PHYSICS

BOOKS - DISHA PHYSICS (HINGLISH)

ROTATIONAL MOTION

Physics

1. A thin circular ring of mass M and radius R is rotating about its axis with a constant angular velocity omega. Four objects each of mass m, are kept gently to the opposite ends of two perpendicular diameters of the ring. The angular velocity of the ring will be

A. $\frac{M\omega}{M+4m}$

B. $\frac{(M+4m)\omega}{M}$

C. $\frac{(M-4m)\omega}{M+4m}$

D. $\frac{M\omega}{4m}$

Answer:

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2. The angular momentum of a system of particles is conserved

A. When no external force acts upon the system

B. When no external torque acts upon the system

C. When no external impulse acts upon the system

D. When axis of rotation remains same

Answer:

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3. Two rigid bodies A and B rotate with rotational kinetic energies E_A and E_B respectively. The moments of inertia of A and B about the axis of rotation are I_A and I_B respectively. If $I_A = I_B/4$ and E_(A)= 100 E_(B), the ratio of angular momentum (L_(A)) of A to the angular momentum (L_(B)) of B is

A. 25

B. 5//4

C. 5

D. 1//4

Answer:

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4. A uniform heavy disc is rotating at constant angular velocity ω about a vertical axis through its centre and perpendicular to the plane of the disc. Let L be its angular momentum. A lump of plasticine is dropped vertically on the disc and sticks to it. Which of the following will be constant?

A. ω

B. omega andL both

C. L only

D. Neither omega nor L

Answer:

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5. Two discs of moment of inertia I_1 and I_2 and angular speeds ω_1 and ω_2 are rotating along the collinear axes passing through their center of mass and perpendicular to their plane. If the two are made to

rotate combindly along the same axis the rotational $K.E.$ of system will be

A. $\frac{I_1\omega_1 + I_1\omega_2}{2(I_1 + I_2)}$

B. $\frac{(I_1 + I_2)(\omega_1 + \omega_2)^2}{2}$

C. $\frac{(I_1\omega_1 + I_2\omega_2)^2}{2(I_1 + I_2)}$

D. None of these

Answer:

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6. A particle performing uniform circular motion gas angular momentum L. If its angular frequency is double

and its kinetic energy halved, then the new angular momentum is :

A. 2 L

B. 4 L

C. $L/2$

D. $L/4$

Answer:

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7. A round disc of moment of inertia I_2 about its axis perpendicular to its plane and passing through its

centre is placed over another disc of moment of inertia I_1 rotating with an angular velocity ω about the same axis. The final angular velocity of the combination of discs is.

A. $\frac{I_2\omega}{I_1+I_2}$

B. ω

C. $\frac{I_1\omega}{I_1+I_2}$

D. $\frac{(I_1+I_2)\omega}{I_1}$

Answer:

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8. Calculate the angular momentum of a body whose rotational energy is 10 joule. If the angular momentum vector coincides with the axis of rotation and its moment of inertia about this axis is 8×10^{-7} kg m^(2)

A. $4 \times 10^{-3} kgm^2 / s$

B. $2 \times 10^{-3} kgm^2 / s$

C. $6 \times 10^{-3} kgm^2 / s$

D. None of these

Answer:

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9. if the earth is treated as a sphere of radius Radn mass M, Its angular momentum about the axis of its rotation with period T, is

A. $\frac{\pi MR^3}{T}$

B. $\frac{MR^2\pi}{T}$

C. $\frac{2\pi MR^2}{5T}$

D. $\frac{4\pi MR^2}{5T}$

Answer:

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10. If the earth is a point mass of 6×10^{24} kg revolving around the sun at a distance of 1.5×10^{8} km and in time $T = 3.14 \times 10^{7} s$. then the angular momentum of the earth around the sun is

A. $1.2 \times 10^{18} kgm^2 / s$

B. $1.8 \times 10^{29} kgm^2 / s$

C. $1.5 \times 10^{37} kgm^2 / s$

D.

Answer:

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11. An automobile engine develops 100 kilo $-$ watt, when rotating at a speed of $1800 rev / \min$. Find the torque developed by it.

A. 350 N-m

B. 440 N-m

C. 531 N-m

D. 628 N-m

Answer:

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12. A constant torque acting on a uniform circular wheel changes its angular momentum from A_0 to $4A_0$ in 4 seconds. Find the magnitude of this torque.

A. $\frac{3A_0}{4}$

B. A_0

C. $4A_0$

D. $12A_0$

Answer:

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13. A wheel having moment of inertia $2kgm^2$ about its vertical axis, rotates at the rate of $60r \pm$ about this axis. The torque which can stop the wheel's rotation in one minute would be

A. $\frac{2\pi}{15}Nm$

B. $\frac{\pi}{12}Nm$

C. $\frac{\pi}{15}Nm$

D. $\frac{\pi}{18}Nm$

Answer:

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14. Find the torque of a force $\overrightarrow{F} = -3\hat{i} + \hat{j} + 5\hat{k}$ acting at the point $\overrightarrow{r} = 7\hat{i} + 3\hat{j} + \hat{k}$

A. $14\hat{i} - 38\hat{j} + 16\hat{k}$

B. $4\hat{i} + 4\hat{j} + 6\hat{k}$

C. $-14\hat{i} + 38\hat{j} - 16\hat{k}$

D. $-21\hat{i} + 3\hat{j} + 5\hat{k}$

Answer:

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15. A constant torque of $1000N - m$ turns a wheel of moment of inertia $200kg - m^2$ about an axis through

its centre. Its angular velocity after 3 seconds is.

A. $15rad/s$

B. $10rad/s$

C. $5rad/s$

D. $1rad/s$

Answer:

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16. A torque of $20N-m$ is applied on a wheel initially at rest. Calculate the angular momentum of the wheel after 3 sec.

