Indian School Al Wadi Al Kabir

Unit test (2025-2026)

Class: XI | Subject: Physics (042) | Max. marks: 30
Date: 15/05/2025 | SET- 1 | Time: 1 hour

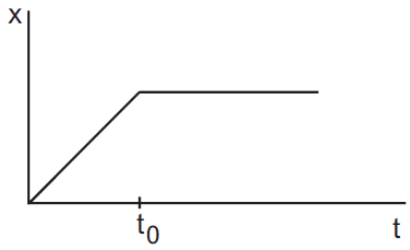
GENERAL INSTRUCTIONS

(1) There are 15 questions in all. All questions are compulsory.
(2) This question paper has 5 sections. Section A, Section B, Section C, Section D and Section E
(3) All sections are compulsory.
(4) Section A contains 8 questions, 6 MCQ and 2 Assertion -reasoning based of 1 mark each. Section B contains 2 questions of 2 marks each. Section C contains 3 questions of 3 marks each. Section D contains 1 case study-based question of 4 marks. Section E contains 1 long answer question of 5 marks.
(5) There is no overall choice. However, an internal choice has been provided in 1 question in section B, 1 question in section C, 1 question in section D and 1 question in section E. You have to attempt only one of the choices in such questions.
(6) Use of calculators is not allowed

SECTION-A **(08x1=8 marks)**

1. Figure below shows the displacement-time graph of a particle moving on the *X*-axis. Choose the correct statement.

(a) The particle is continuously going in positive *x* direction.
(b) The particle is at rest.
(c) The velocity increases up to a time t_0, and then becomes constant.
(d) The particle moves at a constant velocity up to a time t_0, and then stops.



2. The acceleration of a moving body can be found from
(a) Area under distance – time graph.
(b) Area under velocity – time graph.
(c) Slope of the velocity – time graph.
(d) Slope of the distance – time graph.

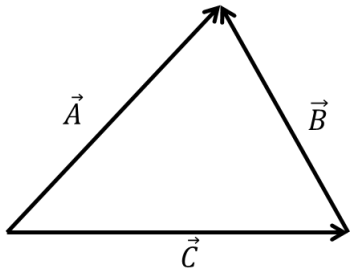
3. A ball is thrown vertically upward with an initial velocity of 50 m/s. What is its maximum height?
(a) 125 m
(b) 250 m
(c) 500 m
(d) 1000 m

4. The expression $\left(\frac{1}{\sqrt{2}}\,\hat{\imath} + \frac{1}{\sqrt{2}}\,\hat{\jmath}\right)$ is

(a) a unit vector.
(b) null vector.
(c) a vector of magnitude $\sqrt{2}$.
(d) scalar.

5. For the given vectors $\vec{A}$, $\vec{B}$ and $\vec{C}$,

(a) $\vec{A} + \vec{B} = \vec{C}$
(b) $\vec{A} = \vec{C} + \vec{B}$
(c) $\vec{C} + \vec{A} = \vec{B}$
(d) $\vec{C} = \vec{A} = \vec{B}$



6. Two vectors have a magnitude of 4 unit and 3 unit respectively. Which of the following cannot be the magnitude of their resultant?

(a) 5 unit
(b) 7 unit
(c) 8 unit
(d) 2 unit

For Questions 7 and 8, two statements are given – one labelled Assertion (A) and other labelled Reason (R). Select the correct answer to these questions from the options as given below.

(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false and R is also false.

7. Assertion(A): Position-time graph of a stationary object is a straight line parallel to time axis.
Reason(R): For a stationary object, position does not change with time.

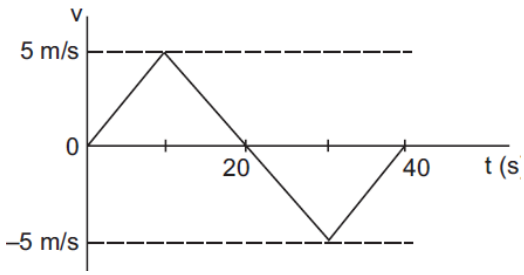
8. Assertion(A): If $\vec{A} \cdot \vec{B} = \vec{B} \cdot \vec{C}$ then A may not always be equal to C.
Reason(R): The dot product of two vectors involves cosine of the angle between the two vectors.

