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Chapter : SYSTEM OF PARTICLES AND ROTATIONAL MOTION

Assignment 2

Class 11

DPP

DAILY PRACTICE PROBLEMS

CLASS : XITH **SUBJECT : PHYSICS**

DATE : **DPP NO. : 2**

Topic :- SYSTEM OF PARTICLES AND ROTATIONAL MOTION

1. Moment of inertia of a uniform circular disc about a diameter is I. Its moment of inertia about an axis $\perp$ to its plane and passing through a point on its will be

   a) $5I$ b) $3I$ c) $6I$ d) $4I$

2. The angular velocity of a wheel increases from 100 rps to 300rps in 10 s. The number of revolutions made during that time is

   a) 600 b) 1500 c) 1000 d) 2000

3. If linear density of a rod of length 3 m varies as λ=2+x, then the position of the centre of gravity of the rod is

   a) $\frac{7}{3}$m b) $\frac{12}{7}$m c) $\frac{10}{7}$m d) $\frac{9}{7}$m

4. A wheel of mass 10 kg has a moment of inertia of 160 kg-m^2 about its own axis, the radius of gyration will be

   a) 10 m b) 8 m c) 6 m d) 4 m

5. 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 the axis passing through the centre of the disc & perpendicular to its plane is

   a) 1 kg-m^2 b) 0.1 kg-m^2 c) 2 kg-m^2 d) 0.2 kg-m^2

6. If the external torque acting on a system $\vec{\tau} = 0$, then

   a) $\omega = 0$ b) $\alpha = 0$ c) $J = 0$ d) $F = 0$

7. A dancer is standing on a stool rotating about the vertical axis passing through its centre. She pulls her arms towards the body reducing her moment of inertia by factor of n. The new angular speed of turn table is proportional to

   a) n b) n^{-1} c) n^0 d) n^2

8. Two spherical bodies of the same mass M are moving with velocities v_1 and v_2. These collide perfectly inelastically

a) $\frac{1}{2}M(v_1 - v_2)^2$ b) $\frac{1}{2}M(v_1^2 - v_2^2)^2$ c) $\frac{1}{4}M(v_1 - v_2)^2$ d) $2M(v_1^2 - v_2^2)$

9. A mass m is moving with a constant velocity along a line parallel to x-axis. Its angular momentum with respect to origin an z-axis is

a) Zero b) Remains constant c) Goes on increasing d) Goes on decreasing

10. A swimmer while jumping into water from a height easily forms a loop in the air, if

a) He pulls his arms and legs in b) He spreads his arms and legs c) He keeps himself straight d) None of the above

11. A pulley fixed to the ceiling carries a string with blocks of masses m and $3m$ attached to its ends. The masses of string and pulley are negligible. When the system is released, the acceleration of center of mass will be

a) Zero b) $-\frac{g}{4}$ c) $\frac{g}{2}$ d) $-\frac{g}{2}$

12. One solid sphere A and another hollow sphere B are of same mass and same outer radius. Their moments of inertia about their diameters are respectively I_A and I_B such that

a) $I_A = I_B$ b) $I_A > I_B$ c) $I_A < I_B$ d) $\frac{I_A}{I_B} = \frac{d_A}{d_B}$

13. A uniform rod of length $2L$ is placed with one end in contact with the horizontal and is then inclined at an angle α 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) $\omega = \sqrt{\frac{6g\sin\alpha}{2L}}$ d) $\omega = \sqrt{\frac{2L}{g\sin\alpha}}$

14. A solid cylinder (SC) a hollow cylinder (HC) and a solid sphere (S) of the same mass and radius are released simultaneously from the same height of incline. The order in which these bodies reach the bottom of the incline is

a) SC, HC, S b) SC, S, HC c) S, SC, HC d) HC, SC, S

15. Masses $8, 2, 4, 2\ kg$ are placed at the corners A, B, C, D respectively of a square $ABCD$ of diagonal $80\ cm$. The distance of centre of mass from A will be

a) $20\ cm$ b) $30\ cm$ c) $40\ cm$ d) $60\ cm$

16. The moment of inertia of a solid sphere about an axis passing through centre of gravity is $\frac{2}{5}MR^2$, then its radius of gyration about a parallel axis at a distance $2R$ from first axis is

a) $5R$ b) $\sqrt{\frac{22}{5}}R$ c) $\frac{5}{2}R$ d) $\sqrt{\frac{12}{5}}R$

17. A small disc of radius 2 cm is cut from a disc of radius 6 cm. If the distance between their centres is 3.2 cm, what is the shift in the centre of mass of the disc

a) 0.4 cm b) 2.4 cm c) 1.8 cm d) 1.2 cm

18. A solid cylinder of mass M and radius R rolls without slipping down an inclined plane of length L and height h. What is the speed of its centre of mass when the cylinder reaches its bottom

a) $\sqrt{\frac{3}{4}gh}$ b) $\sqrt{\frac{4}{3}gh}$ c) $\sqrt{4gh}$ d) $\sqrt{2gh}$

19. Which is a vector quantity

a) Work b) Power c) Torque d) Gravitational Constant

20. What is the moment of inertia of solid sphere of density ρ and radius R about its diameter?

a) $\frac{105}{176}R^5\rho$ b) $\frac{105}{176}R^2\rho$ c) $\frac{176}{105}R^5\rho$ d) $\frac{176}{105}R^2\rho$