SAPTARSHI

Note: For each wrong answer, 1/4th mark will be deducted.

1) Two particles are released from the same height at an interval of 1s. How long after the first particle beings to fall will the two particles be 10 m apart? (g = 10 ms^{-2})
   a) 1.5 s *
   b) 2 s
   c) 1.25 s
   d) 2.5 s

2) A car moves from X to Y with a uniform speed V_u and returns to Y with a uniform speed V_d . The average speed for this round trip is
   a) $\dfrac{2V_d V_u}{V_d + V_u}$ *
   b) $\sqrt{V_u V_d}$
   c) $\dfrac{V_d V_u}{V_d + V_u}$
   d) $\dfrac{V_u + V_d}{2}$

3) A juggler maintains four balls in motion, making each of them to rise a height of 20 m from his hand. What time interval should be maintained for the proper distance between them? (g = 10 ms^{-2})
   a) 3 s

   b) $\dfrac{3}{2} s$
   c) 1 s*
   d) 2 s

4) A man throws balls with the same speed vertically upwards one after the other at an interval of 2 s. What should be the speed of the throw so that more than two balls are in the sky at any time? (g = 10 ms^{-2})
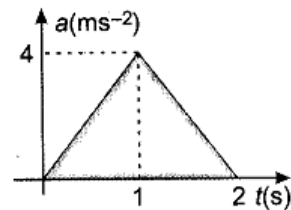   a) Any speed less than $19.6 ms^{-1}$
   b) Only with speed $19.6 ms^{-1}$
   c) More than $19.6 ms^{-1}$ *
   d) At least $9.8 ms^{-1}$

5) The acceleration –time-graph of a particle moving in a straight line is as shown in figure. The velocity of the particle at time t = 0 is $2 ms^{-1}$. The velocity after 2 s will be
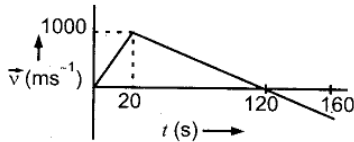

   a) $6 ms^{-1}$ *
   b) $4 ms^{-1}$

c) $2ms^{-1}$

d) $8ms^{-1}$

6) A rocket is projected vertically upwards, whose graph is shown. The maximum height attained by the rocket is :

a) 1 km

b) 10 km

c) 20 km

d) 60 km *

7) A person is moving eastward with a speed of $5ms^{-1}$ and in 10s, the speed changes to $5ms^{-1}$ northwards. The average acceleration will be :

a) Zero

b) $\dfrac{1}{\sqrt{2}}ms^{-2}$ towards $N-W$ *

c) $\dfrac{1}{2}ms^{-2}$ towards $N-W$

d) $\dfrac{1}{2}ms^{-2}$ towards $N-E$

8) A ball is projected upwards from the foot of a tower. The ball crosses the top of the tower twice after an interval of 6 s and the ball reaches the ground after 12 s. The height of the tower is (g = 10 ms^{-2})

a) 120 m

b) 135 m *

c) 175 m

d) 80 m

9) A ball is dropped from the roof of a tower of height h. The total distance covered by it in the last second of its motion is equal to the distance covered by it in first 3 s. The value of h in meter is (g = 10 ms^{-2})

a) 125*

b) 200

c) 100

d) 80

10) A body is moving in a straight line as shown in velocity –time graph. The displacement and distance traveled by body in 8 s are respectively
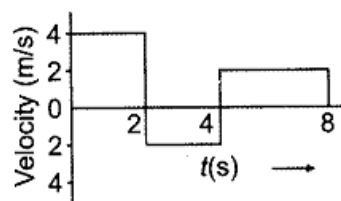
a) 12 m, 20 m *

b) 20 m, 12 m

c) 12 m, 12 m

d) 20 m, 20 m

11) The velocity of a particle at an instant is $10ms^{-1}$. After 3 s its velocity will become $16ms^{-1}$. The velocity at 2 s before the given instant, will be

a) $6ms^{-1}$ *

b) $4ms^{-1}$

c) $2ms^{-1}$

d) $1ms^{-1}$

12) A particle moves along a straight line OX. At a time t (in second) the distance x (in meter) of the particle from O is given by $x = 40 + 12t - t^3$ How

long would the particle travel before coming to rest?

a) 24 m

b) 40 m

c) 56 m*

d) 16 m

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

a) 5/4

b) 12/5

c) 5/12

d) 4/5*

14) The displacement of particle is given by

$x = a_0 + \dfrac{a_1 t}{2} - \dfrac{a_2 t^2}{3}$ what is its acceleration?