SECTION-B **(02x2= 4 marks)**

9. What do you mean by instantaneous velocity? How can we find it graphically?

OR

From the velocity–time plot shown in figure, find the distance travelled by the particle during the first 40 seconds. Also find the average velocity during this period.



10. Define unit vector. Find unit vector in the direction of a vector $\vec{A} = A_x \hat{\imath} + A_y \hat{\jmath} + A_z \hat{k}$.

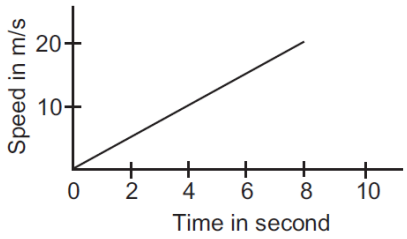
SECTION-C **(03x3= 9 marks)**

11. (i) Explain the differences between distance and displacement with suitable examples.
    (ii) A car moving along a straight road covers half the distance with speed 30 m/s and the other half with a speed of 50 m/s. Calculate the average speed of the car for the entire journey.

12. The slope of a velocity-time graph is parallel to time axis. What is its acceleration?
    Plot a displacement-time graph for constant accelerated motion of a particle.

OR

The speed of a car as a function of time is shown in the figure. Find the distance travelled by the car in 8 seconds and its acceleration.



13. State triangle law of vector addition. Find the magnitude and direction of resultant of two vectors added by the triangle law.

SECTION-D **(01x4= 4 marks)**

14. Work is a fundamental concept in physics that quantifies the energy transfer when a force is applied to an object over a displacement. Mathematically, work done by a force can be expressed using the dot product of force and displacement vectors. A force (10i + 6j) N acts on an object that moves (4i + 3j) m.
    Answer the following questions.

(i) The component of a vector is
  (a) always less than its magnitude.
  (b) always greater than its magnitude.
  (c) always equal to its magnitude.
  (d) none of these.

(ii) What is the work done in this case?
  (a) 40 J
  (b) 58 J
  (c) 48 J
  (d) 60 J

(iii) If displacement increases to (5i + 4j) m, what will be the new work done?
  (a) 64 J
  (b) 72 J
  (c) 80 J
  (d) 74 J

(iv) If the force is perpendicular to displacement, what will be the work done?
  (a) 0 J
  (b) 10 J
  (c) 20 J
  (d) 30 J

OR

What is the significance of a negative work done value?

(a) Force opposes motion

(b) Force supports motion

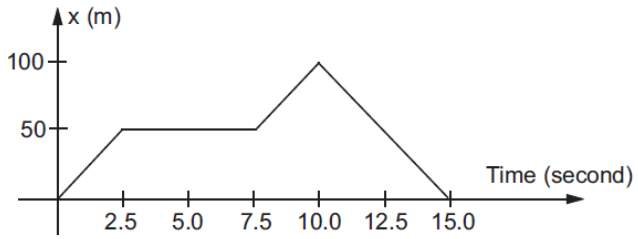
(c) No effect on motion

(d) Object moves faster

SECTION-E **(01x5= 5 marks)**

15. (i) A particle is moving along straight line with constant acceleration. Plot the variation in velocity with respect to time and derive the following equations, (a) $v = u + at$, (b) $s = ut + \frac{1}{2} at^2$.

(ii) Figure shows the graph of the x-coordinate of a particle going along the X-axis as a function of time. Find the average velocity during 0 to 10 s.



OR

(i) Explain the significance of displacement-time, velocity-time, and acceleration-time graphs with suitable examples. How can one determine acceleration from a velocity-time graph and displacement from a velocity-time graph?

(ii) An object having a velocity 4.0 m/s is accelerated at the rate of 1.2 m/s^2 for 5.0 s. Find the distance travelled during the period of acceleration.

(iii) A ball is thrown up at a speed of 4.0 m/s. Find the maximum height reached by the ball. Take g = 10 m/s^2.