A. 750 rad

B. 1500 rad

C. 3000 rad

D. 6000 rad

Answer:

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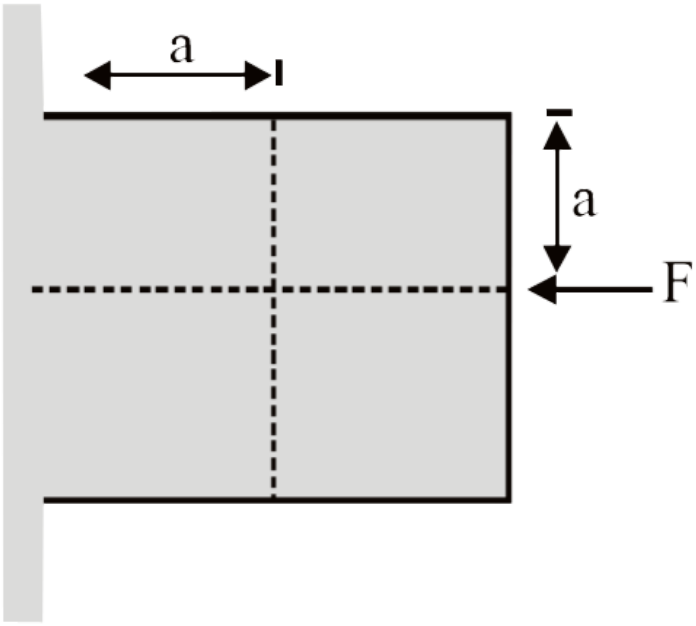
17. A horizontal force F is applied such that the block remains stationary, then which of the following

statement is false



A. f = mg [where f is the friction force]

B. F = N [where N is the normal reaction]

C. F will not produce torque

D. N will not produce torque

Answer:

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18. In a bicycle the radius of rear wheel is twice the radius of front wheel. If v_F and v_r are the speeds of top most points of front and rear wheels respectively, then :

A. $v_r = 2v_F$

B. $v_F = 2v_r$

C. $v_F = v_r$

D. $v_F > v_r$

Answer:

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19. The wheel of a car is rotating at the rate of 1200 revolutions per minute. On pressing the accelerator for 10 seconds, it starts rotating at 4500 revolutions per minute. The angular acceleration of the wheel is

A. $30 rad / \sec^2$

B. $1880 degree / \sec^2$

C. $40 rad / \sec^2$

D. $1980 degree / \sec^2$

Answer:

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20. A wheel rotates with a constasnt acceleration of $2.0ra\frac{d}{s^2}$. If the wheel starts from rest, how many evolutions wil it make in the first 10 senconds?

A. 8

B. 16

C. 24

D. 32

Answer:

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21. A child is standing with folded hands at the center of a platform rotating about its central axis. The kinetic energy of the system is K. The child now stretches his arms so that the moment of inertia of the system doubles. The kinetic energy of the system now is

A. 1, 2 and 3 are correct

B. 1 and 2 are correct

C. 2 and 4 are correct

D. 1 and 3 are correc

Answer:

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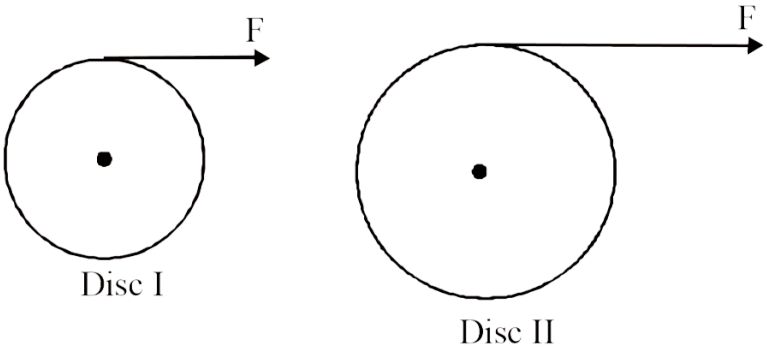
22. Two uniforms discs of equal mass but unequal radii are mounted on fixed horizontal axiles. Light strings are wrapped on each of the discs. The strings are pulled by constant equal forces F for same amount of time as shown in the figure



Angular momenta of discs are L1 and L2 and their kinetic energies are K1 and K2. Which of the following statements true –

$L_1 = L_2$

$L_1 < L_2$

$K_1 > K_2$

$K_1 = K_2$

A. 1, 2 and 3 are correct

B. 1 and 2 are correct

C. 2 and 4 are correct

D. 1 and 3 are correct

Answer:

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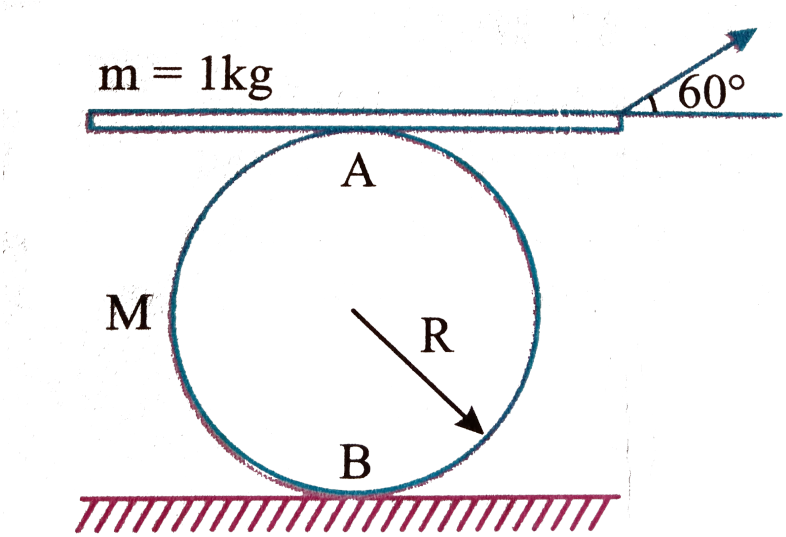
23. Consider a cylinder of mass $M = 1kg$ and radius $R = 1m$lying on a rough horizontal plane. It has a

plank lying on its stop as shown in the figure.



