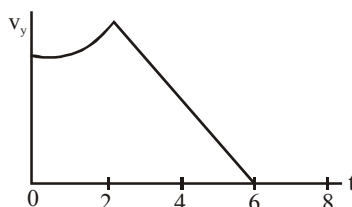


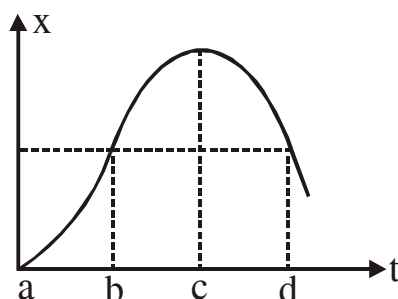
**RACE # 18**

**PHYSICS**

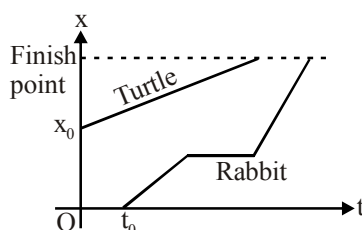
1. The graph below represents the y-component of the velocity of an object as a function of time. Which of the following could be a reasonable description of its motion ? (Positive y-axis is upwards)



- (A) The object accelerates upward at a constant rate and then accelerates downward until it hits the ground at  $t = 6$  s.  
 (B) The object accelerates upward at a constant rate and then accelerates downward until it reaches its highest point at  $t = 6$  s.  
 (C) The object accelerates upward at a non-constant rate and then accelerates downward until it hits the ground at  $t = 6$  s.  
 (D) The object accelerates upward at a non-constant rate and then accelerates downward until it reaches its highest point at  $t = 6$  s.
2. In the given figure is shown position-time graph of a particle moving in a straight-line. The **CORRECT** statement(s) is/are :-



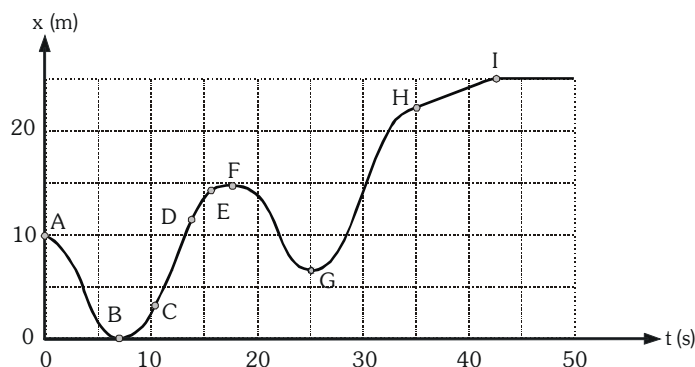
- (A) Average velocity between a & b is less than instantaneous velocity at b.  
 (B) Average velocity between b & d is equal to instantaneous velocity at c.  
 (C) Direction of average velocity from a to d is opposite to instantaneous velocity at d.  
 (D) Average velocity in interval a to c is less than average velocity in interval a to d.
3. Figure shows a graph of  $x$  versus  $t$  for a race between a turtle and rabbit. The graph shows that



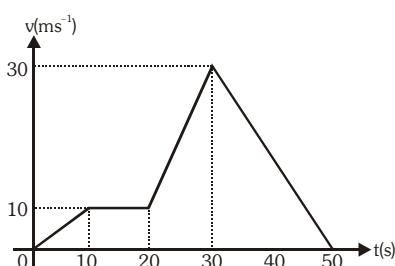
- (A) At the beginning of race turtle was ahead of rabbit.  
 (B) Rabbit began to move certain time later as compared to turtle  
 (C) There was an interval of time when rabbit was taking rest.  
 (D) When rabbit was in motion at all the instants its speed was greater than that of the turtle.

