YAKEEN NEET 2.0

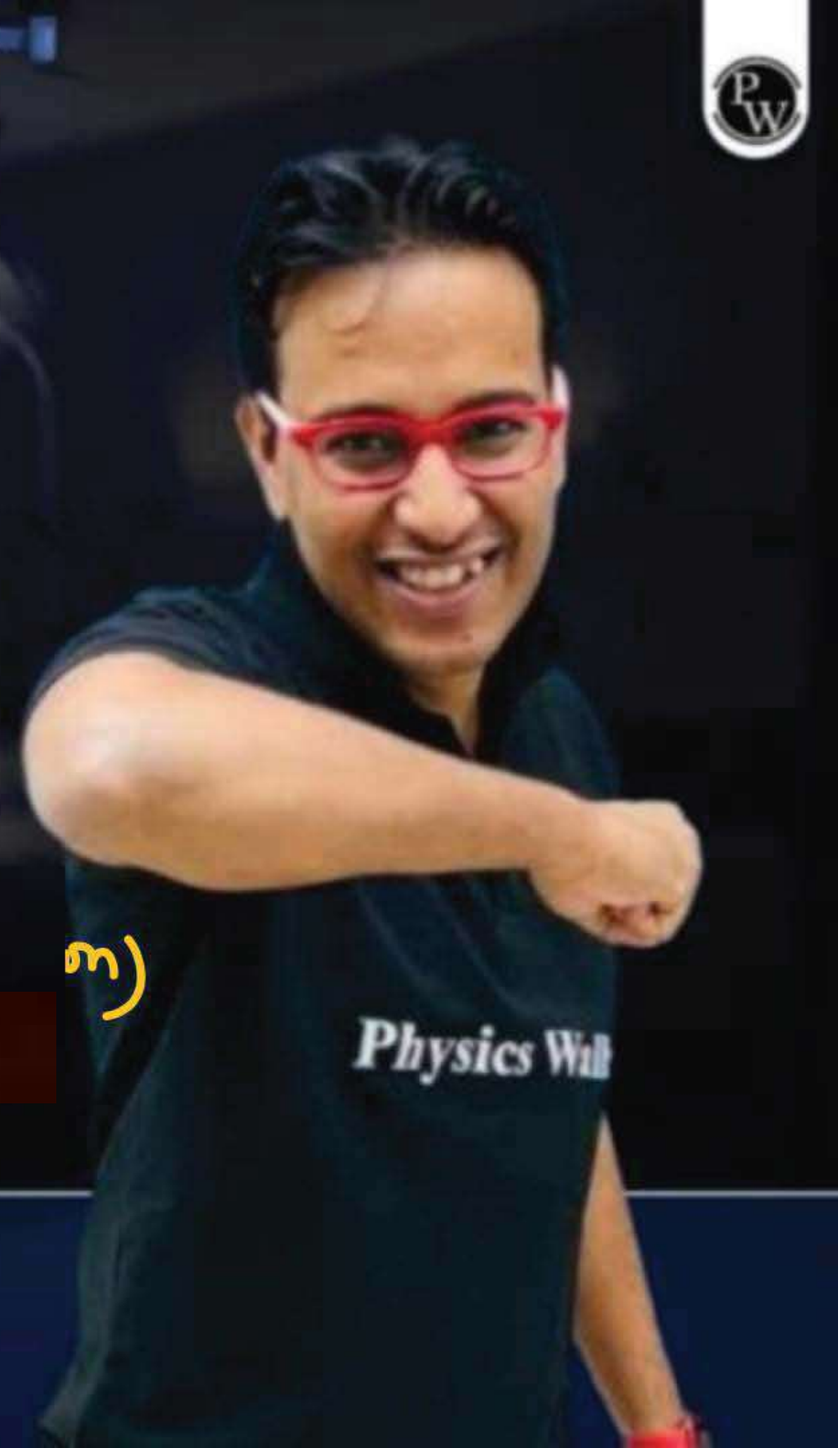
2026

Kinematics

PHYSICS

KPP-15(Part 01)

By - Saleem Ahmed Sir



Level - 01 (Part 1)

