PHYSICS

BOOKS - R G PUBLICATION

SYSTEM OF PARTICLES AND ROTATIONAL MOTION

Exercise

1. What is the physical significance of moment of inertia?

2. Establish the relation between torque and angular momentum.

3. Define moment of inerita of a rigid body capable of rotation about an axis. State its physical significance.

4. Establish a relation between angular momentum, moment of inertia and angular velocity.

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5. Establish a relation between linear velocity and angular velocity.

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6. Find the torque of a force $\vec{F} = 7\hat{i} + 3\hat{j} - 5\hat{k}$ about the point whose position vector is $\vec{r} = \hat{i} - \hat{j} + \hat{k}$.

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7. Establish the relation between torque and angular momentum.

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8. A car is moving form rest. After 10 seconds its wheels rotate 360 times in 1 minute. If the radius of the wheel is 50cm. Then find angular acceleration

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9. A car is moving from rest. After 10 seconds its wheels rotate 360 times in 1 minute. If the radius of the wheel is 50cm. Then find angular velocity after 30 seconds.

10. Define radius of gyration. Is ti a constant quantity?

11. Write down the difference between mass and moment of inertia.

12. Establish a relation between angular momentum, moment of inertia and angular velocity.

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13. Show that the total linear momentum of a system of particles is equal to the product of the total mass of the system and the velocity of its centre of mass.

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14. what is law of conservation of linear momentum?

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15. What do you mena by centripetal force? What is its direction?

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16. Calculate the moment of inertia of a rod of mass M, length l about an axis perpendicular to it through one end.

17. What is centre of mass? Show that centre of mass of a system of particles is defined as the point whose position vec is given by

$$\overrightarrow{R} = \frac{\Sigma m_1 \overrightarrow{r}_\square}{M}$$

18. Define moment of inerita of a rigid body capable of rotation about an axis. State its physical significance.

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19. What is the relation between kinetic energy and moment of inerita for a rotational body?

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20. Define radius of gyration. Is ti a constant quantity?

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21. What is the relation between linear momentum and angular momentum?

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22. what is law of conservation of angular momentum .

23. What is moment of inertia of a solid sphere

about its diameter.

24. What is the dimension of moment of

inertia? Is it vector?

25. A dise of metal is melted and make a solid sphere. What will happen to moment of inertia about the axis passing through centre?

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26. Two solid sphere of the same mass and same radius, one solid and other hollow. Which one have greater moment of inertia about a diameter?

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27. What are the factors on which moment of inertia of a body depend?

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28. Two circular disc A and B of same mass and sam ethickness are made of two different metals. Whose densites are d_A and $d_B(d_A > d_b)$. Which is greater I_A or I_n.

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29. Establish the relation between torque and moment of inertia.

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30. Write the parellel and perpendicular axis theorem.

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31. If the radius of earth becomes half of it's present radius how many times decrease in a day.

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32. Show that angular momentum is conserved.

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33. The moment of inertia of two rotating bodies A and B are I_A and $I_B(I_a > I_B)$ and the angular momenta are equal. Which one has greater K.E.

34. Calculate the moment of inertia of earth about its diamter taking mass 10^25 kg and diameter 12800km.

35. What is the physical significance of radius of gyration.

36. Prove that $I = 2 \times KE$ of rotation.

37. Calculate the moment of inertia of a circular disc passing through centre and perpendicular to its plane.

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38. Show that the value of co-efficient of friction is greater than $\dfrac{1}{3}\tan\theta$ for a cylinder rotationing in an inclined in an inclined plane without slipping.

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39. Prove and write the perpendicular axis theorem.

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40. Calculate the moment of inertia of a ring about in axis passing through centre and perpendicular to its plane.

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41. Prove that angular momentum $L = I\omega$.

42. Show that the value of co-efficient of friction is greater than $\frac{1}{3}\tan\theta$ for a cylinder rotationing in an inclined in an inclined plane without slipping.