSTEM OF PARTICLES AND ROTATIONAL MOTION — THEOREMS OF PARALLEL AND PERPENDICULAR AXES — PYQS

Max. Marks: 44 **Questions:** 11

Section A (MCQ) — 4 questions

Q.1 Two circular discs of radius each 10 cm are joined at their centres by a rod of length 30 cm and mass 600 gm as shown in figure.
If the mass of each disc is 600 gm and applied torque between two discs is 43×10^5 dyne.cm, the angular acceleration of the discs about the given axis AB is _____ rad/s^2.

[JEE Main 2026 (Online) 28th January Morning Shift]



(1) 100 (2) 22 (3) 27 (4) 11

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Q.2 The moment of inertia of a square loop made of four uniform solid cylinders, each having radius R and length L (R < L) about an axis passing through the mid points of opposite sides, is (Take the mass of the entire loop as M):

[JEE Main 2026 (Online) 23rd January Morning Shift]

(1) $\frac{3}{4}MR^2 + \frac{1}{6}ML^2$ (2) $\frac{3}{8}MR^2 + \frac{7}{12}ML^2$

(3) $\frac{3}{4}MR^2 + \frac{7}{12}ML^2$ (4) $\frac{3}{8}MR^2 + \frac{1}{6}ML^2$

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Q.3 A solid sphere of mass 5 kg and radius 10 cm is kept in contact with another solid sphere of mass 10 kg and radius 20 cm. The moment of inertia of this pair of spheres about the tangent passing through the point of contact is _____ kg·m^2.

[JEE Main 2026 (Online) 22nd January Morning Shift]

(1) 0.18 (2) 0.72 (3) 0.36 (4) 0.63

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Q.4 The moment of inertia of a circular ring of mass M and diameter r about a tangential axis lying in the plane of the ring is :

[JEE Main 2025 (Online) 2nd April Evening Shift]

(1) $\frac{3}{8}Mr^2$ (2) $2Mr^2$ (3) $\frac{1}{2}Mr^2$ (4) $\frac{3}{2}Mr^2$

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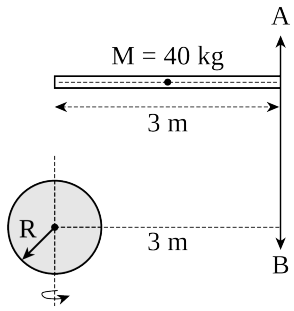
Section B (Numerical) — 7 questions

Q.5 Moment of inertia about an axis AB for a rod of mass 40 kg and length 3 m is same as that of a solid sphere of mass of 10 kg and radius R about an axis parallel to AB axis with separation of 3 m as shown in figure below. The value of R is given as $\sqrt{\frac{\alpha}{2}}$. The value of α is _____.

[JEE Main 2026 (Online) 2nd April Evening Shift]



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Q.6 A solid sphere of radius 10 cm is rotating about an axis which is at a distance 15 cm from its centre. The radius of gyration about this axis is $\sqrt{n}$ cm. The value of n is

[JEE Main 2026 (Online) 28th January Morning Shift]

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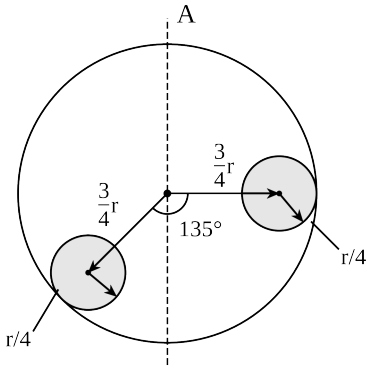
Q.7 Suppose there is a uniform circular disc of mass M kg and radius r m shown in figure. The shaded regions are cut out from the disc. The moment of inertia of the remainder about the axis A of the disc is given by $\frac{x}{256}Mr^2$. The value of x is _____.

[JEE Main 2026 (Online) 23rd January Evening Shift]



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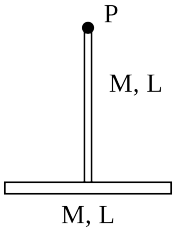
Q.8 Two identical thin rods of mass M kg and length L m are connected as shown in figure. Moment of inertia of the combined rod system about an axis passing through point P and perpendicular to the plane of the rods is $\frac{x}{12}ML^2\ \text{kg}\,\text{m}^2$. The value of x is _____.

[JEE Main 2026 (Online) 21st January Morning Shift]



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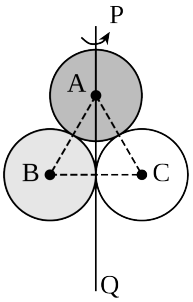
Q.9 A, B and C are disc, solid sphere and spherical shell respectively with same radii and masses. These masses are placed as shown in figure.



The moment of inertia of the given system about PQ axis is $\frac{x}{15}I$, where I is the moment of inertia of the disc about its diameter. The value of x is _____.

[JEE Main 2025 (Online) 7th April Morning Shift]

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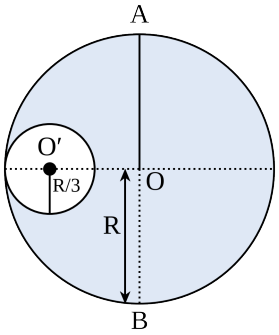
Q.10 Let M and R be the mass and radius of a disc. A small disc of radius R/3 is removed from the bigger disc as shown in figure. The moment of inertia of remaining part of bigger disc about an axis passing through the centre O and perpendicular to the plane of disc is $\frac{4}{x}MR^2$. The value of x is _____.

[JEE Main 2025 (Online) 7th April Evening Shift]



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Q.11 The moment of inertia of a solid disc rotating along its diameter is 2.5 times higher than the moment of inertia of a ring rotating in similar way. The moment of inertia of a solid sphere which has same radius as the disc and rotating in similar way, is n times higher than the moment of inertia of the given ring. Here, n = _____. Consider all the bodies have equal masses.

[JEE Main 2025 (Online) 28th January Morning Shift]

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ANSWER KEY

Section A (MCQ) — 4 questions

Ques.	1	2	3	4							
Ans.	**4**	**4**	**4**	**1**							

Section B (Numerical) — 7 questions

Ques.	5	6	7	8	9	10	11
Ans.	**15**	**265**	**109**	**17**	**199**	**9**	**4**