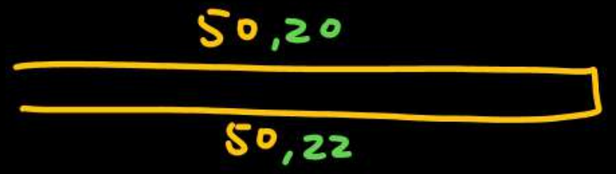
Question - 01

An athlete swims the length of 50 m pool in 20 s and makes the return trip to the starting position in 22 s. Determine his average velocity in

(a) The first half of the swim $50/20$

(b) The second half of the swim $50/22\ (-\hat{i})$

(c) The round trip 0



Ans : (a) 2.5 ms^{-1}, (b) 2.27 ms^{-1}, (c) v_{av} is zero for round trip

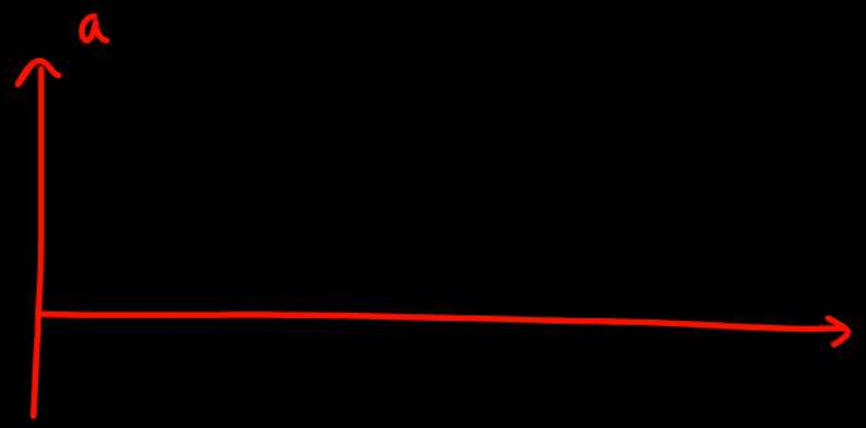
Question - 02

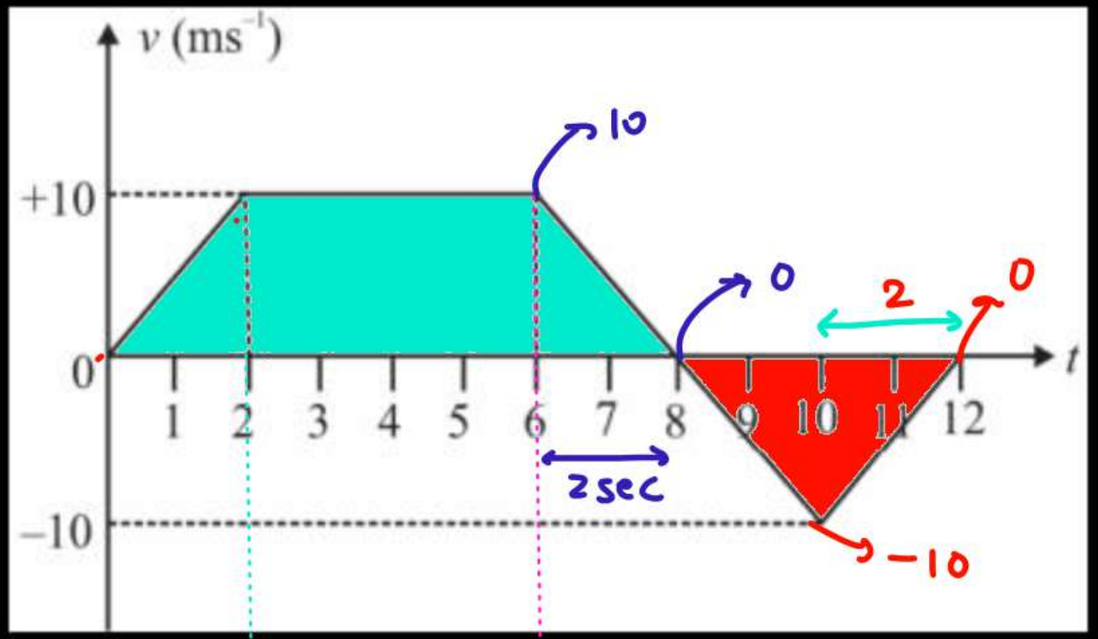
The velocity-time graph of a body moving along a straight line is given below. Find:

