1.

Six particles situated at the corners of a regular hexagon of side a move at constant speed v. Each particles maintains a direction towards the particle at the next. The time which the particle will take to meet each other is :

1. $\frac{2a}{v}$ sec
2. $\frac{a}{v}$ sec
3. $\frac{2a}{3v}$ sec
4. $\frac{3a}{2v}$ sec

2.

The velocity of a body moving with a uniform acceleration of 2 m/sec^2 is 10 m/sec. Its velocity after an interval of 4 *sec* is

(1) 12 m/sec

(2) 14 m/sec

(3) 16 m/sec

(4) 18 m/sec

3.

An alpha particle enters a hollow tube of 4 *m* length with an initial speed of 1 *km/s*. It is accelerated in the tube and comes out of it with a speed of 9 *km/s*. The time for which it remains inside the tube is

(1) $8 \times 10^{-3}\ s$

(2) $80 \times 10^{-3} s$

(3) $800 \times 10^{-3} s$

(4) $8 \times 10^{-4} s$

4.

A body of mass 10 *kg* is moving with a constant velocity of 10 *m/s*. When a constant force acts for 4 *seconds* on it, it moves with a velocity 2 *m/sec* in the opposite direction. The acceleration produced in it is

(1) 3 *m/sec*^{2}

(2) –3 *m/sec*^{2}

(3) 0.3 *m/sec*^{2}

(4) –0.3 *m/sec*^{2}

5.

A body starts from rest from the origin with an acceleration of $6\,m/s^2$ along the *x*-axis and $8\,m/s^2$ along the *y*-axis. Its distance from the origin after 4 seconds will be

(1) 56 *m*

(2) 64 *m*

(3) 80 *m*

(4) 128 *m*

6.

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

(1) $b,\ -4d$

(2) $-b,\ 2c$

(3) $b,\ 2c$

(4) $2c,\ -4d$

7.

A car moving with a speed of 40 *km/h* can be stopped by applying brakes for atleast 2 *m*. If the same car is moving with a speed of 80 *km/h*, what is the minimum stopping distance

(1) 8 *m*

(2) 2 *m*

(3) 4 *m*

(4) 6 *m*

8.

The displacement is given by $x = 2t^2 + t + 5$, the acceleration at $t = 2s$ is

(1) $4\ m/s^2$

(2) $8\ m/s^2$

(3) $10\ m/s^2$

(4) $15\ m/s^2$

9.

A body moves from rest with a constant acceleration of 5 *m/s*^{2}. Its instantaneous speed (in *m/s*) at the end of 10 *sec* is

(1) 50

(2) 5

(3) 2

(4) 0.5

10.

If a car at rest accelerates uniformly to a speed of 144 *km/h* in 20 *s*. Then it covers a distance of

(1) 20 *m*

(2) 400 *m*

(3) 1440 *m*

(4) 2880 *m*

11.

If a train travelling at 72 *kmph* is to be brought to rest in a distance of 200 metres, then its retardation should be

(1) 20 *ms*$^{-2}$

(2) 10 *ms*$^{-2}$

(3) 2 ms^{-2}

(4) 1 ms^{-2}

12.

The displacement of a particle starting from rest (at $t = 0$) is given by $s = 6t^2 - t^3$. The time in seconds at which the particle will attain zero velocity again, is

(1) 2

(2) 4

(3) 6

(4) 8

13.

Two cars A and B at rest at same point initially. If A starts with uniform velocity of 40 *m/sec* and B starts in the same direction with constant acceleration of 4 m/s^2, then B will catch A after how much time

(1) 10 *sec*

(2) 20 *sec*

(3) 30 *sec*

(4) 35 *sec*

14.

The motion of a particle is described by the equation $x = a + bt^2$ where a = 15 *cm* and b = 3 cm/s^2. Its instantaneous velocity at time 3 *sec* will be

(1) 36 *cm/sec*

(2) 18 *cm/sec*

(3) 16 *cm/sec*

(4) 32 *cm/sec*

15.

Consider the acceleration, velocity and displacement of a tennis ball as it falls to the ground and bounces back. Directions of which of these changes in the process

(1) Velocity only

(2) Displacement and velocity

(3) Acceleration, velocity and displacement

(4) Displacement and acceleration

16.

The displacement of a particle, moving in a straight line, is given by $s = 2t^2 + 2t + 4$ where s is in *metres* and t in seconds. The acceleration of the particle is

(1) 2 m/s^2

(2) 4 m/s^2

(3) 6 m/s^2

(4) 8 m/s^2

17.

