Work Sheet (Dose-I) [Motion in One dimension]

Objective Problems

1. A point traversed $3/4^{th}$ of the circle of radius R in time t. the magnitude of the average velocity of the particle in this time interval is

(a) $\frac{\pi R}{t}$ (b) $\frac{3\pi R}{2t}$ (c) $\frac{R\sqrt{2}}{t}$ (d) $\frac{R}{\sqrt{2}t}$

2. A body travelling with uniform acceleration crosses two points A and B with velocities 20 m/s and 30 m/s respectively. The speed of the body at mid-point of A and B is

(a) 25 m/s (b) 25.5 m/s (c) 24 m/s (d) $10\sqrt{6}$ m/s

3. A man in a balloon rising vertically with an acceleration of 4.9 m/s^2 releases a ball 2s after the balloon is let go from the ground. The greatest height above the ground reaches by the ball is ($g = 9.8\ m/s^2$).

(a) 14.7 m (b) 19.6 m (c) 9.8 m (d) 24.5 m

4. A stone is allowed to fall freely from rest. The ratio of the time taken to fall through the first meter and the second meter distance is

(a) $\sqrt{2}-1$ (b) $\sqrt{2}+1$ (c) $\sqrt{2}$ (d) None of these.

5. A stone is thrown upward with a speed u from the top of the tower reaches the ground with a speed 3u. The height of the tower is

(a) $3u^2/g$ (b) $4u^2/g$ (c) $6u^2/g$ (d) $9u^2/g$.

6. A particle is thrown vertically upwards. Its velocity at half of the height is 10 m/s. Then, the maximum height attained by it is ($g = 10 m/s^2$)

(a) 16 m (b) 10 m (c) 20 m. (d) 40 m.

7. Which of the following represents uniformly accelerated motion

(a) $x = \sqrt{\frac{t+a}{b}}$ (b) $x = \frac{t+a}{b}$ (c) $t = \sqrt{\frac{x+a}{b}}$ (d) $x = \sqrt{t+a}$

8. A train accelerates from rest at a constant rate α for distance x_1 and time t_1. After that it retards to rest at const. rate β for distance x_2 and time t_2. Which of the following relations is correct?

(a) $\frac{x_1}{x_2} = \frac{\alpha}{\beta} = \frac{t_1}{t_2}$ (b) $\frac{x_1}{x_2} = \frac{\beta}{\alpha} = \frac{t_1}{t_2}$ (c) $\frac{x_1}{x_2} = \frac{\alpha}{\beta} = \frac{t_2}{t_1}$ (d) $\frac{x_1}{x_2} = \frac{\beta}{\alpha} = \frac{t_2}{t_1}$

9. A particle initially at rest moves along the x-axis. Its acceleration varies with time as $a = 4t$. If it starts from the origin, the distance covered by it in 3 s is

(a) 12 m (b) 18 m (c) 24 m (d) 36 m

10. The displacement (x) of a particle depends on time t as $x = \alpha t^2 - \beta t^3$, choose the incorrect statements from the following.

(a) The particle never returns to its starting point

(b) The particle comes to rest after time $\frac{2\alpha}{3\beta}$.

(c) The initial velocity of the particle is zero.

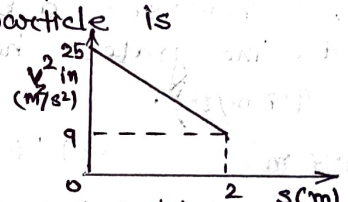
(d) The initial acceleration of the particle is zero.

11. A particle moves along the positive branch of the curve $y = \frac{x^2}{2}$ where $x = \frac{t^2}{2}$, x and y are measured in meters and t in second. At $t = 2$ s, the velocity of the particle is

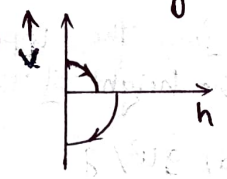
(a) $2\hat{i} - 4\hat{j}$ m/s (b) $4\hat{i} + 2\hat{j}$ m/s (c) $2\hat{i} + 4\hat{j}$ m/s (d) $4\hat{i} - 2\hat{j}$ m/s

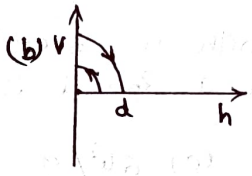
12. A graph between the square of the velocity of a particle and the distance s moved by the particle is shown in the figure. The acceleration of the particle is

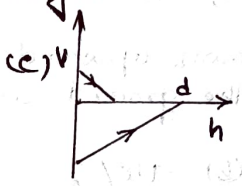
(a) -8 m/s^2 (b) 4 m/s^2 (c) -16 m/s^2 (d) None

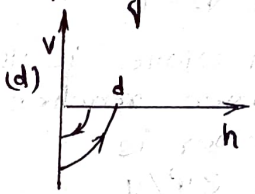


13. A ball is dropped vertically from a height d above the ground. It hits the ground and bounces back vertically to a height $d/2$. Neglect subsequent motion and air resistance, its velocity v varies with the height h above the ground is

(a) 

(b) 

(c) 

(d) 

14. Two bodies are held separated by 9.8 m vertically one above the other. They are released simultaneously to fall freely under gravity. After 2 s the relative distance between them is

(a) 4.9 m (b) 19.6 m (c) 9.8 m (d) 39.2 m.

15. A man is 25 m behind a bus, when bus starts accelerating at 2 m/s^2 and man starts moving with constant velocity of 10 m/s. Time taken by him to board the bus is

(a) 2 s (b) 3 s (c) 4 s (d) 5 s

16. The speed of boat is 5 km/h in still water. It crosses a river of width 1 km along the shortest possible path in 15 min. Then velocity of river will be

(a) 4.5 km/h (b) 4 km/h (c) 1.5 km/h (d) 3 km/h