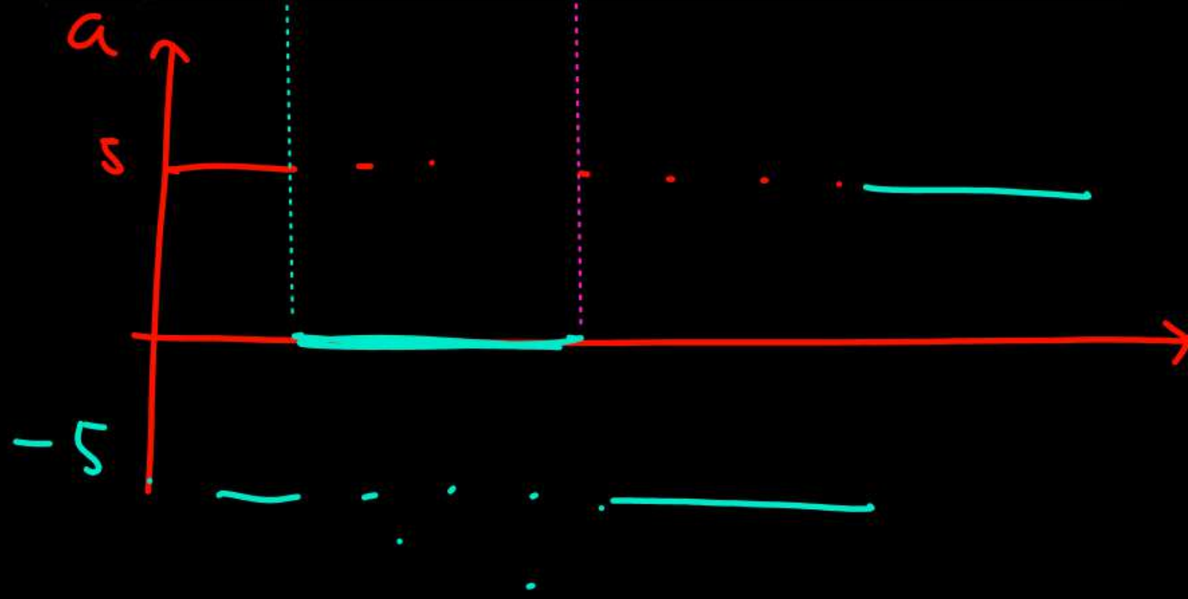
(a) Average velocity in whole time of motion

