

Dear student following is an Easy level [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 Option correct)

- Q.1** If K.E. of a body increase by 0.1 %, the percent increase in its momentum will be
 (A) 0.05 % (B) 0.1 %
 (C) 1.0 % (D) 10 %
- Q.2** The K. E. acquired by a mass m in travelling a certain distance d , starting from rest, under the action of a constant force is directly proportional to
 (A) m (B) \sqrt{m}
 (C) $\frac{1}{\sqrt{m}}$ (D) Independent of m .
- Q.3** A ball is dropped from a height of 10m. It is embedded 1 m in sand and stops,
 (A) Only momentum remains conserved
 (B) Only K.E. remains conserved
 (C) Both momentum and K.E. are conserved
 (D) Neither momentum nor K.E. is conserved.
- Q.4** The earth's radius is R and acc. due to gravity at its surface is g . If a body of mass m falls from a height $h = R/5$ from earth's surface, its potential energy decreases by
 (A) mgh (B) $\frac{4}{5}mgh$
 (C) $\frac{5}{6}mgh$ (D) $\frac{6}{7}mgh$
- Q.5** In which case does the potential energy decrease
 (A) On compressing the spring
 (B) On stretching a spring
 (C) On moving a body against gravitational pull
 (D) On the rise of an air bubble in water.
- Q.6** The K.E of a light and a heavy object is same. Which object has more momentum ?
 (A) Light object (B) Heavy object
 (C) Both have some momentum
 (D) Data is not sufficient
- Q.7** Which of the following is not perfectly inelastic collision ?
 (A) Striking of two glass balls
 (B) A bullet striking a bag of sand
 (C) An electron captured by a proton
 (D) A man jumping onto a moving cart
- Q.8** A rod elongates by ℓ when a body of mass M is suspended from it. The work done is
 (A) $Mg\ell$ (B) $\frac{1}{2}Mg\ell$
 (C) $2Mg\ell$ (D) Zero
- Q.9** A bullet of mass M hits a block of mass M' . The transfer of energy is maximum, when
 (A) $M' = M$ (B) $M' = 2M$
 (C) $M' \ll M$ (D) $M' \gg M$
- Q.10** A force of 10 N displaces an object by 10m. If work done is 50,J then direction of force makes an angle with direction of displacement
 (A) 120° (B) 90°
 (C) 60° (D) None of these



PHYSICS IIT JEE (JULY 5th WEEK CLASS TEST 2) (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"/>					

SOLUTIONS

Sol.1 (A)

$$\text{As K.E.} = \frac{p^2}{2m}$$

$$\therefore \frac{\Delta E}{E} = \frac{2\Delta p}{p}$$

$$\text{or } \frac{\Delta p}{p} = \frac{1}{2} \frac{\Delta E}{E} = \frac{1}{2} \times 0.1 \% = 0.05 \%$$

Sol.2 (D)

K.E. acquired = Work done
 $= F \times d = \text{constant.}$
 i.e. it is independent of mass m .

Sol.3 (A)

As the collision is inelastic, therefore, only momentum is conserved.

Sol.4 (C)

$$\begin{aligned} \Delta V &= \frac{GMm}{R} - \frac{GMm}{(R+R/5)} \\ &= \frac{1}{6} \frac{GMm}{R} = \frac{m}{6} \frac{gR^2}{R} = \frac{mgR}{6} \end{aligned}$$

$$\text{As } h = \frac{R}{5} \therefore R = 5h.$$

$$\text{Hence } \Delta V = \frac{mgR}{6} = \frac{5}{6} mgh.$$

Sol.5 (D)

P.E. decreases when air bubble rises in water, because work is done by upthrust.

Sol.6 (B)

$$\frac{1}{2} m_1 v_1^2 = \frac{1}{2} m_2 v_2^2$$

$$\therefore \frac{v_1}{v_2} = \sqrt{\frac{m_2}{m_1}}$$

$$\frac{P_1}{P_2} = \frac{m_1 v_1}{m_1 v_2} = \frac{m_1}{m_2} \sqrt{\frac{m_2}{m_1}} = \sqrt{\frac{m_1}{m_2}}$$

When $m_1 > m_2$; $P_1 > P_2$
 i.e. heavier object has more momentum.

Sol.7 (D)

When a man jumps onto a moving cart, the linear momentum and K.E. both are conserved. Therefore, it can be treated as a perfectly elastic collision.

Sol.8 (B)

$$\text{As } W = \frac{1}{2} F(x)$$

$$\therefore W = \frac{1}{2} Mg \times \ell$$

Sol.9 (A)

When $M' = M$, velocities are exchanged i.e. bullet comes to rest and block moves with the velocity of bullet. Transfer of energy is maximum.

Sol.10 (C)

$$\text{As } W = Fs \cos\theta$$

$$\therefore 50 = 10 \times 10 \cos\theta,$$

$$\cos\theta = \frac{50}{100} = \frac{1}{2}$$

$$\theta = 60^\circ$$