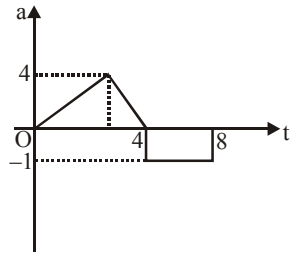
CLASS TEST

SECTION-I

Single Correct Answer Type 2 Q. [3 M (–1)]

1. The acceleration time graph of a particle is shown in the figure. What is the velocity of particle at t = 8 s if its initial velocity is 3 m/s ?



(A) 4 m/s (B) 5 m/s (C) 6 m/s (D) 7 m/s

2.. A particle is dropped in uniform gravity (g = 10 m/s^2) from the top of a tall building. A graph is plotted between velocity and displacement of particle. Magnitude of slope of this graph at t = 1s :-

(A) $\sqrt{3}$ (B) 1 (C) $\frac{1}{2}$ (D) $\frac{1}{\sqrt{3}}$

Multiple Correct Answer Type 2 Q. [4 M (–1)]

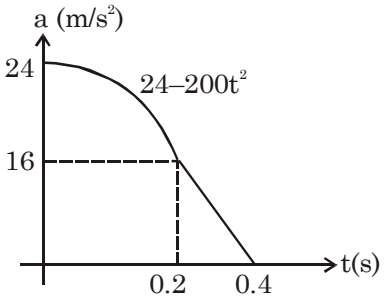
3. An accelerometer record for the motion of the given part of mechanism is approximated by an arc of a parabola for 0.2 sec and an straight line for next 0.2 sec as shown the diagram. Given that v = 0 when t = 0 and x = 0.8 m when t = 0.4 sec.

(A) Acceleration of particle at t = 0.3 sec is 8 m/s^2.

(B) Velocity of particle at t = 0.1 sec is $\left(\frac{7}{3}\right)$ m/s .

(C) Velocity of particle at t = 0.3 sec is 6 m/s.

(D) Position of particle at t = 0.2 sec is 0.9 m



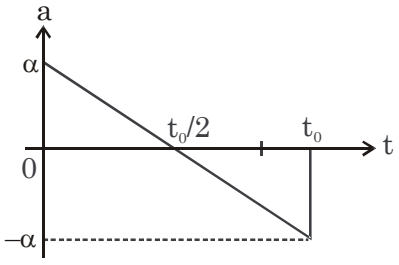
4. A person stands in an elevator. Starting at rest at t = 0 the elevator moves upward, coming to rest again at time t = t_0. The acceleration of the elevator during this period is shown graphically below. Which of the following statement(s) is/are **CORRECT**?

(A) The maximum speed of the elevator is $\frac{\alpha t_0}{4}$

(B) The total distance traveled by the elevator is $\frac{\alpha t_0^2}{6}$

(C) Acceleration does not change sign during motion

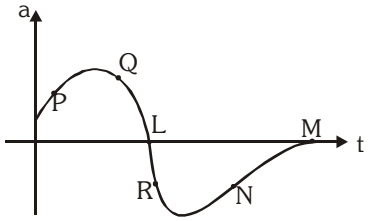
(D) Magnitude of acceleration continuously decreases



Linked Comprehension Type (3 Para × 3Q.) [3 M (-1)]
(Single Correct Answer Type)

Paragraph for Question No. 5 to 7

Acceleration–time graph of a moving particle is shown in figure



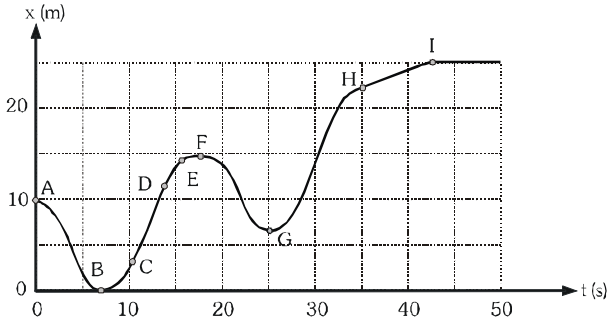
5. Does particle speeding up just before reaching at L?
Information I : Velocity of particle at L is in positive direction
Information II : Velocity of particle at L is in negative direction
(A) Question can be solved by using information I only
(B) Question can be solved by using information II only
(C) Question can be solved by using either information I or information II
(D) Question can't be solved by using either information I or information II