A force $F = 55N$ is applied on the plank moves and causes the cylinder to roll. The plank always remains horizontal. there is no slipping at any point of contact. The acceleration of cylinder is

A. $20m/s^2$

B. $10m/s^2$

C. $5m/s^2$

D. None of these

Answer:

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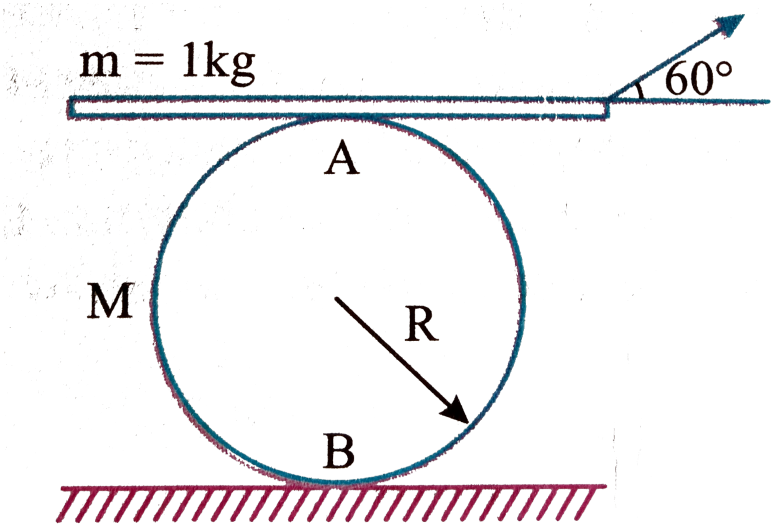
24. Consider a cylinder of mass $M = 1kg$ and radius $R = 1m$lying on a rough horizontal plane. It has a plank lying on its stop as shown in the figure.



A force $F = 55N$ is applied on the plank moves and causes the cylinder to roll. The plank always remains horizontal. there is no slipping at any point of contact. The value of frictional force at A is

A. 7.5 N

B. 5.0 N

C. 2.5 N

D. None of these

Answer:

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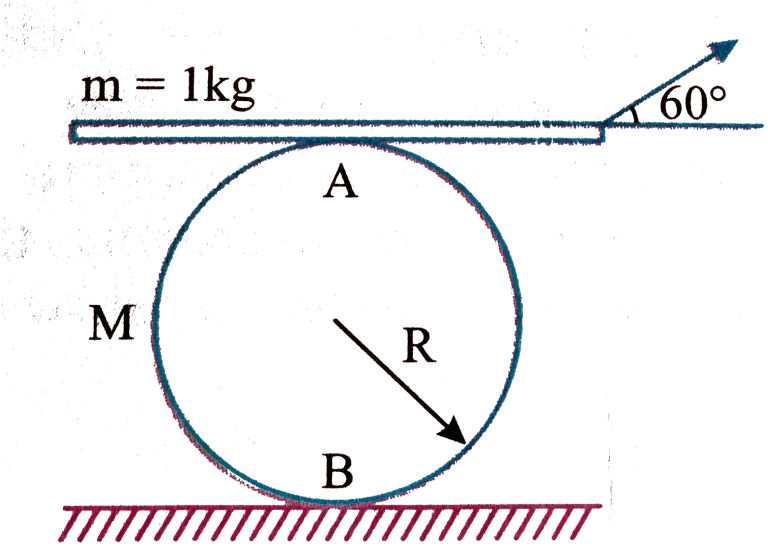
25. Consider a cylinder of mass $M = 1kg$ and radius $R = 1m$lying on a rough horizontal plane. It has a plank lying on its stop as shown in the figure.



A force $F = 55N$ is applied on the plank moves and causes the cylinder to roll. The plank always remains horizontal. there is no slipping at any point of contact. The value of frictional force at B is

A. 7.5 N

B. 5.0 N

C. 2.5 N

D. None of these

Answer:

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26. Statement -1 : Torque is equal to rate of change of angular momentum .

Statement -2: Angular momentum depends on moment of inertia and angular velocity.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement -1 is False, Statement-2 is True

D. Statement -1 is True, Statement-2 is False.

Answer:

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27. Statement -1: Torque due to force is maximum when angle between $\overrightarrow{r}$ and $\overrightarrow{F}$ $is 90^{\circ}$.

Statement -2: The unit of torque is newton- meter.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement -1 is False, Statement-2 is True

D. Statement -1 is True, Statement-2 is False.

Answer:

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28. Statement -1: It is harder to open and shut the door if we apply force near the hinge

Statement -2: Torque is maximum at hinge of the door.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for

Statement-1.

C. Statement -1 is False, Statement-2 is True

D. Statement -1 is True, Statement-2 is False.

Answer:

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29. Five particles of mass 2 kg are attached to the rim of a circular disc of radius 0.1 m & negligible mass. Moment of inertia of the system about an axis passing through the centre of the disc & perpendicular to its plane is

A. $1\text{kg} - m^2$

B. $0.1\text{kg} - m^2$

C. $2\text{kg} - m^2$

D. $0.2\text{kg} - m^2$

Answer:

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30. Two discs of the same material and thickness have radii 0.2 m and 0.6 m. Their moments of inertia about their axes will be in the ratio of

A. $1:81$

B. $1:27$

C. $1:9$

D. $1:3$

Answer:

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31. A cylinder of 500 g and radius 10 cm has moment of inertia (about its natural axis)

A. $2.5 \times 10^{-3} \mathrm{kg} - m^2$

B. $2 \times 10^{-3} \mathrm{kg} - m^2$

C. $5 \times 10^{-3} \mathrm{kg} - m^2$

D. $3.5 \times 10^{-3} \mathrm{kg} - m^2$

Answer:

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32. A constant torque of $31.4N - m$ id exterted on a pivoted wheel. If the angular acceleration of the wheel is $4\pi rad / s^2$, then the moment of inertia will be.

