# DISHA CLASSES

## FOUNDATION COURSE for NTSE/IIT-JEE

## Topic : Conservation of Momentum

## (Physics) Assignment-1

1. Two identical 1 kg blocks are moving with the same speed of 10 m/s towards each other, along a frictionless horizontal surface. The two blocks collide and stick together and come to rest. What is the work done by the external forces?
(a) 2.5 J (b) 5.0 J (c) 10.0 J (d) zero

2. In the above question, work done by internal forces is
(a) – 100 J (b) 50 J (c) zero (d) 200 J

3. A body of mass $m_1$ moving with a uniform velocity of 40 m/s collides with another of mass $m_2$ at rest and then the two together begin to move with a uniform velocity of 30 m/s. The ratio of their masses ($m_1 / m_2$) is
(a) 0.75 (b) 4.0 (c) 3.0 (d) 1.33

4. A bullet fired into a target loses half its velocity after penetrating 25 cm. How much further will it penetrate before coming to rest?
(a) $\sqrt{25}$ cm (b) 25 cm (c) 8.3 cm (d) 75 cm

5. A body of mass m moving with velocity V collides head on with another body of mass 2 m which is initially at rest. The ratio of K.E of colliding body before and after collision will be :
(a) 9 : 1 (b) 4 : 1 (c) 2 : 1 (d) 1 : 1

6. A sand bag of 10 kg mass is suspended by a 3 m long weight less string. A 0.2 kg mass bullet enters the bag with a velocity of 0.2 m/sec. and gets embedded into it. The loss in K.E. in the collision is :
(a) 40.2 joules (b) 38.2 joules (c) 49.2 joules (d) 39.2 joules

7. Two solid rubber balls A and B having masses 200 and 400 gm respectively are moving in opposite direction with velocity of A equal to 0.3 m/sec. After collision, the two balls come to rest when the velocity of B is
(a) 0.15 m/sec (b) 1.5 m/sec (c) – 0.15 m/sec (d) None of these

8. A bullet fired from a gun with a velocity of $10^4$ m/sec goes through a bag full of straw. If the bullet loses half of its kinetic energy in the bag, its velocity when it comes out of the bag will be :
(a) 7071.06 m/sec (b) 707 m/sec (c) 70.71 m/sec (d) 707.06 m/sec

9. If a shell fired from a cannon explodes in mid air, its total :
(a) momentum increase (b) momentum decreases
(b) kinetic energy increases (d) kinetic energy remains unchanged

10. A body of mass m strikes a stationary body of mass M and undergoes an elastic collision. After collision, m has a speed one-third its initial speed. The ratio M/m is
(a) 1 : 2 (b) 2 : 1 (c) 1 : 3 (d) 3 : 1

11. A body of mass 1 kg strikes elastically another body at rest and continues to moves in the same direction with one fourth the initial velocity. The mass of the other body is :
(a) 3 kg (b) 0.6 kg (c) 2.4 kg (d) 4 kg

12. A bullet hits and gets embedded in a solid block resting on a horizontal frictionless table. What is conserved?
(a) Momentum and Kinetic Energy (b) Kinetic Energy alone
(c) Momentum alone (d) Neither momentum nor Kinetic Energy

13. A body of mass 2 kg moving with a velocity of 3 m/sec. collides head on with a body of mass 1 kg moving in opposite direction with a velocity of 4 m/sec. After collision, two bodies stick together and move with a common velocity which in the units m/sec. is equal to
(a) 1/4 (b) 1/3 (c) 2/3 (d) ¾

14. A shell initially at rest explodes into two pieces of equal mass, the two pieces will :
(a) move with different velocities in different directions
(b) move with eh same velocity in opposite directions
(c) move with the same velocity in the same directions
(d) be at rest

15. A particle of mass m moving eastward with speed $\upsilon$ collides with another particle of the same mass moving northwards with the same speed. If two particles coalesce on collision, the new particle of mass 2 m will move in the north-east direction with a velocity:
(a) $\upsilon/2$ (b) $\upsilon\sqrt{2}$ (c) $\upsilon/\sqrt{2}$ (d) None of these

***Physics (Assignment-1)***

| | | | | | |
|---|---|---|---|---|---|
| 1 | D | 6 | D | 11 | B |
| 2 | A | 7 | A | 12 | C |
| 3 | C | 8 | A | 13 | C |
| 4 | D | 9 | C | 14 | B |
| 5 | A | 10 | A | 15 | C |