

**BCM SCHOOL, BASANT AVENUE, DUGRI
ROAD, LUDHIANA**

CLASS – XI

ASSIGNMENT – 3

SUBJECT – PHYSICS

CHAPTER – WORK, ENERGY AND POWER

1. Force $F = [3x^2 \mathbf{i} + 4 \mathbf{j}]$ N with x in metres, acts on a particle. How much work is done on the particles as it moves from coordinates $(2\text{m}, 3\text{m})$ to $(3\text{m}, 0\text{m})$?
 a. 7 J. b. 10 J. c. 16 J. d. 22 J
2. A force of 10 N is applied on an object of mass 2 kg placed on a rough surface having coefficient of friction equal to 0.2. Work done by applied force in 4 s is
 A. 120 J
 B. 240 J
 C. 250 J
 D. 100 J

Assertion & Reason type Questions:

- A. Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- B. Both Assertion and Reason are true but Reason is not correct explanation of Assertion.
- C. Assertion is true but Reason is false.
- D. Assertion is false but Reason is true.
3. **Assertion:** If momentum of a body increases by 50%, its kinetic energy will increase by 125%.
Reason: Kinetic energy is proportional to square of velocity.
4. **Assertion:** Force applied on a block moving in one dimension is producing a constant power, then the motion should be uniformly accelerated.
Reason: This constant power multiplied with time is equal to change in kinetic energy.
5. Prove that coefficient of restitution for one dimensional elastic collision is equal to one.
6. A fast moving neutron make a head-on elastic collision with a stationary deuteron. What fraction of its initial kinetic energy is lost by the neutron during collision?

7. (a) Derive an expression for elastic potential energy stored in a stretched spring.

(b). Derive an expression for work done by a variable force.

8. CASE STUDY BASED QUESTION:

Collision between two bodies is said to occur when they physically strike against each other or if the path of motion of one is influenced by others. It is of two types namely elastic and inelastic collision. In elastic collision both kinetic energy and momentum is conserved.

On the other hand, in inelastic collision, only momentum is conserved, but there is loss of some kinetic energy.

The degree of elasticity of a collision is determined by a physical quantity called coefficient of restitution (e). It is the ratio of velocity of separation after collision to velocity of approach before collision.

For perfectly elastic collision, $e = 1$ and for inelastic collision, $e = 0$.

- (i) What is the type of collision in which the two colliding bodies stick together and moves with common velocity?
- (ii) Two bodies of masses 1 kg and 2 kg moves with initial velocity 5 m/s and 3 m/s. If they are colliding perfectly elastically, find the velocity of the two bodies.
- (iii) Write the range of coefficient of restitution of real collision.
- (iv) Name the collision in which the velocity of approach will be equal to velocity of separation of two colliding bodies.