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PHYSICS

AAKASH INSTITUTE ENGLISH

MOCK TEST 11

Example

1. A rod of weight W is supported by two parallel knife edges A and B and is in equilibrium in a horizontal position. The knives

are at a distance d from each other. The centre of mass of the rod is at disatance x from A. The normal reaction on A is :

A. 50N

B. 100N

C. 35N

D. 20N

Answer: C

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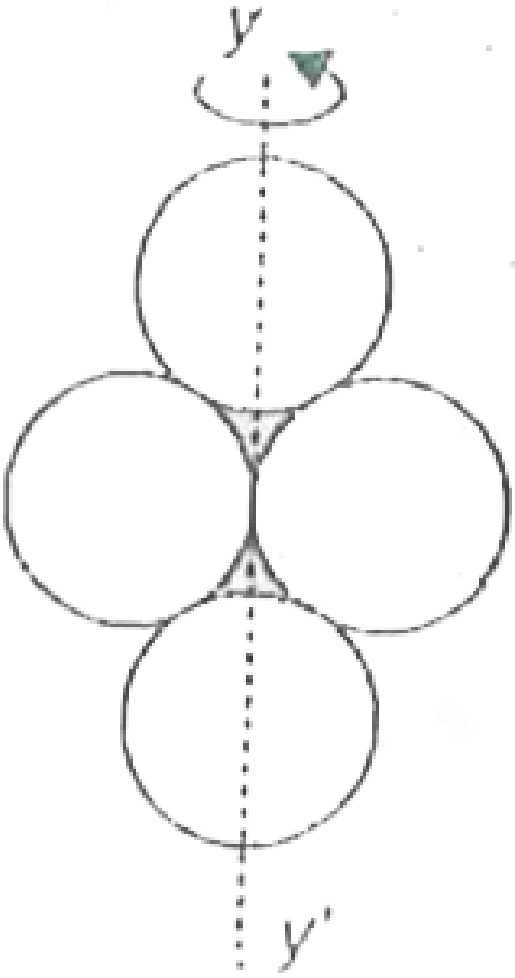
2. Four rings each of mass M and radius R are arranged as shown in the figure. The moment of inertia of the system about the axis yy' is



A. $3MR^2$

B. `11/4 MR^2

C. $5MR^2$

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

Answer: A

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3. Moment of inertia of a uniform rod of length L and mass M, about an axis passing

through $L/4$ from one end and perpendicular to its length is

A. $M\frac{L^2}{3}$

B. $\left(ML^2\right)/12$

C. $\left(ML^2\right)/4$

D. $\left(7ML^2\right)/48$

Answer: B

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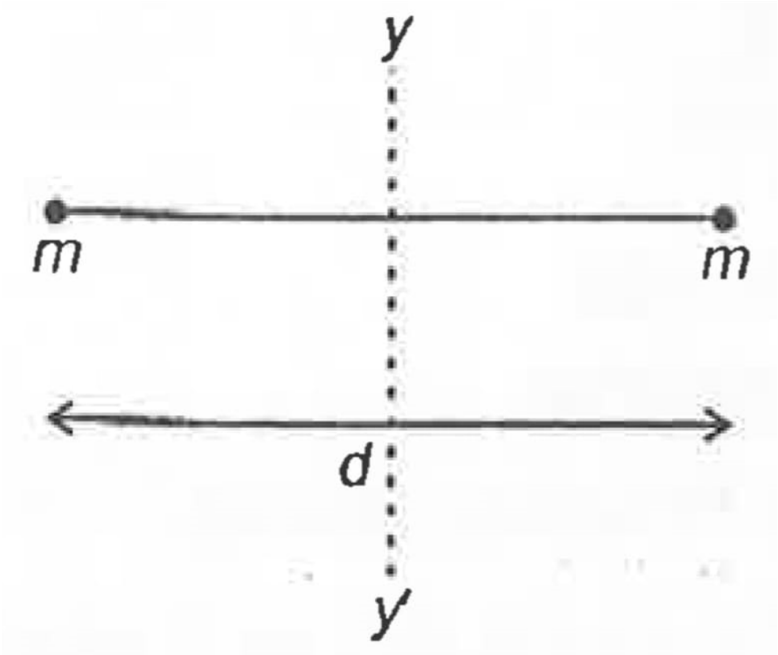
4. find moment of inertia about an axis yy` which passes through the centre of mass of the two particle system as shown



A. $m\frac{d^2}{2}$

B. md

C. $(md^2)/4$

D. $(md^2)/8$

Answer: A

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5. From a circular disc of radius R and mass 9M, a small disc of radius R/3 is removed as shown in figure. The moment of inertia of the remaining disc about an axis perpendicular to

the plane of the disc and passing through O is

A. MR^2

B. $\frac{13}{8}MR^2$

C. $\frac{3}{4}MR^2$

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

Answer: B

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6. Moment of inertia depends on