The velocity of a bullet is reduced from 200m/s to 100m/s while travelling through a wooden block of thickness 10cm. The retardation, assuming it to be uniform, will be

(1) 10×10^4 m/s^2

(2) 12×10^4 m/s^2

(3) 13.5×10^4 m/s^2

(4) 15×10^4 m/s^2

18.

A student is standing at a distance of 50 metres from the bus. As soon as the bus begins its motion with an acceleration of 1ms^{-2}, the student starts running towards the bus with a uniform velocity u. Assuming the motion to be along a straight road, the minimum value of u, so that the student is able to catch the bus is

(1) 5 ms^{-1}

(2) 8 ms^{-1}

(3) 10 ms^{-1}

(4) 12 ms^{-1}

19.

An object accelerates from rest to a velocity 27.5 *m/s* in 10 *sec* .Then find distance covered by object in next 10 *sec*

(1) 550 *m*

(2) 137.5 *m*

(3) 412.5 *m*

(4) 275 *m*

20.

Speed of two identical cars are u and 4u at a specific instant. The ratio of the respective distances in which the two cars are stopped from that instant is

(1) 1 : 1

(2) 1 : 4

(3) 1 : 8

(4) 1 : 16

21.

A car, starting from rest, accelerates at the rate f through a distance S, then continues at constant speed for time t and then decelerates at the rate $\frac{f}{2}$ to come to rest. If the total distance traversed is 15 S, then

(1) $S = \frac{1}{2}ft^2$

(2) $S = \frac{1}{4}ft^2$

(3) $S = \frac{1}{72}ft^2$

(4) $S = \frac{1}{6}ft^2$

22.

A man is 45 *m* behind the bus when the bus start accelerating from rest with acceleration 2.5 m/s^2. With what minimum velocity should the man start running to catch the bus ?

(1) 12 *m/s*

(2) 14 *m/s*

(3) 15 *m/s*

(4) 16 *m/s*

23.

A 120 *m* long train is moving in a direction with speed 20 *m/s*. A train *B* moving with 30 *m/s* in the opposite direction and 130 *m* long crosses the first train in a time

(1) 4 *s*

(2) 36 *s*

(3) 38 *s*

(4) 5 s

24.

A 210 meter long train is moving due North at a speed of 25*m/s*. A small bird is flying due South a little above the train with speed 5*m/s*. The time taken by the bird to cross the train is

(1) 6 *s*

(2) 7 *s*

(3) 9 *s*

(4) 10 *s*

25.

The distance between two particles is decreasing at the rate of 6 *m/sec*. If these particles travel with same intial speeds and in the same direction, then the separation increases at the rate of 4 *m/sec*. The particles have speeds as

(1) 5 *m*/*sec* ; 1 *m*/*sec*

(2) 4 *m*/*sec* ; 1 *m*/*sec*

(3) 4 *m*/*sec* ; 2 *m*/*sec*

(4) 5 *m*/*sec* ; 2 *m*/*sec*

26.

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

(1) 14.7 *m*

(2) 19.6 *m*

(3) 9.8 *m*

(4) 24.5 *m*

27.

A body is projected up with a speed '*u*' and the time taken by it is *T* to reach the maximum height *H*. Pick out the correct statement

(1) It reaches *H*/2 in *T*/2 *sec*

(2) It acquires velocity *u*/2 in *T*/2

(3) Its velocity is *u*/2 at *H*/2

(4) Same velocity at 2*T*

28.

A ball of mass m_1 and another ball of mass m_2 are dropped from equal height. If time taken by the balls are t_1 and t_2 respectively, then

(1) $t_1 = \frac{t_2}{2}$

(2) $t_1 = t_2$

(3) $t_1 = 4t_2$

(4) $t_1 = \frac{t_2}{4}$

29.

Velocity of a body on reaching the point from which it was projected upwards, is

(1) $v = 0$

(2) $v = 2u$

(3) $v = 0.5\ u$

(4) $v = -u$

30.

Time taken by an object falling from rest to cover the height of h_1 and h_2 is respectively t_1 and t_2 then the ratio of t_1 to t_2 is

(1) $h_1 : h_2$

(2) $\sqrt{h_1} : \sqrt{h_2}$

(3) $h_1 : 2h_2$

(4) $2h_1 : h_2$

31.

A car moving with a speed of 40 km h^{-1} can be stopped by applying brakes for 2 m. If the same car is moving with a speed of 80 km h^{-1}, what is the minimum stopping distance?

(1) 8 m

(2) 2 m

(3) 4 m

(4) 6 m

32.

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.