### Paragraph for Question 4 to 6

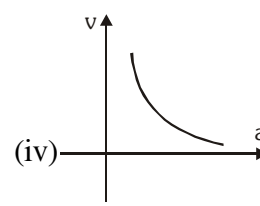
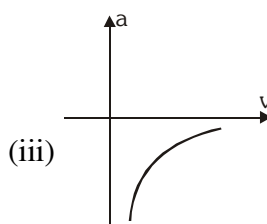
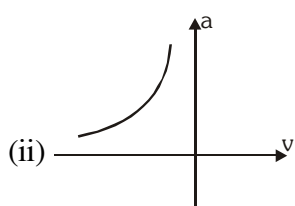
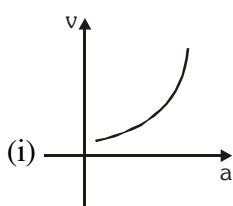
An observer records position of a particle moving on a straight-line path at various instants of time. He starts his stopwatch when the particle is passing the point  $x = 10$  m. With the help of these data he prepares the following graph, where position  $x$  is shown on the ordinate in meters and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



4. 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 from origin 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.
5. 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.
6. 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.
7. Write down maximum acceleration (in  $\text{ms}^{-2}$ ) for shown velocity – time graph of a moving body.



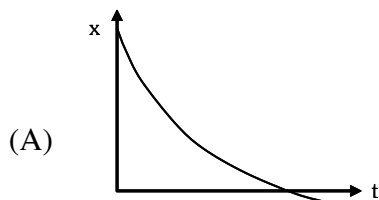
8. A particle is moving in a straight line with velocity  $v$  and acceleration  $a$ . Write number of graph(s) in which the particle is always speeding down.



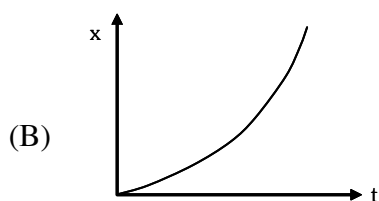
9. Position-time ( $x - t$ ) graph of a particle moving on a straight line is shown in the first column of the following table. In the second column some descriptions of the motion are given. Suggest suitable match between these two

**Column-I**

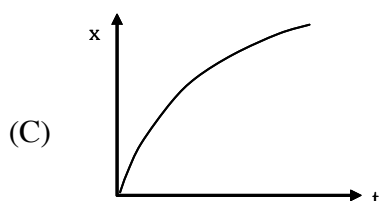
**Column-II**



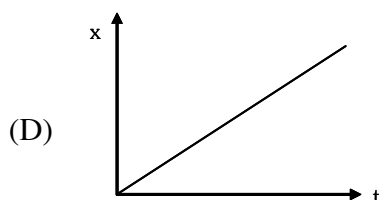
(P) Particle is speeding up moving in the positive  $x$ -direction.



(Q) Particle is speeding down moving in the positive  $x$ -direction.



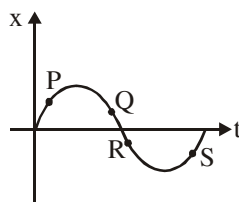
(R) Particle is speeding up moving in the negative  $x$ -direction.



(S) Particle is speeding down moving in the negative  $x$ -direction.

(T) Particle is moving with uniform speed in positive  $x$ -direction.

10. A car is moving along a straight line. It's position ( $x$ ) - time( $t$ ) graph is shown in column-II. Match the entries in column-I with points on graph.



**Column-I**

**Column-II**

- (A)  $x \rightarrow$  negative,  $v \rightarrow$  positive,  $a \rightarrow$  positive  
(B)  $x \rightarrow$  positive,  $v \rightarrow$  negative,  $a \rightarrow$  negative  
(C)  $x \rightarrow$  negative,  $v \rightarrow$  negative,  $a \rightarrow$  positive  
(D)  $x \rightarrow$  positive,  $v \rightarrow$  positive,  $a \rightarrow$  negative

- (P) P  
(Q) Q  
(R) R  
(S) S

**N\_Race # 18****ANSWER KEY****1. Ans. (D)****2. Ans. (A,B,C)****3. Ans. (A,B,C,D)****4. Ans. (A)****5. Ans. (A)****6. Ans. (B)****7. Ans. 2****8. Ans. 2 and 3****9. Ans. (A)  $\rightarrow$  (S) ; (B)  $\rightarrow$  (P) ; (C)  $\rightarrow$  (Q) ; (D)  $\rightarrow$  (T)****10. Ans. (A) S (B) Q (C) R (D) P**