Saitech Informatics

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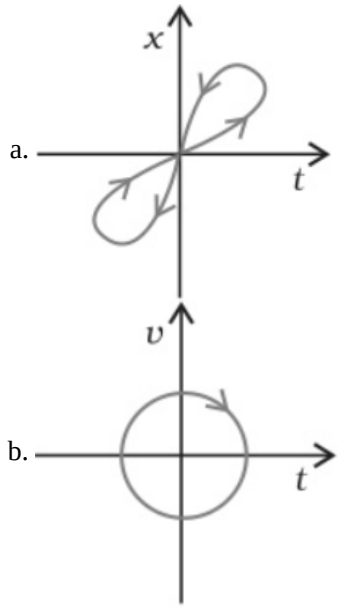
MOTION IN A STRAIGHT LINE

Class 11 - Physics

Time Allowed: 45 minutes **Maximum Marks: 45**

1. The position of an object moving along x-axis is given by $x = a + bt^2$, where a = 8.5 m, b = 2.5 m and t is measured in seconds. What is its velocity at t = 0 s and t = 2.0 s? **[1]**
2. Can a particle in one-dimensional motion have zero speed and a non-zero velocity? **[1]**
3. What does the slope of the velocity-time graph represent? **[1]**
4. Can a body have a constant speed and still have a varying velocity? **[1]**
5. Can a body have zero velocity and still be accelerating? **[1]**
6. Can speed of an object be negative? Justify. **[1]**
7. Draw displacement time graph for a uniformly accelerated motion. **[1]**
8. Draw position-time graphs for two objects having zero relative velocity. **[1]**
9. A ball thrown vertically upwards with a speed of 19.6 ms^{-1} from the top of a tower returns to the earth in 6 seconds. Find the height of the tower. (Take g = 9.8 m/s^2) **[1]**
10. Is the formula: $s = vt - \frac{1}{2}at^2$ correct, when the body is moving with uniform acceleration? **[1]**
11. A 100 m sprinter uniformly increases his speed from rest at the rate of 1 ms^{-2} up to $\frac{3}{4}$th of the total run and then covers the last quarter($\frac{1}{4}$th) run with uniform speed. How much time does he take to complete the race? **[3]**
12. A stone is dropped from the top of a cliff and is found to ravel 44.1m diving the last second before it reaches the ground. What is the height of the cliff? g = 9.8m/s^2. **[3]**
13. Look at the graphs (a) to (d) (figure) carefully and state, with reasons, which of these cannot possibly represent one-dimensional motion of a particle. **[3]**



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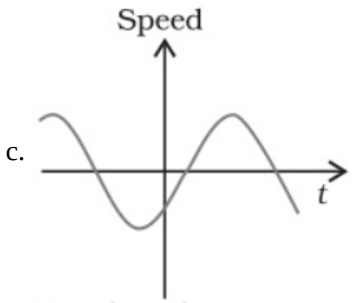

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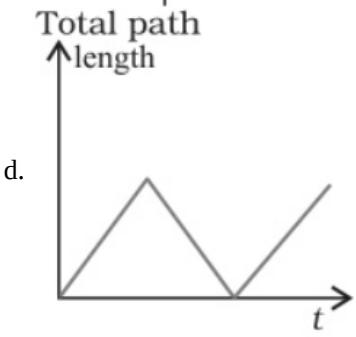
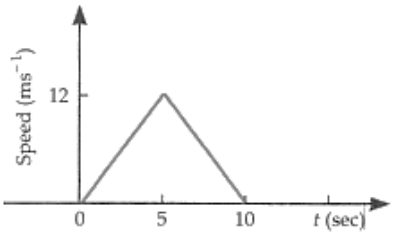


14. From the top of a tower, a ball is dropped to fall freely under gravity and at the same time, another ball is thrown up with a velocity of 50 ms^{-1}. Plot the position-time graph for the motion of the two balls during the time interval t = 0 to t = 5s. Take g = 10 ms^{-2}. **[3]**

15. Give example of a motion where x > 0, v < 0 and a > 0 at a particular instant. **[3]**

16. The speed-time graph of a particle moving along a fixed direction is shown in Fig. Find: **[5]**



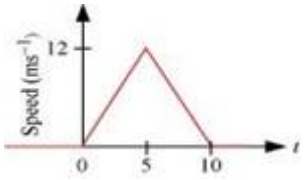
i. distance travelled by the particle between 0 sec to 10 sec

ii. average speed between this interval

iii. the time when the speed was minimum

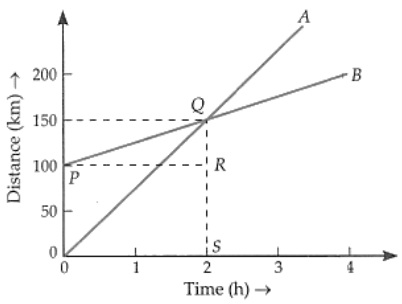
iv. the time when speed was maximum.

17. The speed-time graph of a particle moving along a fixed direction is shown in Figure. Obtain the distance traversed by the particle between (a) t = 0 s to 10 s, (b) t = 2 s to 6 s. **[5]**



What is the average speed of the particle over the intervals in (a) and (b)?

18. Figure shows the distance-time graphs of two trains, which start moving simultaneously in the same direction. From the graphs, find: **[5]**



i. How much ahead of A is B when the motion starts?

ii. What is the speed of B?

iii. When and where will A catch B?

iv. What is the difference between the speeds of A and B?

19. Prove Galileo's Law of Odd Numbers. **[5]**