6. Does speed of particle at M is less than speed at L?
Information I : Velocity of particle at L is in positive direction
Information II : Velocity of particle at L is in negative direction
(A) Question can be solved by using information I only
(B) Question can be solved by using information II only
(C) Question can be solved by using either information I or information II
(D) Question can't be solved by using either information I or information II

7. Select the correct alternative
(A) Particle at L is accelerating
(B) Particle at M is accelerating
(C) Particle at R is speeding up
(D) None of these

Paragraph for Question 8 to 10

An observer records positions of a particle moving on a straight-line path at various instants of time. He starts his stopwatch when the particle is passing the point x = 10 m. With the help of these data he prepares the following graph, where position x is shown on the ordinate in meters and time t on the abscissa in seconds.



8. At the instant t = 0,
(A) the particle was moving in the negative x-direction and the observer started his stopwatch.
(B) the particle was moving in the positive x-direction and the observer started his stopwatch.
(C) the particle started its motion with a negative velocity and the observer started his stopwatch.
(D) the particle started its motion with a positive velocity and the observer started his stopwatch.

9. Speed of the particle
(A) first increases then decreases in time interval between points B and F
(B) first increases then decreases in time interval between points D and F
(C) always increases between points H and I.
(D) always decreases between points F and G.

10. The particle is changing its direction of motion at the instant corresponding to points
(A) A and E only.
(B) B, F and G only.
(C) C, D, E and H only.
(D) C, D, E, H and I only.

Paragraph for question nos. 11 to 13

A student designed a rocket. The rocket was launched from ground straight up into the air. At t = 0, the rocket is at y = 0 with $V_y(t = 0) = 0$. The velocity of the rocket is given by : $V_y = (24t - 3t^2)$ m/s for $0 \le t \le t_b$ where t_b is the time at which fuel burns out. Vertically upward direction is taken as positive. ($g = 10\ m/s^2$)

11. The expression for the acceleration $a_y(t)$ valid at all times in the interval $0 < t < t_b$ is

(A) $12t^2 - t^3$ (B) $24 - 6t$ (C) $24t - 6t^2$ (D) $24 - 6t - g$

12. The displacement of the rocket till the fuel burns out ($t = t_b$) is

(A) 128 m (B) 486 m (C) 203 m (D) 242 m

13. The time taken for rocket to reach its maximum height is

(A) 4 sec. (B) 8 sec. (C) 8.8 sec (D) 9.6 sec.

Linked Comprehension Type (1 Para × 2Q.) [3 M (-1)]
(Single Correct Answer Type)

Paragraph for Question no 14 and 15

Tim and Rick both can run at speed v_r and walk at speed v_w, with $v_w < v_r$. They set off together on a journey of distance D. Rick walks half of the distance and runs the second half. Tim walks half of the time and runs the other half.

14. Mark the incorrect statement :

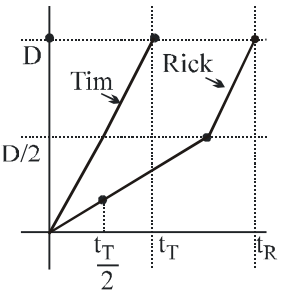
(A) Time taken by Rick to cover the distance D is $t_R = \frac{D}{2}\left(\frac{v_w + v_R}{v_w v_R}\right)$

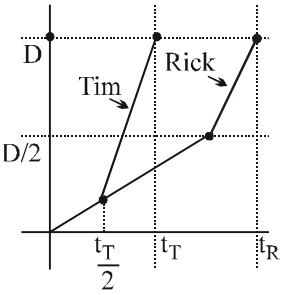
(B) Time taken by Tim to cover the distance is $t_T = \frac{2D}{V_r + V_w}$

