

KENDRIYA VIDYALAYA BHU (FS)**MONTHLY TEST****CLASS 11****SUB.-PHYSICS****Time-90minutes****M.M.-40****General Instructions-**

- (i) All questions are compulsory.
- (ii) Question no. 1 to 7 are multiple choice type and A&R questions of one mark each.
- (iii) Question no. 08 to 11 are two marks questions.
- (iv) Question no. 12 to 15 are three marks questions.
- (v) Question no. 16 to 17 are five marks questions.
- (vi) Question no. 18 is case study-based question and carry 3 marks.

SECTION -A**Q.1** Which of the following is self-adjusting force?

- a) Static friction b) Limiting friction c) Kinetic friction d) Rolling friction

Q2. A body of mass M hits normally a rigid wall with velocity v and bounces back with the same velocity. The impulse experienced by the body is

- a) Zero b) Mv c) $1.5Mv$ d) $2Mv$

Q3. What is the angle between velocity and acceleration at the highest point of a projectile motion?

- (a) 0° (b) 180° (c) 45° (d) 90°

Q4. The linear momentum of the body is increased by 10%. The percentage change in its kinetic energy is

- (a) 10% (b) 20% (c) 21% (d) none of these.

Q5. A ball with a weight of 1.5 N is thrown at an angle of 30° above the horizontal with an initial speed of 12 m/s. At its highest point, the net force on the ball is:

- (a) 9.8 N, 30° below horizontal (b) zero (c) 9.8 N, up (d) 1.5 N, down

Question no 6 & 7 are of two statements each, printed as Assertion and Reason. While answering these Questions you are required to choose any one of the following four responses

- (A) If both Assertion & Reason are true & the Reason is a correct explanation of the Assertion
(B) If both Assertion and Reason are true but Reason is not a correct explanation of the Assertion
(C) If Assertion is true but the Reason is false (D) If Assertion & Reason both are false.

Q6.Assertion: Two objects of equal mass rest on the opposite pans of an arm balance. Scale will remain balanced, when it is accelerated up or down in a lift.**Reason:** Both masses experience unequal fictitious forces in magnitude as well as in direction**Q7. Assertion :** A cyclist bends inwards from his vertical position, while turning to secure the necessary centripetal force**Reason :** Friction between the tyres and road provides him the necessary centripetal force.**SECTION- B****Q8.** A body of mass 0.25 Kg moving with velocity 12 m/s is stopped by applying a force of 0.6 N. Calculate the time taken to stop the body. Also calculate the impulse of this force.**Q9.** An electron and a proton are detected in a cosmic ray experiment, the first with kinetic energy 10 keV, and the second with 100 keV. Which is faster, the electron or the proton? Obtain the ratio of their speeds, (electron mass = 9.11×10^{-31} kg, proton mass = 1.67×10^{-27} kg, $1 \text{ eV} = 1.60 \times 10^{-19} \text{ J}$).**Q10.** A body is moving unidirectionally under the influence of a source of constant power. Prove that its displacement in time t is proportional to $t^{3/2}$.**Q11.** A rocket with a lift-off mass 20,000 kg is blasted upwards with an initial acceleration of 5.0 ms^{-2} . Calculate the initial thrust (force) of the blast.

SECTION -C

Q12. Prove that the Newton's second Law of motion is the real law of motion.

Q13. State and prove work energy theorem for variable force.

Q14. A body of mass 2 kg initially at rest moves under the action of an applied horizontal force of 7 N on a table with coefficient of kinetic friction = 0.1. Compute the

- (a) Work done by the applied force in 10 s
- (b) Work done by friction in 10 s
- (c) Work done by the net force on the body in 10 s

Q15. A truck starts from rest and accelerates uniformly at 2.0 ms^{-2} . At $t = 10 \text{ s}$, a stone is dropped by a person standing on the top of the truck (6 m high from the ground). What are the (a) velocity, and (b) acceleration of the stone at $t = 11 \text{ s}$? **OR**

Prove that the mechanical energy of a freely falling body remains constant.

SECTION -D

Q16. What do you mean by banking of road? Derive the expression for maximum velocity on banked road. Also find optimum speed.

Q17. (a) State the differences between elastic and inelastic collisions?

(b) prove that during head on elastic collision of two equal masses velocities are just inter changed.

SECTION - E

Q18. Frictional Force refers to the force generated by two surfaces that contact and slide against each other. In the case of an incline, the force of gravity is not perpendicular to the surface. As the angle of the incline increases, the normal force decreases, which decreases the frictional force? The incline can be raised until the object just begins to slide.

Imagine a situation in which, a block placed at the bottom of a rough inclined plane is projected up the plane with some initial speed along the incline. Coefficient of friction between block and the plane is μ . Block moves up the plane and comes to rest after time t_1 . Then it again starts sliding down and reaches the bottom in further time t_2 .

i) Which one of the following statements is incorrect?

- (a) Frictional force opposes the relative motion.
- (b) Limiting value of static friction is directly proportional to normal reaction.
- (c) Rolling friction is smaller than sliding friction.
- (d) Coefficient of sliding friction has dimensions of length.

ii) Calculate retardation of block during upward motion.

- (a) $g \sin\theta - \mu g \cos\theta$
- (b) $g \sin\theta + \mu g \cos\theta$
- (c) $g \cos\theta - \mu g \sin\theta$
- (d) $g \cos\theta + \mu g \sin\theta$

iii) Calculate acceleration during downward motion.

- (a) $g \sin\theta - \mu g \cos\theta$
- (b) $g \sin\theta + \mu g \cos\theta$
- (c) $g \cos\theta - \mu g \sin\theta$
- (d) $g \cos\theta + \mu g \sin\theta$

OR

iv) Select the correct option.

- (a) $t_1 = t_2$
- (b) $t_1 > t_2$
- (c) $t_1 < t_2$
- (d) None of these
