

Dear student following is an Easy level [O ● O O O] test paper. Score of 18 Marks in 15 Minutes would be a satisfactory performance. Questions 1-10 (+3, -1). (All Questions have Single Options correct)

- Q.1** If the linear momentum is increased by 50% the K.E. will be increased by :
 (A) 25% (B) 100%
 (C) 50% (D) 125%
- Q.2** A body acted upon by a variable force $F = 3 + 0.5x$. Work done in moving the body from $x = 0$ to $x = 4\text{m}$ is :
 (A) 16J (B) 32J (C) 8J (D) 24J
- Q.3** Power is given by :
 (A) product of force and velocity
 (B) product of work and time
 (C) product of force and displacement
 (D) product of work and displacement
- Q.4** A bullet is fired from a gun which recoils. The K.E. of the recoil of gun is :
 (A) greater than the K.E. of bullet
 (B) equal than the K.E. of bullet
 (C) less than the K.E. of bullet
 (D) half of K.E. of bullet
- Q.5** A string is stretched by 2cm and its potential energy is U , if it is stretched by 10cm, the P.E. is :
 (A) 5U (B) 10U (C) $\frac{U}{5}$ (D) 25U
- Q.6** Which of the following remains constant for an isolated system ?
 (A) P.E.
 (B) K.E.
 (C) sum of P.E. and K.E.
 (D) None of the above
- Q.7** In perfectly inelastic collision, the relative velocity of the bodies :
 (A) before impact is zero
 (B) before impact is equal to that after impact
 (C) after impact is zero
 (D) None of the above true
- Q.8** Head on collision signifies collision with :
 (A) velocities of equal magnitudes
 (B) velocities of different magnitudes
 (C) velocities acting along same straight line but in opposite direction
 (D) velocities acting at right angles
- Q.9** A sphere of mass m moving with u has a perfectly oblique elastic collision with identical sphere at rest. The angle between the velocity after the collision is :
 (A) π (B) $\frac{\pi}{2}$ (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{3}$
- Q.10** A bag of mass M hanging by a string is hit by a bullet of mass m coming horizontally with velocity v . It is caught into the bag. Then for the combination we have :
 (A) momentum = $\frac{Mmv}{M+m}$
 (B) K.E. = $\frac{mv^2}{2}$
 (C) momentum = $\frac{(M+m)mv}{M}$
 (D) K.E. = $\frac{m^2v^2}{2(M+m)}$



PHYSICS IIT JEE (JULY 4th WEEK CLASS TEST 3) (WORK, POWER, ENERGY & COLLISION) ANSWER KEY

Name :					Roll No. :									
	A	B	C	D		A	B	C	D		A	B	C	D
1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>					
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>					

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	D	A	A	C	A	C	C	C	B	D

SOLUTIONS

Sol.1 (D)

When momentum increased by 50%, the velocity changes from v to $1.5v$ and energy will change by $[(1.5)^2 - 1] = 1.25$ times or 125%.

Sol.2 (A)

$$W = \int_0^4 (F) dx = \int_0^4 (3 + 0.5x) dx$$

$$= [3x]_0^4 + \left[\frac{0.5x^2}{2} \right]_0^4 = (12 + 4) = 16J$$

Sol.3 (A)**Sol.4 (C)**

As K.E. \propto square of velocity and velocity of recoil is far less than velocity of bullet.

Sol.5 (A)**Sol.6 (C)****Sol.7 (C)****Sol.8 (C)****Sol.9 (B)**

Here let v be the final velocity of moving sphere and V be that of stationary after collision. Then by conservation of momentum we get

$$m\bar{u} = m\bar{v} + m\bar{V}$$

$$\text{or } \bar{u} = \bar{v} + \bar{V}$$

$$\text{or } u^2 = v^2 + V^2 + 2vV \cos \theta$$

Now applying conservation of energy we get

$$u^2 = v^2 + V^2$$

Solving the two equations $2Vv \cos \theta = 0$

$$\text{or } \cos \theta = 0, \theta = \frac{\pi}{2}.$$

Sol.10 (D)

$$Mv = (m + M)u$$

$$u = \frac{Mv}{M + m}$$

$$\text{K.E.} = \frac{1}{2} (M + m)u^2$$

$$= \frac{1}{2} (M + m) \left(\frac{Mv}{M + m} \right)^2$$

$$= \frac{1}{2} \frac{M^2 v^2}{M + m}$$