(b) Average speed in whole time of motion

(c) Draw acceleration vs time graph

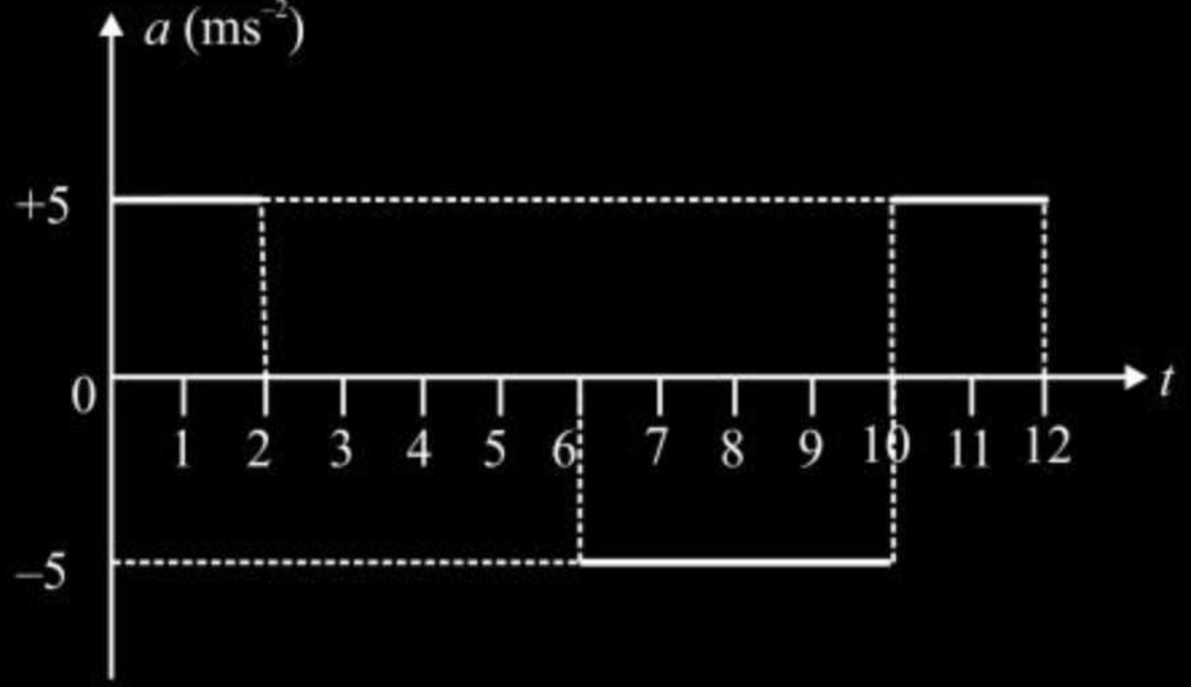






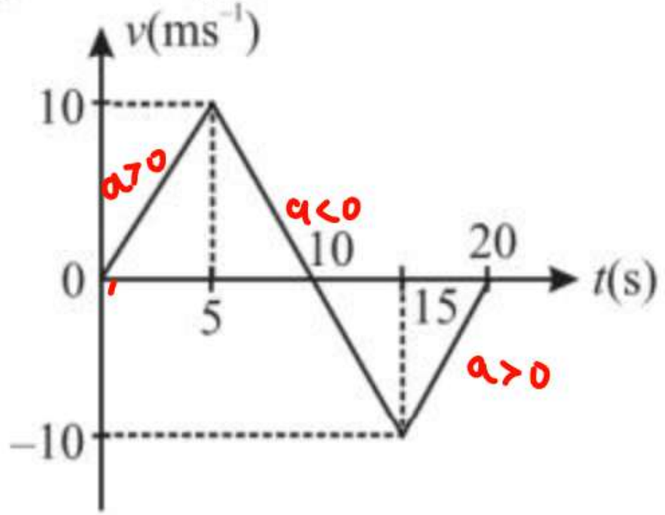
Ans: (a) 3.33 ms^{-1}, (b) 6.67 ms^{-1},

(c)

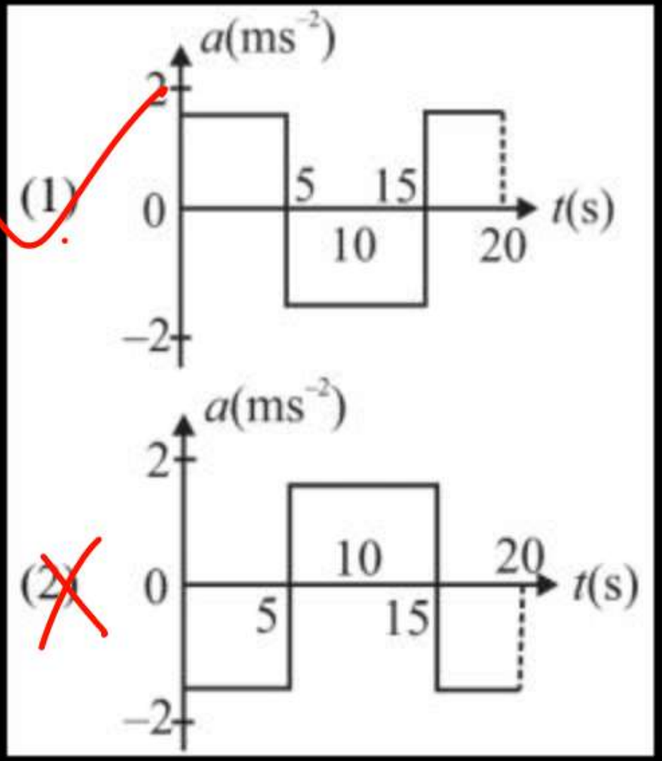


Question - 03

Plot the acceleration-time graph of the velocity-time graph given in figure.