A. $2.5\mathrm{kg} - m^2$

B. $2.5kg - m^2$

C. $4.5kg - m^2$

D. $5.5kg - m^2$

Answer:

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33. From a uniform wire, two circular loops are made (i) P of radius r and (ii) Q of radius nr. If the moment of inertia of Q about an axis passing through its center and perpendicular to tis plane is 8 times that of P about a similar axis, the value of n is (diameter of the wire is very much smaller than r or nr)

A. 8

B. 6

C. 4

D. 2

Answer:

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34. The moment of inertia of a sphere of mass M and radius R about an axis passing through its centre is $\frac{2}{5}MR^2$. The radius of gyration of the sphere about a parallel axis to the above and tangent to the sphere is

A. $\frac{7}{5}R$

B. $\frac{3}{5}R$

C. $\left(\sqrt{\frac{7}{5}}\right)R$

D. $\left(\sqrt{\frac{3}{5}}\right)R$

Answer:

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35. Four particles each of mass m are placed at the corners of a square of side length l. The radius of gyration of the system about an axis perpendicular to the plane of square and passing through its centre is

A. $\frac{l}{\sqrt{2}}$

B. $\frac{l}{2}$

C. l

D. $(\sqrt{2})l$

Answer:

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36. The radius of gyration of a disc of mass 50 g and radius 2.5 cm, about an axis passing through its centre of gravity and perpendicular to the plane is

A. 0.52 cm

B. 1.76 cm

C. 3.54 cm

D. 6.54 cm

Answer:

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37. Moment of inertia of a ring of mass m = 3 gm and radius r = 1 cm about an axis passing through its edge and parallel to its natural axis is

A. $10gm - cm^2$

B. $100gm - cm^2$

C. $6gm - cm^2$

D. $1gm - cm^2$

Answer:

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38. A disc is of mass M and radius r. The moment of inertia of it about an axis tangential to its edge and in plane of the disc or parallel to its diameter is

A. $\frac{5}{4}Mr^2$

B. $\frac{Mr^2}{4}$

C. $\frac{3}{2}Mr^2$

D. $\frac{Mr^2}{2}$

Answer:

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39. Two spheres each of mass M and radius $R/2$ are connected at their centres with a mass less rod of length $2R$. What will be the moment of inertia of the system about an axis passing through the centre of one of the sphere and perpendicular to the rod ?

A. $\frac{21}{5}Mr^2$

B. $\frac{2}{5}Mr^2$

C. $\frac{5}{2}Mr^2$

D. $\frac{5}{21}Mr^2$

Answer:

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40. Three point masses m_1, m_2 and m_3 are located at the vertices of an equilateral triangle of side α. What is the moment of inertia of the system about an axis along the altitude of the triangle passing through m_1 ?

A. $(m_2 + m_3)\frac{a^2}{4}$

B. $(m_1 + m_2 + m_3)a^2$

C. $(m_1 + m_2)\frac{a^2}{4}$

D. $(m_2 + m_3)a^2$

Answer:

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41. Three rods each of length L and mass M are placed along X, Y and Z axis in such a way that one end of each of the rod is at the origin. The moment of inertia of this system about Z axis is

A. $\frac{2ML^2}{3}$

B. $\frac{4ML^2}{3}$

C. $\frac{5ML^2}{3}$

D. $\frac{ML^2}{3}$

Answer:

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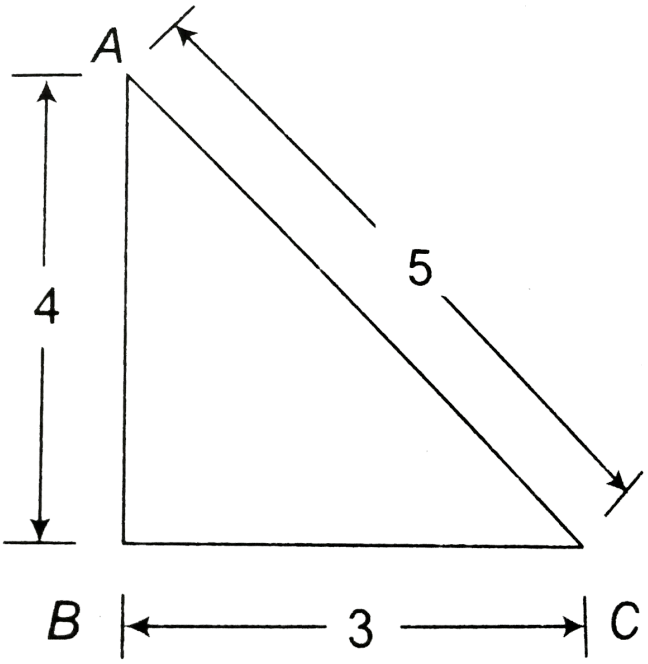
42. ABC is a traiangular plate of uniform thickness. The sides are in the ratio shown in the figure. I_{AB}, I_{BC} and I_{CA} are the moments of inertia of the plate about AB, BC and CA repectively. Which one of the following relations is correct?



A. I_{CA} is maximum

B. $I_{BC} > I_{AB}$

C. $I_{BC} > I_{AB}$

D. $I_{AB} + I_{BC} = I_{CA}$

Answer:

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43. A 1m long rod has a mass of 0.12 kg. The moment of inertia about an axis passin through the centre and perpendicular to the length of rod will be

A. $0.01kg - m^2$

B. $0.001kg - m^2$

C. $1kg - m^2$

D. $10kg - m^2$

Answer:

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44. Two rings of same radius and mass are placed such that their centres are at a common point and their planes are perpendicular to each other. The moment of inertia of the system about an axis passing through the centre and perpendicular to the plane of one of the rings is (mass the ring $= m$, radius $= r$)

A. $\frac{1}{2}mr^2$

B. mr^2

C. $\frac{3}{2}mr^2$

D. $2mr^2$

Answer:

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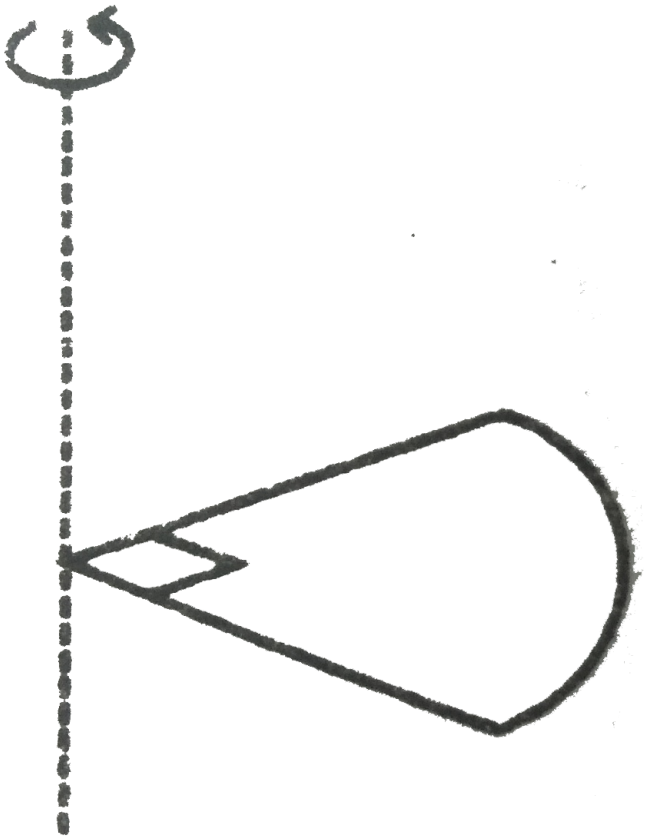
45. One quarter sector is cut from a uniform circular disc of radius R. This sector has mass M. It is made to rotate about a line perpendicular to its plane and passing through the centre of the original disc. It