(1) 18 m s^{-2}

(2) 32 m s^{-2}

(3) 29 m s

-2

(4) 24 m s^{-2}

33.

A stone is thrown vertically upwards. When a stone is at a height half of its maximum height, its speed is 10 m s^{-1}; then the maximum height attained by the stone is (g = 10 m s^{-2}):

(1) 8 m

(2) 10 m

(3) 15 m

(4) 20 m

34.

If a ball is thrown vertically upwards with speed u, the distance covered during the last 't' seconds of its ascent is

(1) ut

(2) $\frac{1}{2}gt^2$

(3) $ut - \frac{1}{2}gt^2$

(4) (u+t)t

35.

A ball is thrown vertically upward. It has a speed of 10 m s^{-1} when it has reached one - half of its maximum height. How high does the ball rise? (Take g = 10 m s^{-2}).

(1) 5 m

(2) 15 m

(3) 10 m

(4) 20 m

36.

Two bodies, A (of mass 1 kg) and B (of mass 3 kg), are dropped from heights of 16 and 25 m, respectively. The ratio of the time taken by them to reach the ground is

(1) $\frac{5}{4}$

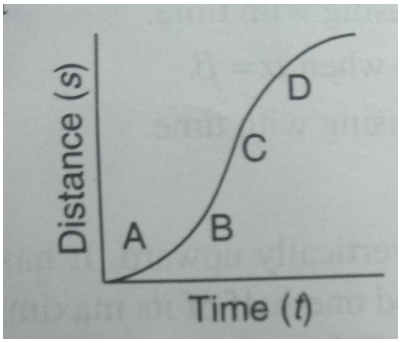
(2) $\frac{12}{5}$

(3) $\frac{5}{12}$

(4) $\frac{4}{5}$

37.

A particle shows distance-time curve as shown in the figure below. The maximum instantaneous velocity of the particle is around the point



(1) A

(2) B

(3) C

(4) D

38.

A particle moves in a straight line with a constant acceleration. It changes its velocity from 10 ms^{-1} to 20 m s^{-1} while passing through a distance 135 m in t s. The value of t is

(1) 9

(2) 10

(3) 1.8

(4) 12

39.

A particle starts its motion from rest under the action of a constant force. If the distance covered in first 10 s is S_1 and that covered in the first 20 s is S_2, then

(1) $S_2 = 3S_1$

(2) $S_2 = 4S_1$

(3) $S_2 = S_1$

(4) $S_2 = 2S_1$

40.

A bus is moving with a speed of 10 m s^{-1} on a straight road. A scooterist wishes to overtake the bus in 100 s. If the bus is at a distance of 1 km from the scooterist, with what speed should the scooterist chase the bus?

(1) 40 ms^{-1}

(2) 25 ms^{-1}

(3) 10 ms^{-1}

(4) 20 ms^{-1}

41.

A particle has initial velocity $\left(3\hat{i} + 4\hat{j}\right)$ and has acceleration $\left(0.4\hat{i} + 0.3\hat{j}\right)$. Its speed after 10 s is

(1) 10 units

(2) 7 units

(3) $7\sqrt{2}$ units

(4) 8.5 units

42.

A particle covers half of its total distance with speed v_1 and the rest half distance with speed v_2. Its average speed during the complete journey is

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

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

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

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

43.

The motion of a particle along a straight line is described by equation $x = 8 + 12t - t^3$, where x is in metre and t in second. The retardation of the particle, when its velocity becomes zero, is

(1) 24 m s^{-2}

(2) zero

(3) 6 m s^{-2}

(4) 12 m s^{-2}

44.

A stone falls freely under gravity. It covers distance $h_1,\ h_2\ and\ h_3$ in the first 5 s, the next 5 s and the next 5 s respectively. The relation between $h_1,\ h_2\ and\ h_3$ is

(1) $h_1 = 2h_2 = 3h_3$

(2) $h_1 = \frac{h_2}{3} = \frac{h_3}{5}$

(3) $h_2 = 3h_1\ and\ h_3 = 3h_2$

(4) $h_1 = h_2 = h_3$

45.

Preeti reached the metro station and found that the escalator was not working. She walked up the stationary escalator in timet_1. On other day, if she remains stationary on the moving escalator, then the escalator takes her up in time t_2. The time taken by her to walk up on the moving escalator will be

(1) $\frac{t_1t_2}{t_2-t_1}$

(2) $\frac{t_1t_2}{t_2+t_1}$

(3) $t_1 - t_2$

(4) $\frac{t_1+t_2}{2}$

Fill OMR Sheet