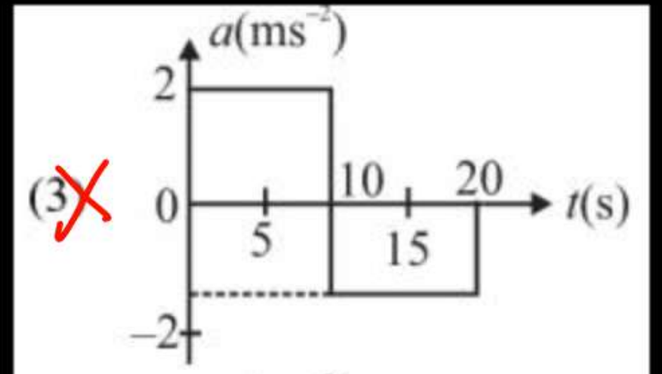


(1)



(2)

(3)



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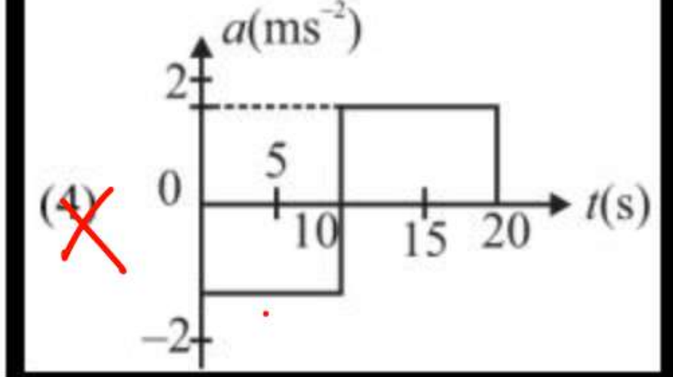


Ans : (1)

Question - 04

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

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

(3) $\frac{2v_1 v_2}{v_1 + v_2}$ (4) $\frac{5v_1 v_2}{3v_1 + 2v_2}$

$$\langle \text{speed} \rangle = \frac{x}{\frac{2x}{5V_1} + \frac{3x}{5V_2}}$$

$$= \frac{5V_1V_2}{2V_2 + 3V_1}$$

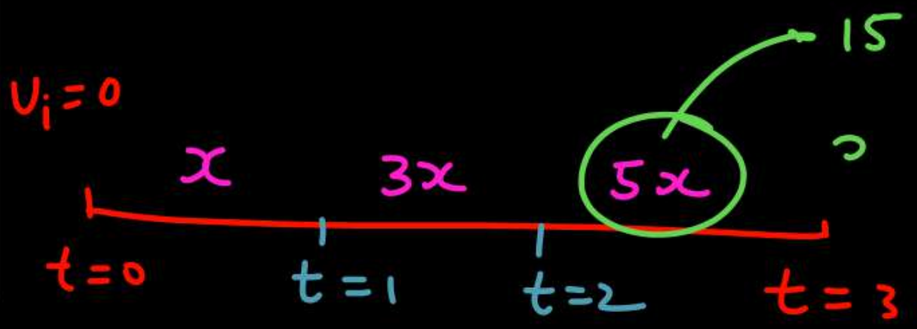
fast

$$\langle \text{speed} \rangle = \frac{5x}{\frac{2x}{V_1} + \frac{3x}{V_2}}$$

Ans : (4)

Question - 05

A car accelerates with uniform rate from rest on a straight road. The distance travelled in the last second of a three second interval from the start is 15 m then find the distance travelled in first second in m.



$$S_n = u + \frac{1}{2}(2n-1)a$$

$$15 = 0 + \frac{1}{2} \times 5 \times a$$

$$a = 6$$

$$5x = 15$$

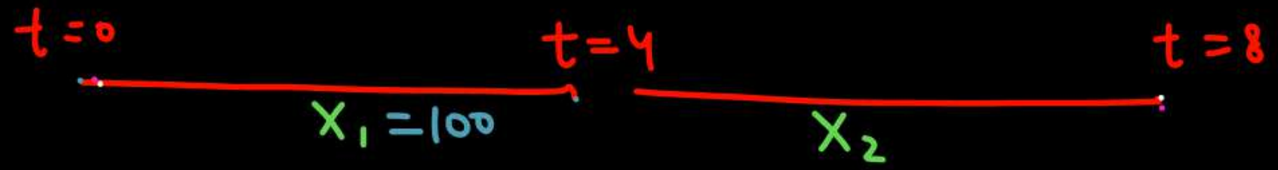
$$x = 3$$

$$S_{1st} = 0 + \frac{1}{2} \times 1 \times 6 = 3$$

Ans : (3)

Question - 06

A particle moving in one-dimension with constant acceleration of 10 m/s^2 is observed to cover distance of 100 m during a 4 s interval. How far will the particle move in the next 4 s?



$$100 = u \times 4 + \frac{1}{2} \times 10 \times 4^2$$

$$u = 5$$

$$100 + X_2 = 5 \times 8 + \frac{1}{2} \times 10 \times 8^2$$

$$X_2 = 260$$

Ans : (260 m)

Question - 07

A particle travels 10 m in first 5 sec and 10 m in next 3 sec. Assuming constant acceleration what is the distance travelled in next 2 sec.