A. distribution of particle

B. mass

C. position of axis of rotation

D. all of these

Answer: D

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7. The physical quantity in translational motion, which is analogous to moment of inertia in rotational motion is

A. mass

B. distance

C. time

D. speed

Answer: A

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8. The moment of inertia of a uniform rod about a perpendicular axis passing through one end is I_1. The same rod is bent into a ring and its moment of inertia about a diameter is I_2. Then I_1 / I_2 is

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

B. $\frac{5}{3}\pi^2$

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

D. $\frac{4}{3}\pi^2$

Answer: C

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9. One solid sphere A and another hollow spher B are of same mass and same outer radii. Their moment of inertia aobut their diameters are respectively I_A and I_B such that

where d_A and d_B are their densities,

A. $I_A = I_B$

B. $I_A > I_B$

C. $I_A < I_B$

D. data is incomplete

Answer: C

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10. which of the following equation is incorrect for a body undergoing rotational motion with uniform angular acceleration (symbols have their usual meanings)

A. $\omega = \omega_0 + \alpha t$

B. theta - theta_0 = omega_0t + 1/2alphat^2

C. $\omega^2 - \omega_0^2 = \alpha(\theta - \theta_0)$

D. $\omega^2 - \omega_0^2 = 2\alpha(\theta - \theta_0)$

Answer: C

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11. Calculate the magnitude of linear acceleration of a particle moving in a circle of radius 0.5 m at the instant when its angular

velocity is 2.5 rad s–1 and its angular acceleration is $6rads^{-2}$.

A. $40\sqrt{26}\frac{m}{s^2}$

B. $40\frac{m}{s^2}$

C. Zero

D. $20\frac{m}{s^2}$

Answer: A

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12. Angular velocity

A. radially outward

B. radially inward

C. along the tangent to the circular path

D. along the axis of rotation

Answer: D

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13. the angular velocity omega of a particle varies with time t as $\omega = 5t^2 + 25ra\frac{d}{s}$. the angular acceleration of the particle at$t = 1$s is

A. $10ra\frac{d}{s^2}$

B. $5ra\frac{d}{s^2}$

C. Zero

D. $3ra\frac{d}{s^2}$

Answer: A

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14. If earth suddenly contracts to half of its present radius keeping its mass constant what would be the length of the day?

A. 24 hours

B. 8 hours

C. 2.66 hours

D. 216 hours

Answer: C

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15. The initial angular velocity of a circular disc of mass M is ω_1 . Then two small spheres of mass m each are attached gently to diametrically opposite points on the edge of the disc. What is the final angular velocity of the disc?

A. $I\dfrac{\omega}{I+2mR^2}$

B. ω

C. $I\dfrac{\omega}{I+mR^2}$

D. $I^2\dfrac{\omega}{(I+mR^2)^2}$

Answer: A

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16. A hot solid sphere is rotating about a diameter at an angular velocity ω_0. If it cools so that its radius reduces to $\frac{1}{\eta}$ of its original value, its angular velocity becomes.

A. ω

B. $\frac{\omega}{4}$

C. 4ω

D. $\frac{\omega}{2}$

Answer: B

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17. A particle of mass 1kg has been thrown with initial speed 20 $\frac{m}{s}$ making an angle 60° with the horizontal ground. the angular momentum of the particle about point of projection when the projectile is at highest point is (g=10m/s^2)

A. $150kg\frac{m^2}{s}$

B. $300kg\frac{m^2}{s}$

C. Zero

D. $100kg\frac{m^2}{s}$

Answer: A

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18. the angular acceleration of flywheel having moment of inertia 50 kg m^2 when a torque of 5 $N-m$ is applied on the flywheel is

A. $0.1 rads^{-2}$

B. $250 rads^{-2}$

C. $10 rads^{-2}$

D. $1.25 rads^{-2}$

Answer: A

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19. when a ceiling fan is switched on it makes 10 revolutions in the first 4 second. assuming

a uniform angular acceleration, how many revolution it will makes in the next 4 seconds?

A. 10

B. 20

C. 30

D. 40

Answer: C

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20. A uniform disc of mass M and radius R is mounted on an axle supported in frictionless bearings. A light cord is wrapped around the rim of the disc and a steady downward pull T is exerted on the cord. The angular acceleration of the disc is

A. $\frac{F}{M}R$

B. $2\frac{F}{M}R$

C. $\frac{F}{2}MR$

D. $M\frac{R}{F}$

Answer: B

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