moment of inertia about the axis of rotation is.



A. $\frac{1}{2}MR^2$

B. $\frac{1}{4}MR^2$

C. $\frac{1}{8}MR^2$

D. $\sqrt{2}MR^2$

Answer:

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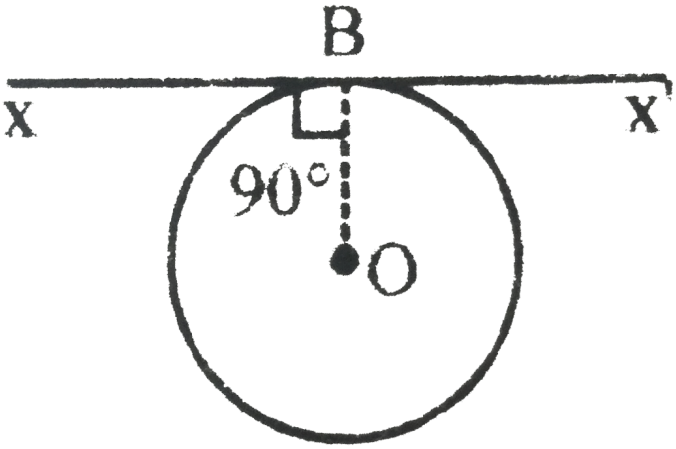
46. A thin wire of length L and uniform linear mass density ρ is bent into a circular loop with centre at O as shown. The moment of inertia of the loop about the

axis XX' is :



A. $\frac{\rho L^3}{8\pi^2}$

B. $\frac{\rho L^3}{16\pi^2}$

C. $\frac{5\rho L^3}{16\pi^2}$

D. $\frac{3\rho L^3}{8\pi^2}$

Answer:

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47. Two discs of same thickness but of different radii are made of two different materials such that their masses are same. The densities of the materials are in the ratio of $1:3$. The moments of inertia of these discs about the respective axes passing through their centres and perpendicular to their planes will be in the ratio of

A. $1:3$

B. $3:1$

C. $1:9$

D. $9:1$

Answer:

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48. A circular disc of radius R and thickness $R/6$ has moment of inertia I about an axis passing through its centre and perpendicular to its plane. It is melted and recast into a solid sphere. The $M.I$ of the sphere about its diameter as axis of rotation is

A. I

B. $\frac{2I}{8}$

C. $\frac{I}{5}$

D. $\frac{I}{10}$

Answer:

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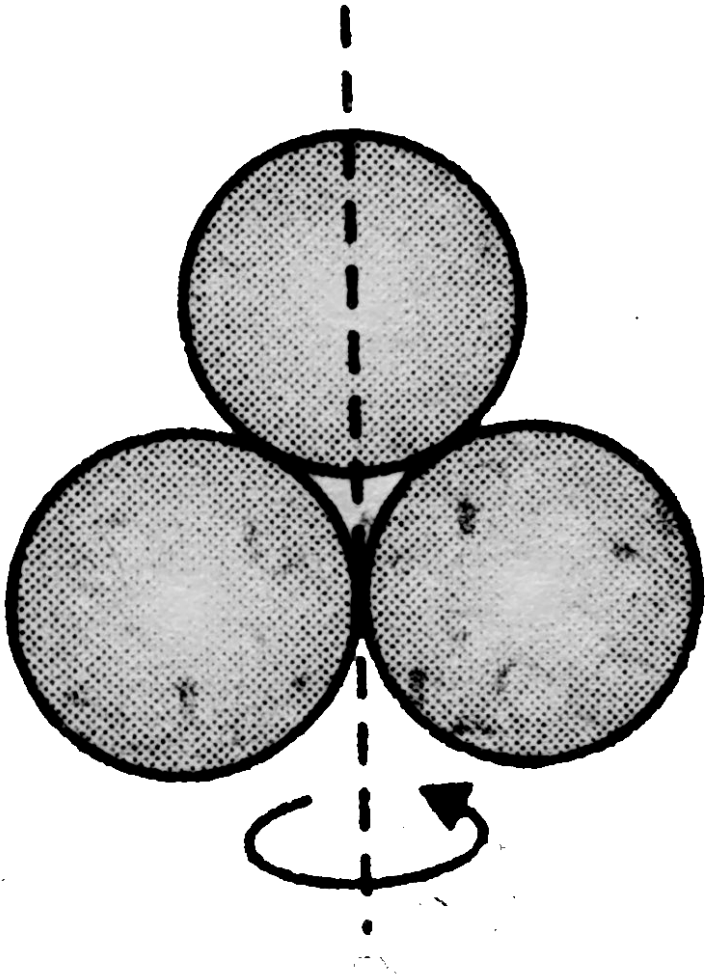
49. Three rings, each of mass m and radius r, are so placed that they touch each other. Find the moment of

inertia about the axis as shown in Fig.



A. $3MR^2$

B. $\frac{3}{2}MR^2$

C. $5MR^2$

D. $\frac{7}{2}MR^2$

Answer:

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50. The density of a rod AB increases linearly from A to B its midpoint is O and its centre of mass is at C. four axes pass through A, B, O and C, all perpendicular to the length of the rod. The moment of inertial of the rod about these axes are I_A, I_B, I_O and I_C respectively.

