

- 1) 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 $f/2$ to come to rest. If the total distance traversed is $15S$, then

(a) $S = \frac{1}{6}ft^2$ (b) $S = ft$ (c) $S = \frac{1}{4}ft^2$ (d) $S = \frac{1}{72}ft^2$ [AIEEE 2005]

- 2) The relation between time t and distance x is $t = ax^2 + bx$ where a and b are constants. The acceleration is

(a) $2bv^3$ (b) $-2abv^2$ (c) $2av^2$ (d) $-2av^3$ [AIEEE 2005]

- 3) A parachutist after bailing out falls 50 m without friction. When parachute opens, it decelerates at 2 m/s^2 . He reaches the ground at the rate of 3 m/s . At what height, did he bail out?

(a) 182 m (b) 91 m (c) 111 m (d) 293 m [AIEEE 2005]

(NOTE: Actually, frictional force in the upward direction is not constant but increases in proportion to the downward velocity. Hence, the downward deceleration of the parachutist keeps decreasing and he finally reaches a constant terminal velocity.)

- 4) A ball is released from the top of a tower of height h metres. It takes T seconds to reach the ground. What is the position of the ball in $T/3$ seconds?

(a) $h/9$ m from the ground (b) $7h/9$ m from the ground
(c) $8h/9$ m from the ground (d) $17h/18$ m from the ground [AIEEE 2004]

- 5) An automobile traveling with a speed of 60 km/hr can brake to stop within a distance of 20 m . If the car is going twice as fast, i.e., 120 km/hr , the stopping distance will be

(a) 20 m (b) 40 m (c) 60 m (d) 80 m [AIEEE 2004]

- 6) A car moving with a speed of 50 km/hr can be stopped by brakes in 6 m . If the same car is moving with a speed of 100 km/hr , then minimum stopping distance is

(a) 6 m (b) 12 m (c) 18 m (d) 24 m [AIEEE 2003]

- 7) Two cars 1 and 2, starting from rest are moving with speeds v_1 and $v_2\text{ m/s}$ ($v_1 > v_2$). Car 2 is ahead of car 1 by ' s ' metres when the driver of car 1 sees car 2. What minimum retardation should be given to car 1 to avoid collision?

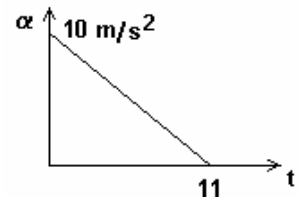
(a) $\frac{v_1 - v_2}{2}$ (b) $\frac{v_1 + v_2}{2}$ (c) $\frac{[v_1 + v_2]^2}{2s}$ (d) $\frac{[v_1 - v_2]^2}{2s}$ [AIEEE 2002]

- 8) A car moves along a straight line whose motion is given by $s = 12t + 3t^2 - 2t^3$, where (s) is in metres and (t) is in seconds. The velocity of the car at start will be

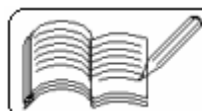
(a) 7 m/s (b) 9 m/s (c) 12 m/s (d) 16 m/s [AIEEE 2002]

- 9) A particle starts from rest. Its acceleration (α) versus time (t) is as shown in the figure. The maximum speed of the particle will be

(a) 110 m/s (b) 55 m/s (c) 550 m/s (d) 660 m/s

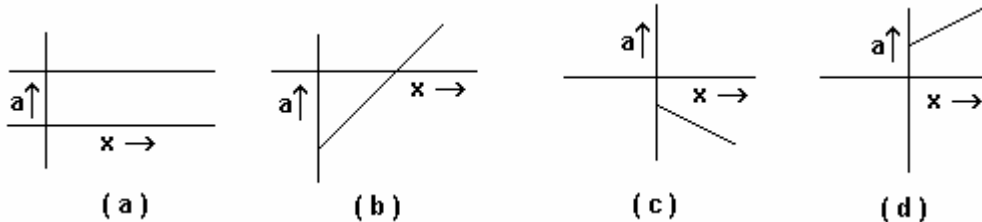
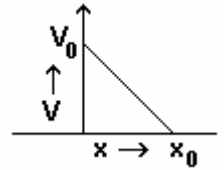


[IIT 2004]



- 10) If graph of velocity vs. distance is as shown, which of the following graphs correctly represents the variation of acceleration with displacement?

[IIT 2005]



- 11) A particle of mass m moves on the x -axis as follows: it starts from rest at $t = 0$ from the point $x = 0$, and comes to rest at $t = 1$ at the point $x = 1$. No other information is available about its motion at intermediate times ($0 < t < 1$). If α denotes the instantaneous acceleration of the particle, then

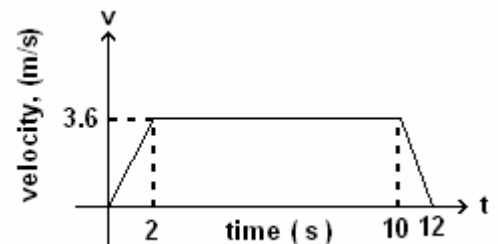
- (a) α cannot remain positive for all t in the interval $0 \leq t \leq 1$
 - (b) $|\alpha|$ cannot exceed 2 at any point in its path
 - (c) $|\alpha|$ must be ≥ 4 at some point or points in its path
 - (d) α must change sign during the motion, but no other assertion can be made with the information given.
- [IIT 1993]

- 12) Four persons K, L, M and N are initially at the corners of a square of side of length d . If every person starts moving with velocity v such that K is always headed towards L, L towards M, M towards N and N towards K, then the four persons will meet after

- (a) d/v s
 - (b) $d\sqrt{2}/v$ s
 - (c) $d/\sqrt{2}v$ s
 - (d) $d/2v$ s
- [IIT 1984]

- 13) A lift is going up. The variation in the speed of the lift is as given in the graph. What is the height to which the lift takes the passengers?