a) $\dfrac{2a_2}{3}$

b) $-\dfrac{2a_2}{3}$ *

c) a_2

d) Zero

15) A body traveling along a straight line traversed one –third of the total distance with a velocity $4ms^{-1}$. The remaining part of the distance was covered with a velocity $2ms^{-1}$ for half the time and with velocity $6ms^{-1}$ for the other half of time. The mean velocity averaged over the whole time of motion is

a) $5ms^{-1}$

b) $4ms^{-1}$ *

c) $4.5ms^{-1}$

d) $3.5ms^{-1}$

16) The displacement of a particle moving in a straight line is described by the relation, $s = 6 + 12t - 2t^2$, here s is in meter and t in second. The distance covered by particle in first 5 s is

a) 20 m

b) 32 m

c) 24 m

d) 26 m *

17) A parachutist jumps from an aeroplane moving with a velocity of u. Parachute opens and accelerates downwards with $2ms^{-1}$. He reaches the ground with velocity $4ms^{-1}$. What distance does the parachutist covered in the air?

a) 1.5 m

b) 2.5 m

c) 4 m *

d) None of these

18) A car accelerates from rest at constant rate for first 10 s and covers a distance x. It covers a distance y in next 10 s at the same acceleration. Which of the following is true?

a) $x = 3y$

b) $y = 3x$ *

c) $x = y$

d) $y = 2x$

19) **Assertion** Velocity –time graph for an object in a uniform motion along a straight line is parallel to the time axis.

Reason : in uniform motion of an object velocity increases as the square of time elapsed

a) If both Assertion and Reason are true and the Reason is the correct explanation of the Assertion

b) If both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion

c) If assertion is true but Reason is false *

d) If both Assertion and Reason are false

20) **Assertion** When a body is dropped or thrown horizontally from the same height, it would reach the ground at the same time.

Reason Horizontal velocity has no effect on the vertical directions.

a) If both Assertion and Reason are true and the Reason is the correct explanation of the Assertion *

b) If both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion

c) If assertion is true but Reason is false

d) If both Assertion and Reason are false

21) A balloon rises from rest with a constant acceleration g . A stone is released from it when it has risen to height h. The time taken by the stone to reach the ground is

a) $4\sqrt{\dfrac{h}{g}}$

b) $2\sqrt{\dfrac{h}{g}}$ *

c) $\sqrt{\dfrac{2h}{g}}$

d) $\sqrt{\dfrac{g}{h}}$

22) A particle moves along with x-axis. The position x of particle with respect to time t from origin is given by $x = b_0 + b_1 t + b_2 t^2$. The acceleration of particle is

a) b_0

b) b_1

c) b_2

d) $2b_2$ *

23) A particle has initial velocity $\left(3\hat{i} + 4\hat{j}\right)$ and acceleration $\left(0.1\hat{i} + 0.3\hat{j}\right)$. Its speed after 10 s is

a) 7 units

b) $7\sqrt{2}$ *units* *

c) 8.5 units

d) 10 units

24) A body is moving with velocity 30 m/s towards east. After 10 s its velocity becomes 40 m/s towards north. The average acceleration of body is

a) $7 \, m/s^2$

b) $\sqrt{7} m/s^2$

c) $5m/s^2$ *

d) $1m/s^2$

25) With what speed should a body be thrown upwards so that the distances traversed in 5th second and 6th second are equal :

a) $58.4 ms^{-1}$

b) $49 ms^{-1}$ *

c) $\sqrt{98} ms^{-1}$

d) $98 ms^{-1}$

26) A ball is released from the top of a tower of height 'h' meter. It takes T seconds to reach the ground. what is the position of the ball in T/3 seconds :

a) h/9 meter from the ground

b) 7h/9 meter from the ground

c) 8h/9 meter from the ground *

d) 17h/18 meter from the ground

27) When a ball is thrown up vertically with velocity V_0. It reaches a maximum height h. If one wishes to triple the maximum height, then the ball should be thrown with velocity

a) $\sqrt{3} v_0$ *

b) $3 v_0$

c) $9 v_0$

d) $3/2 v_0$

28) A car moves at $80\ kmh^{-1}$ in the first half of total time of motion and at $40\ kmh^{-1}$ in the later half. Its average speed is
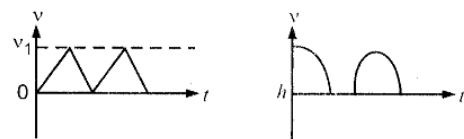
a) $60\ kmh^{-1}$ *

b) $30\ kmh^{-1}$

c) $120\ kmh^{-1}$

d) None of these

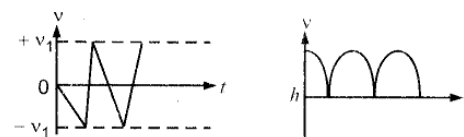29) A bullet loses 1/20 of its velocity after penetrating a plank. How many planks are required to stop the bullet?

a) 6

b) 9*

c) 11

d) 13

30) Consider a rubber ball freely feeling from a height h = 4.9 m on to a horizontal elastic plate. Assume that the duration of the collision is negligible and the collision with the plate is totally elastic. Then the velocity as a function of time and the height as a function of time and the height as a function of time will be :
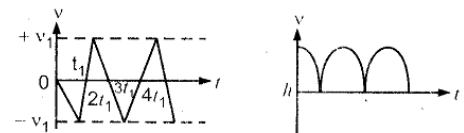
a)

b)

c) *

d)