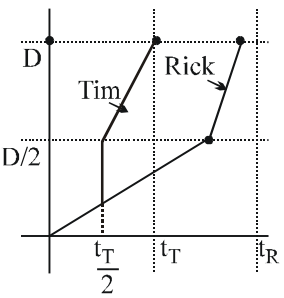
(C) Rick's average speed for covering the distance D is $\frac{2V_r V_w}{V_r + V_w}$

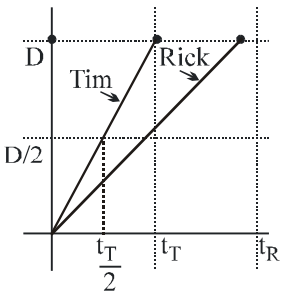
(D) Average speed of Rick for covering distance D is $\frac{V_r + V_w}{2}$

15. Which of the following graphs shows the positions of both Tim and Rick versus time.

(A)


(B)


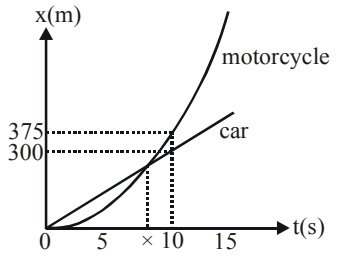
(C)


(D)


Linked Comprehension Type (1 Para × 2 Q.) [4 M (–1)]
(Multiple Correct Answer Type)

Paragraph for Question No. 16 and 17

A car travelling at constant velocity, passes a stationary motor cycle at a traffic light. As the car overtakes the motorcycle, the motorcycle accelerates uniformly from rest. The following displacement-time graph represents the motions of both vehicles from the traffic light onwards.



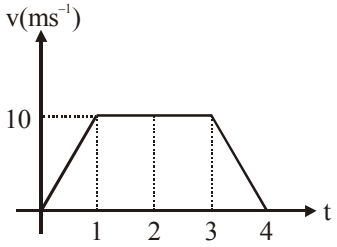
16. In which of following time interval/s speed of the motorcycle may be less than the speed of the car :-
(A) 0 to 2 sec (B) 0 to 4 sec (C) 0 to 8 sec (D) 5 to 10 sec

17. Choose the correct statement(s) :-
(A) The time at which motorcycle will cross the car is 8 sec
(B) Acceleration of the motorcycle is 7.5 m/s^2
(C) Average velocity of the motorcycle from starting point to the point of overtake is greater than that of car.
(D) Speed of the motorcycle at the point of overtake is equal to the speed of car.

SECTION-III

Numerical Grid Type (Ranging from 0 to 9) 2 Q. [4 M (0)]

1. Find the modulus of average acceleration (in m/s^2) of the block from time t=2 sec to t=4 sec.



2. A person who had to catch a train having 16 coaches each 16 m long, when ran into the platform found that the train has already started moving. He could not board the train but saw the front of 10^{th} coach, from the engine, pass by the position where front of 1^{st} coach was positioned. It takes 8s for the rest of the train to pass. The uniform acceleration of the train is $\left(\frac{\alpha}{4}\right) m/s^2$ then the value of α is :

CLASS TEST # 07 **ANSWER KEY**

SECTION-I

Single Correct Answer Type **2 Q. [3 M (–1)]**

1. Ans. (D) **2. Ans. (B)**

Multiple Correct Answer Type **2 Q. [4 M (–1)]**

3. Ans. (A,B) **4. Ans. (A,B)**

Linked Comprehension Type **(3 Para × 3Q.)[3 M (-1)]**
(Single Correct Answer Type)

5. Ans. (C) **6. Ans. (C)** **7. Ans. (D)** **8. Ans. (A)** **9. Ans. (A)** **10. Ans. (B)**
11. Ans. (B) **12. Ans. (C)** **13. Ans. (D)**

Linked Comprehension Type(Single Correct Answer Type) (1 Para × 2Q.) [3 M (-1)]

14. Ans. (D) **15. Ans. (B)**

Linked Comprehension Type(Multiple Correct Answer Type)(1 Para × 2 Q.)[4 M (–1)]

16. Ans. (A, B) **17. Ans. (A, B)**

SECTION-III

Numerical Grid Type (Ranging from 0 to 9) **2 Q. [4 M (0)]**

1. Ans. 5 **2. Ans. 2**