A. 1 ,2 and 3 are correct

B. 1 and 2 are correct

C. 2 and 4 are correct

D. 1 and 3 are correct

Answer:

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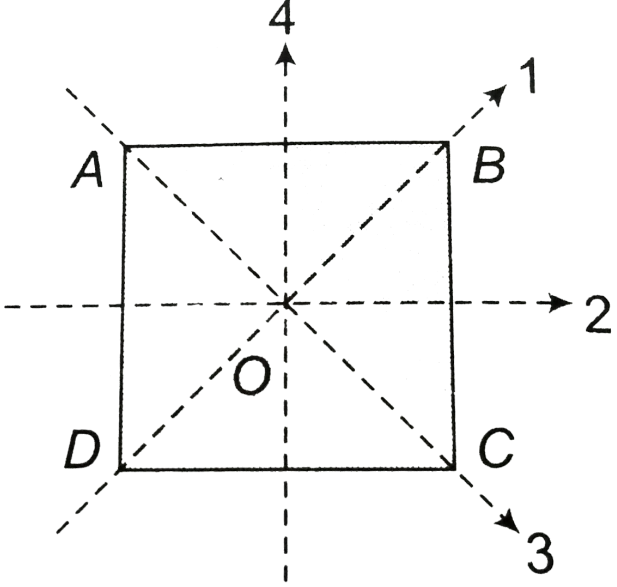
51. The moment of inertia of thin square plate $ABCD$ of uniform thickness about an axis passing through the center O and perpendicular to the plane of the plate is



(*i*) $I_1 + I_2$

(*ii*) $I_2 + I_4$

(*iii*) $I_1 + I_3$

(*iv*) $I_1 + I_2 + I_3 + I_4$

where I_1, I_2, I_3 and I_4 are repectively moments of inertia about axes $1, 2, 3$ and 4 which are in the plane of the plane

A. 1 ,2 and 3 are correct

B. 1 and 2 are correct

C. 2 and 4 are correct

D. 1 and 3 are correct

Answer:

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52. Moment of inertia doesn't depend on

distribution of particles

mass

position of axis of rotation

None of these

A. 1 ,2 and 3 are correct

B. 1 and 2 are correct

C. 2 and 4 are correct

D. 1 and 3 are correct

Answer:

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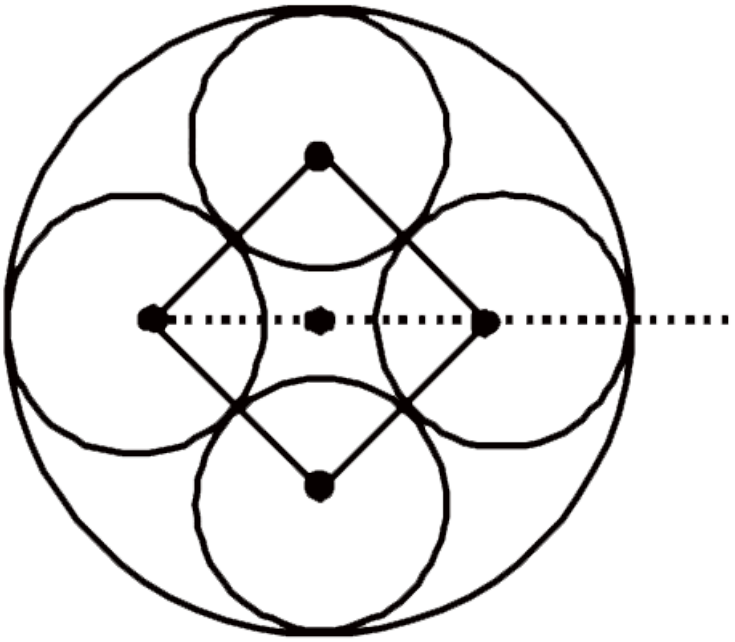
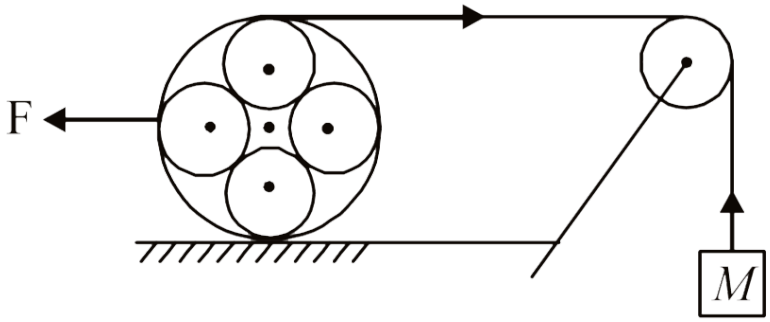
53. Four identical spheres having mass M and radius R are fixed tightly within a massless ring such that the centres of all spheres lie in the plane of ring. The ring is kept on a rough horizontal table as shown. The string is wrapped around the ring can roll without slipping. The

other end of the string is passed over a massless frictionless pulley to a block of mass M. A force F is applied horizontally on the ring, at the same level as the centre, so that the system is in equilibrium.



The moment of inertia of the combined ring system

about the centre of ring will be



A. $\frac{12}{5}MR^2$

B. $\frac{48}{15}MR^2$

C. $\frac{24}{5}MR^2$

D. $\frac{48}{5}MR^2$

Answer:

