

**BCM SCHOOL, BASANT AVENUE, DUGRI ROAD
, LDH.**

ASSIGNMENT

CLASS - XI

SUBJECT - PHYSICS

**CHAPTER – SYSTEM OF PARTICLES AND RIGID
BODIES**

DATE: OCT 25, 2024

Part A - Objective Questions

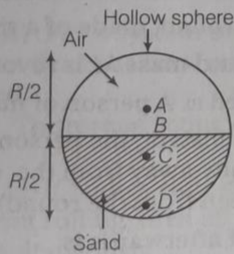
Multiple Choice Questions

- A drum of radius R and mass M rolls down without slipping along an inclined plane of angle θ . The frictional force
 - converts translational energy into rotational energy
 - dissipates energy as heat
 - decreases the rotational motion
 - decreases the rotational and translational motion

- For n -particles in a space, the suitable expression for the position vector of centre of mass is

- | | |
|---|------------------------------------|
| (a) $\frac{\sum m_i \mathbf{r}_i}{m_i}$ | (b) $m_i \mathbf{r}_i$ |
| (c) $\frac{\sum m_i \mathbf{r}_i}{M}$ | (d) $\frac{m_i \mathbf{r}_i}{m_i}$ |

- Which of the following points is the likely position of the centre of mass of the system shown in figure?



- | | |
|-------|-------|
| (a) A | (b) B |
| (c) C | (d) D |

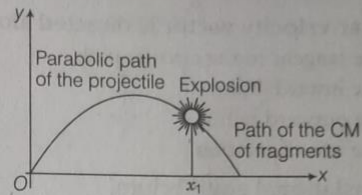
- For which of the following does the centre of mass lie outside the body? (NCERT Exemplar)

- | | |
|--------------|---------------|
| (a) A pencil | (b) A shotput |
| (c) A dice | (d) A bangle |

- The centre of mass of a system of two particles divides the distance between them

- in inverse ratio of square of masses of particles
- in direct ratio of square of masses of particles
- in inverse ratio of masses of particles
- in direct ratio of masses of particles

- A projectile is fired at an angle and it was following a parabolic path. Suddenly, it explodes into fragments. Choose the correct option regarding this situation.



- Due to explosion, CM shifts upwards
- Due to explosion, CM shifts downwards
- Due to explosion, CM traces its path back to origin
- CM continues to move along same parabolic path

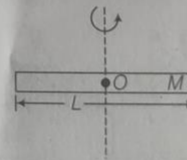
- For rotational equilibrium,

(a) $\sum_{i=1}^n \mathbf{F}_{\text{net}} = 0$

(b) $\sum_{i=1}^n \tau_{\text{net}} = 0$

- Both (a) and (b) are the necessary conditions for the rotational equilibrium
- Both (a) and (b) are not necessary for rotational equilibrium

- A rod is rotating about an axis passing through its centre and perpendicular to its length. The radius of gyration for the rod is



- | | | | |
|------------|-------------------|-----------|------------------|
| (a) $L/12$ | (b) $L/\sqrt{12}$ | (c) $L/6$ | (d) $L/\sqrt{6}$ |
|------------|-------------------|-----------|------------------|

- What is the moment of inertia of a ring about a tangent to the periphery of the ring?

- | | | | |
|------------------------|------------------------|------------|--------------|
| (a) $\frac{1}{2} MR^2$ | (b) $\frac{3}{2} MR^2$ | (c) MR^2 | (d) $MR^2/9$ |
|------------------------|------------------------|------------|--------------|

- When acrobat bends his body (assume no external torque)



- (a) I_{acrobat} decreases
- (b) I_{acrobat} increases
- (c) ω_{acrobat} increases
- (d) Both (a) and (c)

11. Angular velocity vector is directed along

- (a) the tangent to the circular path
- (b) the inward radius
- (c) the outward radius
- (d) the axis of rotation

12. In translational equilibrium,

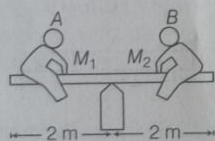
(a) $\sum_{i=1}^n \mathbf{F}_{\text{net}} = 0$ (b) $\sum_{i=1}^n \tau_{\text{net}} = 0$

- (c) Both (a) and (b) are the necessary conditions for the translational equilibrium
- (d) particle may be in equilibrium when (a) and (b) are not fulfilled.

13. A body is rotating with angular velocity $\omega = (3\hat{i} - 4\hat{j} - \hat{k})$. The linear velocity of a point having position vector $\mathbf{r} = (5\hat{i} - 6\hat{j} + 6\hat{k})$ is

- (a) $6\hat{i} + 2\hat{j} - 3\hat{k}$ (b) $-18\hat{i} - 23\hat{j} + 2\hat{k}$
- (c) $-30\hat{i} - 23\hat{j} + 2\hat{k}$ (d) $6\hat{i} - 2\hat{j} + 8\hat{k}$

14. In the game of see-saw, what should be the displacement of boy B from right edge to keep the see-saw in equilibrium? ($M_1 = 40$ kg, $M_2 = 60$ kg)



- (a) $\frac{4}{3}$ m (b) 1 m
- (c) $\frac{2}{3}$ m (d) Zero

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

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

17. If a girl rotating on a chair bends her hand as shown in figure, the (neglecting frictional force)



- (a) I_{girl} will reduce (b) I_{girl} will increase
- (c) ω_{girl} will reduce (d) None of these

18. When a disc rotates with uniform angular velocity, which of the following is not true?

(NCERT Exemplar)

- (a) The sense of rotation remains same
- (b) The orientation of the axis of rotation remains same
- (c) The speed of rotation is non-zero and remains same
- (d) The angular acceleration is zero

19. A merry-go-round, made of a ring-like platform of radius R and mass M , is revolving with angular speed ω . A person of mass M is standing on it. At one instant, the person jumps off the round, radially away from the centre of the round (as seen from the round). The speed of the round afterwards is

(NCERT Exemplar)

- (a) 2ω (b) ω
- (c) $\frac{\omega}{2}$ (d) 0