- (a) 3.6 m
- (b) 28.8 m
- (c) 36 m
- (d) cannot be calculated from the above graph



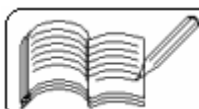
[IIT 1970]

- 14) In the above graph, what will be the average velocity of the lift?

- (a) 1 m/s
 - (b) 2.88 m/s
 - (c) 3.24 m/s
 - (d) 3 m/s
- [IIT 1970]

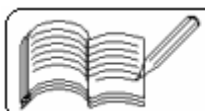
- 15) In the graph of question 12), the average acceleration of the lift is

- (a) 1.8 m/s^2
 - (b) -1.8 m/s^2
 - (c) 0.3 m/s^2
 - (d) zero
- [IIT 1970]



(Answers at the end of all questions)

- 16) A car accelerates from rest at a constant velocity m for some time and then decelerates at a constant rate n to come to rest. If the total time of journey is t , then the maximum velocity acquired by the car is given by
 (a) $\left(\frac{m+n}{mn}\right)t$ (b) $\left(\frac{mn}{m+n}\right)t$ (c) $\left(\frac{m^2 - n^2}{mn}\right)t$ (d) $\left(\frac{mn}{m-n}\right)t$
- 17) The coordinates of a moving particle at any time t are given by $x = at^2$ and $y = bt^2$. The speed of the particle at time t is given by
 (a) $2t(a+b)$ (b) $\sqrt{a^2 + b^2}$ (c) $2t\sqrt{a^2 + b^2}$ (d) $2t\sqrt{a^2 - b^2}$
- 18) A stone thrown upwards with a velocity 10 m/s from the top of the tower reaches the ground with a velocity 20 m/s. The height of the tower, taking $g = 10 \text{ m/s}^2$, is
 (a) 10 m (b) 15 m (c) 20 m (d) 25 m
- 19) If 'a', 'b' and 'c' are the distances travelled by a particle during x th, y th and z th second from the start, then which of the following relations is valid?
 (a) $a(y-z) + b(z-x) + c(x-y) = 0$
 (b) $a(x-y) + b(y-z) + c(z-x) = 0$
 (c) $a(z-x) + b(x-y) + c(y-z) = 0$
 (d) $ax + by + cz = 0$
- 20) The distance-time graph of a particle at time t makes an angle of 45° with the time axis. After 1 second, it makes an angle of 60° with the time axis. The acceleration of the particle is
 (a) $\sqrt{3} - 1$ (b) $\sqrt{3} + 1$ (c) $\sqrt{3}$ (d) 1
- 21) A stone is dropped into a well in which the level of water is at a depth h below the top of the well. If v is the velocity of sound, then the time t after which the splash of sound is heard after dropping the ball is
 (a) $\sqrt{\frac{2h}{g}} + \frac{h}{v}$ (b) $\frac{2h}{v}$ (c) $\sqrt{\frac{h}{2g}} + \frac{h}{v}$ (d) $\sqrt{\frac{h}{2g}} + \frac{2h}{v}$
- 22) The relation between time t and distance x is $t = ax^2 + bx$, where a and b are constants. If v represents the velocity, the retardation is
 (a) $2av^2$ (b) $2bv^3$ (c) $2b^2v^3$ (d) $2abv^3$ [NCERT 1982]
- 23) A particle moving with uniform acceleration has velocities u and v at points A and B in its path. The velocity of the body midway between A and B is
 (a) $\frac{u+v}{2}$ (b) $\sqrt{\frac{u^2 + v^2}{2}}$ (c) \sqrt{uv} (d) None of these
- 24) A particle moves with uniform acceleration and v_1, v_2 and v_3 denote the average velocities in three successive intervals of time t_1, t_2 and t_3 . Then $\frac{v_1 - v_2}{v_2 - v_3}$ is equal to
 (a) $\frac{t_1 - t_2}{t_2 + t_3}$ (b) $\frac{t_1 + t_2}{t_2 + t_3}$ (c) $\frac{t_1 - t_2}{t_2 - t_3}$ (d) $\frac{t_1 - t_2}{t_1 - t_3}$



02 - DESCRIPTION OF MOTION IN ONE DIMENSION
(Answers at the end of all questions)

Answers

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
d	d	d	c	d	d	d	c	b	b	c	a	c	d	d	b	c	b	a	a

21	22	23	24
a	a	c	b