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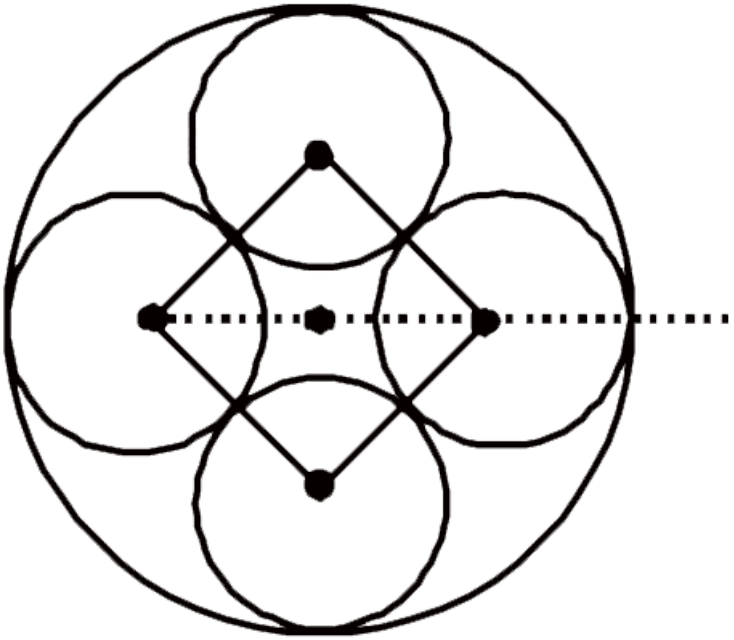
54. Four identical spheres having mass M and radius R are fixed tightly within a massless ring such that the centres of all spheres lie in the plane of ring. The ring is kept on a rough horizontal table as shown. The string is wrapped around the ring can roll without slipping. The other end of the string is passed over a massless frictionless pulley to a block of mass M. A force F is applied horizontally on the ring, at the same level as the centre, so that the system is in equilibrium.



The magnitude of F is

A. Mg

B. 2Mg

C. $\frac{Mg}{2}$

D. None of these

Answer:

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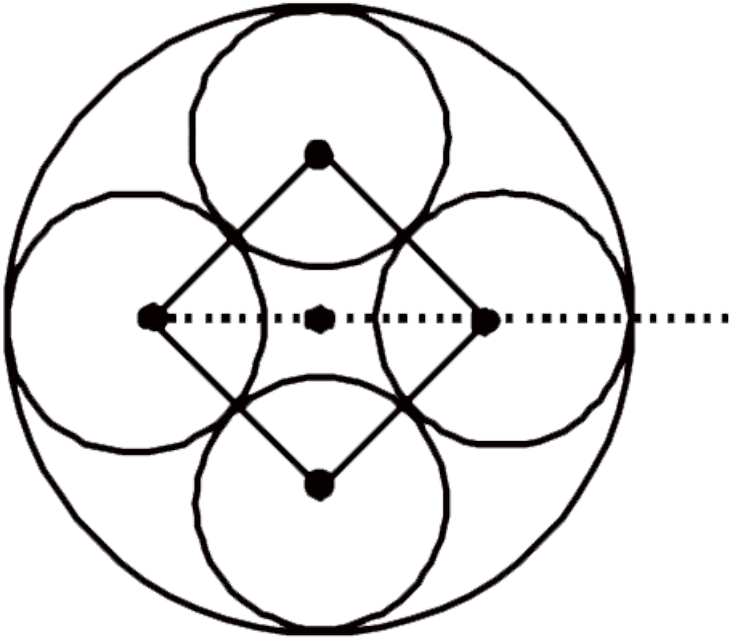
55. Four identical spheres having mass M and radius R are fixed tightly within a massless ring such that the centres of all spheres lie in the plane of ring. The ring is kept on a rough horizontal table as shown. The string is wrapped around the ring can roll without slipping. The other end of the string is passed over a massless frictionless pulley to a block of mass M. A force F is applied horizontally on the ring, at the same level as the centre, so that the system is in equilibrium.



If the masses of the spheres were doubled keeping their dimensions same, the force of friction between the ring and the horizontal surface would

A. be doubled

B. increase but be less than double

C. remain the same

D. decrease

Answer:

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56. Statement-1 : Radius of gyration of a body is a constant quantity.

Statement-2 : The radius of gyration of a body about an axis of rotation may be defined as the root mean square distance of the particles of the body from the axis of rotation.

A. Statement -1 is true , Statement -2 is True , Statement -2 is a correct explanation for

Statement-1.

B. Statement-1 is True , Statement -2 is True , Statement-2 is NOT a correct explanation for statement-1.

C. Statement-1 is False, Statement - 2 is True.

D. Statement - 1 is True , Statement -2 is False.

Answer:

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57. Statement-1 : Moment of inertia of a particle is same, whatever be the axis of rotation.

Statement-2 : Moment of inertia depends on mass and perpendicular distance of the particle from its axis of rotation.

A. Statement -1 is true , Statement -2 is True , Statement -2 is a correct explanation for Statement-1.

B. Statement-1 is True , Statement -2 is True , Statement-2 is NOT a correct explanation for statement-1.

C. Statement-1 is False, Statement - 2 is True.

D. Statement - 1 is True , Statement -2 is False.

Answer:

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58. Statement-1 : If earth shrink (without change in mass) to half of its present size, length of the day would become 6 hours.

Statement-2 : When the size of the earth will change, its moment of inertia will also change.

A. Statement -1 is true , Statement -2 is True , Statement -2 is a correct explanation for Statement-1.

B. Statement-1 is True , Statement -2 is True , Statement-2 is NOT a correct explanation for

statement-1.

C. Statement-1 is False, Statement - 2 is True.

D. Statement - 1 is True , Statement -2 is False.

Answer:

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59. A uniform rod of length 2L is placed with one end in contact with the horizontal and is then inclined at an angle a to the horizontal and allowed to fall without slipping at contact point. When it becomes horizontal, its angular velocity will be

A. $\omega = \sqrt{\frac{3g\sin\alpha}{2L}}$

B. $\omega = \sqrt{\frac{2L}{3g\sin\alpha}}$

C. $\omega = \sqrt{\frac{6g\sin\alpha}{L}}$

D. $\omega = \sqrt{\frac{L}{g\sin\alpha}}$

Answer:

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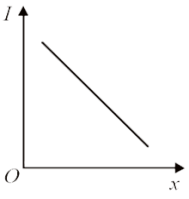
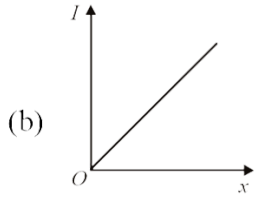
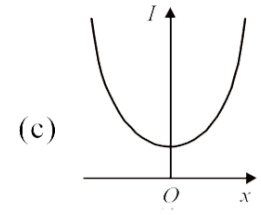
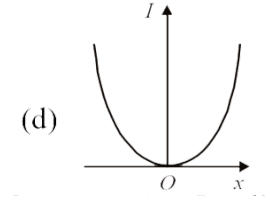
60. According to the theorem of parallel axes $I = I_{\text{cm}} + Mx^2$, the graph between I and x will be

A. (a)



B. 