(1) 8.3 m
(2) 9.3 m
(3) 10.3 m
(4) None of above

$10 = u \times 5 + \frac{1}{2} a \times 5^2$

$20 = u \times 8 + \frac{1}{2} \times a \times 8^2$

$\Rightarrow$ a = ✓, u = ✓

$5a + 2u = 4$

$8a + 2u = 5$

$-3a = -1$

$a = \frac{1}{3}$

$2u = 4 - \frac{5}{3} = \frac{7}{3}$

$u = \frac{7}{6}$

$20 + x = u \times 10 + \frac{1}{2} \times a \times 10^2$

$20 + x = \frac{170}{6} = 28.3$

$x = 8.3$

Ans : (1)

Question - 08

If a body starting from the rest travels with a uniform acceleration of 10 ms^{-2} for first 10 second and with uniform acceleration 5 ms^{-2} for next 20 seconds, then average acceleration of the body for 30 s is:

(1) 15 ms^{-2} (2) 10 ms^{-2}

(3) 20 ms^{-2} (4) 20/3 ms^{-2}

$$\frac{200-0}{30}$$

Ans : (4)

Question - 09

A particle having initial velocity 10 m/s moves with a constant acceleration 5 ms^{-2}, for a time 15 second along a straight line, what is the displacement of the particle in the last 2 second?

(1) 160 m (2) 200 m

(3) 210 m (4) 230 m

$x_{15} - x_{13} =$ ✓

$\left(10\times15+\frac{1}{2}5\times15^2\right)-\left(10\times13+\frac{1}{2}\times5\times13^2\right)$

Ans : (1)

Question - 10

u, a

A particle covered 100 m distance in first 10 sec. and in next 10 sec it travel 200 m. Find distance travel in next 10 sec. (acc. is constant)

$100 = u \times 10 + \frac{1}{2} \times a \times 10^2$

$300 = u \times 20 + \frac{1}{2} a \times (20)^2$

$300 + x = u \times 30 + \frac{1}{2} \times a \times 30^2$

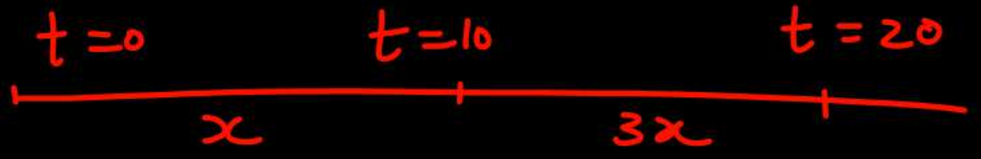
Ans : $(x_3 = 300)$

Question - 11

A particle, after starting from rest experiences, constant acceleration for 20 seconds. If it covers a distance of S_1, in first 10 seconds and distance S_2 in next 10 sec, then

(1) $S_2 = S_1/2$ (2) $S_2 = S_1$

(3) $S_2 = 2S_1$ (4) $S_2 = 3S_1$



$x = S_1$

$3x = S_2$

Ans : (4)

Question - 12

A body moving with uniform acceleration in a straight line describes 25 m in the fifth second and 33 m in the seventh second. Find its initial velocity and acceleration.

$$33 = u + \frac{1}{2}(2\times7-1)a$$

$$25 = u + \frac{1}{2}(2\times5-1)a$$

$$8 = \frac{a}{2}\times 4$$

$$a = 4$$

$$33 = u + \frac{13}{2}\times 4$$

Ans : $(u = 7\ ms^{-1}, a = 4\ ms^{-2})$

Question - 13

A car accelerates with uniform rate from rest on a straight road. The distance travelled in the last second of a three second interval from the start is 15 m then find the distance travelled in first second in m.

