Ch—02 Kinematics

Daily Practice Problem 01

Q1. If a car covers $2/5^{th}$ of the total distance with v_1 speed and $3/5^{th}$ distance with v_2, then average speed is

(a) $\frac{1}{2}\sqrt{v_1 v_2}$

(b) $\frac{v_1+v_2}{2}$

(c) $\frac{2v_1v_2}{v_1+v_2}$

(d) $\frac{5v_1v_2}{3v_1+2v_2}$

Q2. One car moving on a straight road covers one third of the distance with $20\ km/hr$ and the rest with $60\ km/hr$. The average speed is

(a) $40\ km/hr$

(b) $80\ km/hr$

(c) $46\frac{2}{3} km/hr$

(d) $36\ km/hr$

Q3. A car moving along a straight line moves with a constant velocity v_1 for some time and with constant velocity v_2 for the next equal time. What is the average velocity of the car?

Q4. A point traversed half the distance with a velocity v_0. The remaining part of the distance was covered with velocity v_1 for half the time, and with velocity v_2 for the other half of the time. Find the average speed of the point average over the whole time of motion.

Q5. The acceleration $'a'$ in m/s^2 of a particle is given by $a = 3t^2 + 2t + 2$ where t is the time. If the particle starts out with a velocity $u = 2\ m/s$ at $t = 0$, then the velocity at the end of $2\ second$ is

(a) 12 m/s

(b) 18 m/s

(c) 27 m/s

(d) 36 m/s

Q6. The co-ordinates of a moving particle at a time t, are given by, $x = 5\ sin\ 10\ t$, $y = 5\ cos\ 10\ t$. The speed of the particle is

(a) 25

(b) 50

(c) 10

(d) None

Q7. The position x of a particle varies with time t, as $x = at^2 - bt^3$. The acceleration of the particle will be zero at time t equals to

(a) zero

(b) $\frac{a}{3b}$

(c) $\frac{2a}{3b}$

(d) $\frac{a}{b}$

Q8. The displacement x of a particle varies with time t as $x = ae^{-\alpha t} + be^{\beta t}$, where a, b, α and $\beta$are positive constants. The velocity of the particle will

(a) decrease with time

(b) be independent of α and β

(c) drop to zero when $\alpha = \beta$

(d) increase with time

Q9. The x and y coordinates of a particle at any time t are given by $x = 7t + 4t^2$ and $y = 5t$, where x and y are in metre and t in seconds. The acceleration of particle at $t = 5\ s$ is

(a) Zero

(b) 8 m/s^2

(c) 20 m/s^2

(d) 40 m/s^2

Q10. The acceleration of a particle is increasing linearly with time t as bt. The particle starts from the origin with an initial velocity v_0. The distance travelled by the particle in time t will be

(a) $v_0 t + \frac{1}{3}bt^2$

(b) $v_0 t + \frac{1}{3}bt^3$

(c) $v_0 t + \frac{1}{6}\ bt^3$

(d) $v_0 t + \frac{1}{2}bt^2$

Q11. A particle moves along a straight line such that its displacement at any time t is given by $s = (t^3 - 6\,t^2 + 3\,t + 4)\,m$ The velocity when the acceleration is zero, is

(a) $3\ ms^{-1}$

(b) $-12\ ms^{-1}$

(c) $42\ ms^{-1}$

(d) $-9\ ms^{-1}$

Q12. A bus travelling the first one-third distance at a speed of $10\ km/h$, the next one-third at $20\ km/h$ and the last one third at $60\ km/h$. The average speed of the bus is

(a) 9 km/h

(b) 16 km/h

(c) 18 km/h

(d) 48 km/h

Q13. A particle is moving along the x-axis whose acceleration is given by $a = 3x - 4$, where x is the location of the particle. At $t = 0$, the particle is at rest at $x = 4/3\ m$. The distance travelled by the particle in $5\ s$ is

(a) Zero

(b) 42 m

(c) Infinite

(d) None of these

Q14. A particle moves along a straight line such that its displacement at any time t is given by $s = 3t^3 + 7t^2 + 14t + 5$ .The acceleration of the particle at $t = 1\ s$ is

(a) $18\ m/s^2$

(b) $32\ m/s^2$

(c) $29\ m/s^2$

(d) $24\ m/s^2$

Q15. The position of a particle moving along the x-axis is expressed as $x = at^3 + bt^2 + ct + d$. The initial acceleration of the particle is

(a) 6a

(b) 2b

(c) (a + b)

(d) (a + c)

Q16. The acceleration a in m/s^2, of a particle is given by $a = 3t^2 + 2t + 2$ where t is the time. If the particle starts out with a velocity $v = 2\ m/s$ at $t = 0$, then the velocity at the end of $2\ s$ is

(a) 12 m/s

(b) 14 m/s

(c) 16 m/s

(d) 18 m/s

Q17. 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

Q18. The acceleration $a\ (in\ ms^{-2})$ of a body, starting from rest varies with time t (in second) according to the relation $a = 3t + 4$. The velocity of the body starting from rest at time $t = 2\ s$ will be

(a) 10 ms^{-1}

(b) 12 ms^{-1}

(c) 14 ms^{-1}

(d) 16 ms^{-1}.

Q19. 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

Q20. The displacement of a particle is given by $y = a + bt + ct^2 - dt^4$. The initial velocity and acceleration are respectively

(a) $b, -4d$

(b) $-b, -2c$

(c) $b, 2c$

(d) $2c, -4d$

Q21. The position x of a particle with respect to time t along x-axis is given by $x = 9t^2 - t^3$ where x is in metres and t in seconds. What will he the position of this particle when it achieves maximum speed along the +x direction?

(a) 54 m

(b) 81 m

(c) 24 m

(d) 32 m

ANSWERS

1. d

2. d

3. $\frac{v_1+v_2}{2}$

4. $\frac{2v_0(v_1+v_2)}{v_1+v_2+2v_0}$

5. b

6. b

7. b

8. d

9. b

10. c

11. d

12. c

13. a

14. b

15. b

16. d

17. b

18. c

19. a, d

20. c

21. a