C. 

D. 

Answer:

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61. An inclined plane makes an angle 30° with the horizontal. A solid sphere rolling down this inclined

plane from rest without slipping has a linear acceleration equal to

A. $\frac{g}{3}$

B. $\frac{2g}{3}$

C. $\frac{5g}{7}$

D. $\frac{5g}{14}$

Answer:

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62. Moment of inertia of a disc about its own axis is I. Its moment of inertia about a tangential axis in its plane is

A. $\frac{5}{2}I$

B. 3I

C. $\frac{3}{2}I$

D. 2I

Answer:

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63. One circular ring and one circular disc, both are having the same mass and radius. The ratio of their moments of inertia about the axes passing through their centres and perpendicular to their planes, will be

A. $1:1$

B. $2:1$

C. $1:2$

D. $4:1$

Answer:

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64. The moment of inertia of a straight thin rod of mass M and length l about an axis perpendicular to its length and passing through its one end, is

A. $\frac{Ml^2}{12}$

B. $\frac{Ml^2}{3}$

C. $\frac{Ml^2}{2}$

D. Ml^2

Answer: B

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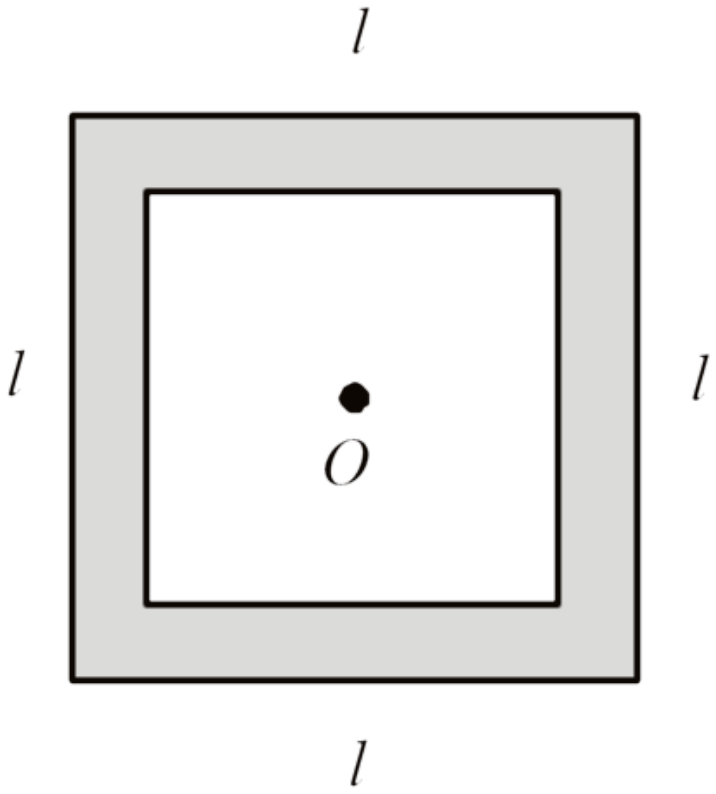
65. Four thin rods of same mass M and same length l, form a square as shown in figure. Moment of inertia of this system about an axis through centre O and

perpendicular to its plane is



A. $\frac{4}{3}Ml^2$

B. $\frac{Ml^2}{3}$

C. $\frac{Ml^2}{6}$

D. $\frac{2}{3}Ml^2$

Answer:

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66. The moment of inertia of a uniform circular ring, having a mass M and a radius R, about an axis tangential to the ring and perpendicular to its plane, is

A. $2MR^2$

B. $\frac{3}{2}MR^2$

C. $\frac{1}{2}MR^2$

D. MR^2

Answer:

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67. The moment of inertia of uniform rectangular plate about an axis passing through its mid-point and parallel to its length l is (b = breadth of rectangular plate)

A. $\frac{Mb^2}{4}$

B. $\frac{Mb^3}{6}$

C. $\frac{Mb^3}{12}$

D. $\frac{Mb^2}{12}$

Answer:

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68. The moment of inertia of a circular ring about an axis passing through its centre and normal to its plane is $200gm \times cm^2$. Then moment of inertia about its diameter is

A. $400gm \times cm^2$

B. $300gm \times cm^2$

C. $200gm \times cm^2$

D. $100gm \times cm^2$

Answer:

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69. The moment of inertia of a thin rod of mass M and length L about an axis perpendicular to the rod at a distance L/4 from one end is

A. $\frac{ML^2}{6}$

B. $\frac{ML^2}{12}$

C. $\frac{7ML^2}{24}$

D. $\frac{7ML^2}{48}$

Answer:

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70. In pure rolling fraction of its total energy associated with rotation is α for a ring and β for a solid sphere . Then

$(1)\alpha = 1/2 \quad (2)\beta = 2/7 \quad (3)\beta = 2/5 \quad (4)\alpha = 1/4$

A. 1 , 2 and 3 are correct

B. 1 and 2 are correct

C. 2 and 4 are correct

D. 1 and 3 are correct

Answer:

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71. A body is rolling down an inclined plane. Its translational and rotational kinetic energies are equal. The body is not a

(1) solid sphere (2) hollow sphere

(3) solid cylinder

(4) hollow cylinder

A. 1 , 2 and 3 are correct

B. 1 and 2 are correct

C. 2 and 4 are correct

D. 1 and 3 are correct

Answer:

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72. Two cylinders, one hollow (metal) and the other solid (wood) with the same mass identical dimensions are simulataneously allowed to roll without slipping down an inclined plane from the same height. The hollow cylinder will reach the bottom of the inclined plane first.

by the principle of conservation of energy, the total kinetic energies of both the cylinders are identical when they reach the bottom of the incline.

A. Statement -1 is true , Statement -2 is True , Statement -2 is a correct explanation for Statement-1.

B. Statement-1 is True , Statement -2 is True , Statement-2 is NOT a correct explanation for statement-1.

C. Statement-1 is False, Statement - 2 is True.

D. Statement - 1 is True , Statement -2 is False.

Answer:

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