$x : 3x : 5x$

$5x = 15$

$x = 3$

Ans : (3)

Question - 14

If a body starts from rest and travels 120 cm in the 6^{th} second, with constant acceleration then what is the acceleration:

(1) $0.20\ m/s^2$ (2) $0.027\ m/s^2$

(3) $0.218\ m/s^2$ (4) $0.03\ m/s^2$

$$120 = 0 + \frac{1}{2} \times (2 \times 6 - 1) \times a$$

$$a = \frac{240}{11} = \underline{\underline{21.8}}\ cm/sec^2$$

$$=$$

Ans : (3)

Question - 15

A body starts from rest and is uniformly accelerated for 30 s. The distance travelled in the first 10 s is x_1, next 10 s is x_2 and the last 10 s is x_3. Then $x_1 : x_2 : x_3$ is the same as:

(1) 1 : 2 : 4
(2) 1 : 2 : 5
(3) 1 : 3 : 5
(4) 1 : 3 : 9

Ans : (3)

Question - 16

A body covers 10 m in the second and 25 m in fifth second of its motion. If the motion is uniformly accelerated, how far will it go in the seventh second?

$25 = u + \frac{1}{2}(2\times5-1)a$

$10 = u + \frac{1}{2}(2\times2-1)a$

$15 = \frac{a}{2}\times 6$

$a = 5$

$10 = u + \frac{3}{2}\times 5$

$u = 10 - \frac{15}{2} = \frac{5}{2}$

Am $\quad \frac{5}{2} + \frac{(2\times7-1)5}{2}$

$= \frac{5+65}{2} = 35$

Ans : (35 m)

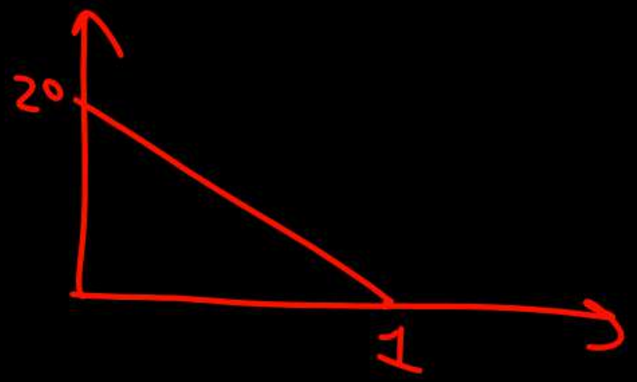
Question - 17

$72 \times \frac{5}{18} = 20$

The driver of a car which is moving on a straight horizontal road with a speed of 72 kmh^{-1} applies brakes. If the retardation produced is 20 ms^{-2}, the distance moved by the car before coming to rest will be:

(1) 10 m
(2) 8 m
(3) 6 m
(4) 2 m

$\frac{v^2}{2a}$



Ans : (1)

Question - 18

A car is moving with a velocity of 30 m/s. The driver applied brake for 5 seconds to bring it down to zero. What is the average acceleration?

(1) $-5\ m/s^2$ (2) $6\ m/s^2$

(3) $-6\ m/s^2$ (4) Zero

$$\langle \vec{a} \rangle = \frac{0 - 30}{5} = -6$$

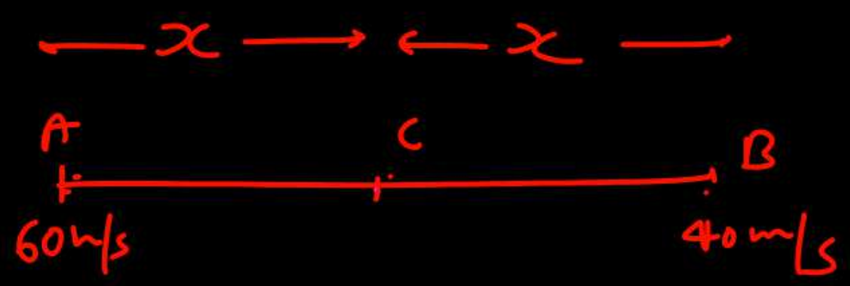
Ans : (3)

Question - 19

A truck travelling with uniform acceleration crosses two points A and B with velocities 60 m/s and 40 m/s respectively. The speed of the body at the midpoint of A and B is nearest to:

(1) 17 m/s (2) 20 m/s

(3) 19.49 m/s (4) 50.9 m/s



$40^2 = 60^2 + 2 \times a \times (2x)$

$V_C^2 = 60^2 + 2 \times a \times x$

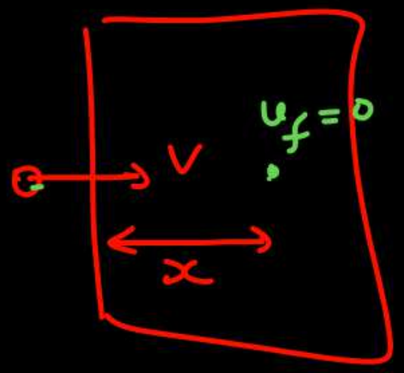
Ans : (4)

Question - 20

A bullet moving with a velocity of 200 cm/s penetrates a wooden block and comes to rest after travelling 4 cm inside it. What velocity is needed for travelling distance of 9 cm in same block?

