AIPMT 2009

1. Two bodies of mass 1 kg and 3kg have position vectors $\hat{i}+2\hat{j}+\hat{k}$ and $-3\hat{i}-2\hat{j}+\hat{k}$, respectively. The centre of mass of this system has a position vector:-

(1) $-\hat{i}+\hat{j}+\hat{k}$ (2) $-2\hat{i}+2\hat{k}$

(3) $-2\hat{i}-\hat{j}+\hat{k}$ (4) $2\hat{i}-\hat{j}-2\hat{k}$

2. An explosion blows a rock into three parts. Two partsgo off at right angles to each other. 1 kg first part moving with a velocity of 12 m/s and 2 kg second part moving with a velocity of 8 m/s. If the third part flies off with a velocity of 4 m/s, its mass would be :-

(1) 3 kg (2) 5 kg (3) 7 kg (4) 17 kg

AIPMT 2010

3. A ball moving with velocity 2 m/s collides head on with another stationary ball of double the mass. If the coefficient of restitution is 0.5, then their velocities (in m/s) after collision will be :-

(1) 0, 2 (2) 0, 1 (3) 1, 1 (4) 1, 0.5

AIPMT (Pre) 2010

4. Two particles which are initially at rest, move towards each other under the action of their internal attraction. If their speeds are v and 2v at any instant, then the speed of centre of mass of the system will be :-

(1) v (2) 2v (3) Zero (4) 1.5 v

5. A man of 50 kg mass is standing in a gravity free space at a height of 10 m above the floor. He throws a stone of 0.5 kg mass downwards with a speed 2 m/s. When the stone reaches the floor, the distance of the man above the floor will be :-

(1) 20 m (2) 9.9 m (3) 10.1 m (4) 10 m

AIPMT (Pre) 2012

6. Two persons of masses 55 kg and 65 kg respectively, are at the opposite ends of a boat. The length of the boat is 3.0 m and weighs 100 kg. The 55 kg man walks up to the 65 kg man and sits with him. If the boat is in still water the centre of mass of the system shifts by :

(1) zero (2) 0.75 m (3) 3.0 m (4) 2.3 m

7. Two spheres A and B of masses m_1 and m_2 respectively collide. A is at rest initially and B is moving with velocity v along x-axis. After collision B has a velocity $\frac{v}{2}$ in a direction perpendicular to the original direction. The mass A moves after collision in the direction.

(1) $\theta = \tan^{-1}(1/2)$ to the x-axis

(2) $\theta = \tan^{-1}(-1/2)$ to the x-axis

(3) same as that of B

(4) opposite to that of B

AIPMT 2015

8. Two particles of masses m_1, m_2 move with initial velocities u_1 and u_2. On collision, one of the particles get excited to higher level, after abosrbing energy ε. If final velocities of particles be v_1 and v_2 then we must have :

(1) $\frac{1}{2}m_1u_1^2+\frac{1}{2}m_2u_2^2=\frac{1}{2}m_1v_1^2+\frac{1}{2}m_2v_2^2-\varepsilon$

(2) $\frac{1}{2}m_1u_1^2+\frac{1}{2}m_2u_2^2-\varepsilon=\frac{1}{2}m_1v_1^2+\frac{1}{2}m_2v_2^2$

(3) $\frac{1}{2}m_1^2u_1^2+\frac{1}{2}m_2^2u_2^2+\varepsilon=\frac{1}{2}m_1^2v_1^2+\frac{1}{2}m_2^2v_2^2$

(4) $m_1^2u_1+m_2^2u_2-\varepsilon=m_1^2v_1+m_2^2v_2$

9. Two spherical bodies of mass M and 5M and radii R and 2R are released in free space with initial separation between their centres equal to 12R. If they attract each other due to gravitational force only, then the distance covered by the smaller body before collision is :-

(1) 4.5R (2) 7.5R (3) 1.5R (4) 2.5R

Re-AIPMT 2015

10. A ball is thrown vertically downwards from a height of 20 m with an initial velocity v_0. It collides with the ground, loses 50% of its energy in collision and rebounds to the same height. The initial velocity v_0 is :

(Take g = 10 m/s^2)

(1) 10 m/s (2) 14 m/s

(3) 20 m/s (4) 28 m/s

11. On a frictionless surface, a block of mass. M moving at speed v collides elastically with another block of same mass M which is initially at rest. After collision the first block moves at an angle θ to its initial direction and has a speed $\frac{v}{3}$. The second block's speed after the collision is :-

(1) $\frac{\sqrt{3}}{2}v$ (2) $\frac{2\sqrt{2}}{3}v$ (3) $\frac{3}{4}v$ (4) $\frac{3}{\sqrt{2}}v$

NEET-II 2016

12. A bullet of mass 10g moving horizontally with a velocity of 400 m/s strikes a wooden block of mass 2 kg which is suspended by a light inextensible string of length 5 m. As a result, the centre of gravity of the block is found to rise a vertical distance of 10 cm. The speed of the bullet after it emerges out horizontally from the block will be :-

(1) 120 m/s (2) 160 m/s
(3) 100 m/s (4) 80 m/s

13. Two identical balls A and B having velocities of 0.5 m/s and –0.3 m/s respectively collide elastically in one dimension. The velocities of B and A after the collision respectively will be :-

(1) –0.3 m/s and 0.5 m/s
(2) 0.3 m/s and 0.5 m/s
(3) –0.5 m/s and 0.3 m/s
(4) 0.5 m/s and –0.3 m/s

NEET(UG) 2018

14. A moving block having mass m, collides with another stationary block having mass 4m. The lighter block comes to rest after collision. When the initial velocity of the lighter block is v, then the value of coefficient of resistitution (e) will be :-

(1) 0.5 (2) 0.25 (3) 0.8 (4) 0.4

NEET(UG) 2019

15. Body A of mass 4m moving with speed *u* collides with another body B of mass 2m, at rest. The collision is head on and elastic in nature. After the collision the fraction of energy lost by the colliding body A is :

(1) $\frac{1}{9}$ (2) $\frac{8}{9}$ (3) $\frac{4}{9}$ (4) $\frac{5}{9}$

NEET(UG) 2019 (Odisha)

16. An object flying in air with velocity $\left(20\hat{i}+25\hat{j}-12\hat{k}\right)$ suddenly breaks in two pieces whose masses are in the ratio 1 : 5. The smaller mass flies off with a velocity $\left(100\hat{i}+35\hat{j}+8\hat{k}\right)$. The velocity of the larger piece will be :-

(1) $4\hat{i}+23\hat{j}-16\hat{k}$ (2) $-100\hat{i}-35\hat{j}-8\hat{k}$

(3) $20\hat{i}+15\hat{j}-80\hat{k}$ (4) $-20\hat{i}-15\hat{j}-80\hat{k}$

17. A particle of mass 5 m at rest suddenly breaks on its own into three fragments. Two fragments of mass m each move along mutually perpendicular direction with speed v each. The energy released during the process is :

(1) $\frac{3}{5}mv^2$ (2) $\frac{5}{3}mv^2$ (3) $\frac{3}{2}mv^2$ (4) $\frac{4}{3}mv^2$

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	**3**	**2**	**2**	**3**	**3**	**1**	**1 or 2**	**2**	**2**	**3**	**2**	**1**	**4**	**2**	**2**
Que.	16	17													
Ans.	**1**	**4**													