(1) 100 cm/s (2) 136.2 cm/s

(3) 300 cm/s (4) 250 cm/s



$$v^2 = u^2 - 2ax$$

$$v^2 = 2ax$$

$$\frac{v_1^2}{v_2^2} = \frac{x_1}{x_2}$$

$$\frac{(200)^2}{v_2^2} = \frac{4}{9}$$

Ans : (3)

Question - 21

A car moving with a velocity of 10 m/s can be stopped by the application of a constant force F in a distance of 20 m. If the velocity of the car is 30 m/s. It can be stopped by this force in

(1) 20/3 m (2) 20 m

(3) 60 m (4) 180 m

$F = ma$

$0^2 = v^2 - 2ax$

$v^2 = 2ax$

$x = \frac{v^2}{2a}$

9 times

$\frac{10^2}{30^2} = \frac{20}{x_2}$

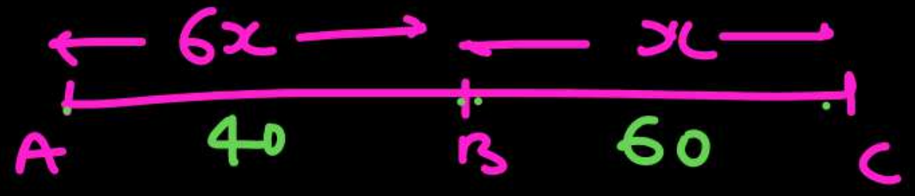
$\frac{v_1^2}{v_2^2} = \frac{x_1}{x_2}$

Ans : (4)

Question - 22

A particle goes from A to B with a speed of 40 km/h and B to C with a speed of 60 km/h. If AB = 6BC the average speed in km/h between A and C is.

$BC = x$



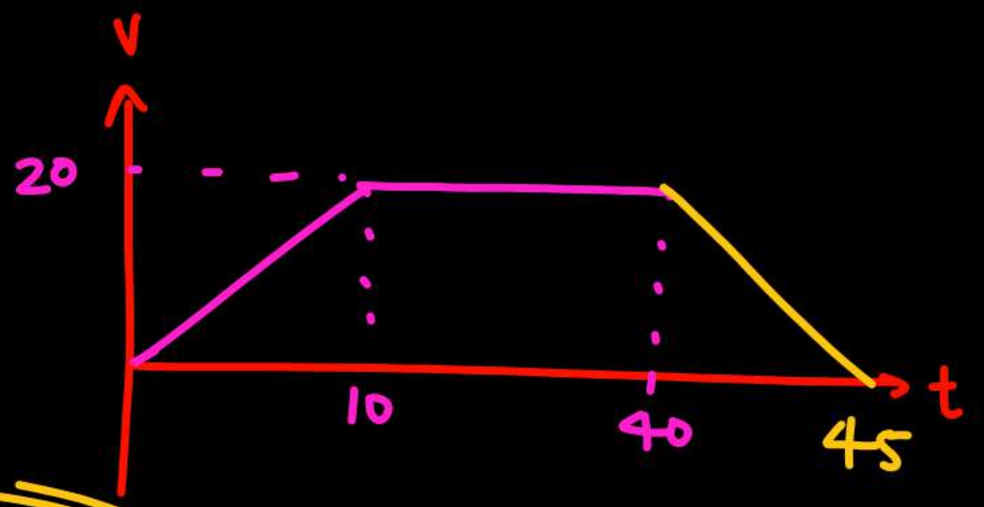
$$\langle speed \rangle = \frac{7x}{\frac{6x}{40} + \frac{x}{60}} = \checkmark$$

Ans : (42 km/hr)

Question - 23

A particle starts from rest, accelerates at 2 m/s^2 for 10 s and then goes at constant speed for 30 s and then decelerates at 4 m/s^2 till it stops. What is the distance travelled by it.

(1) 750 m
(2) 800 m
(3) 700 m
(4) 850 m

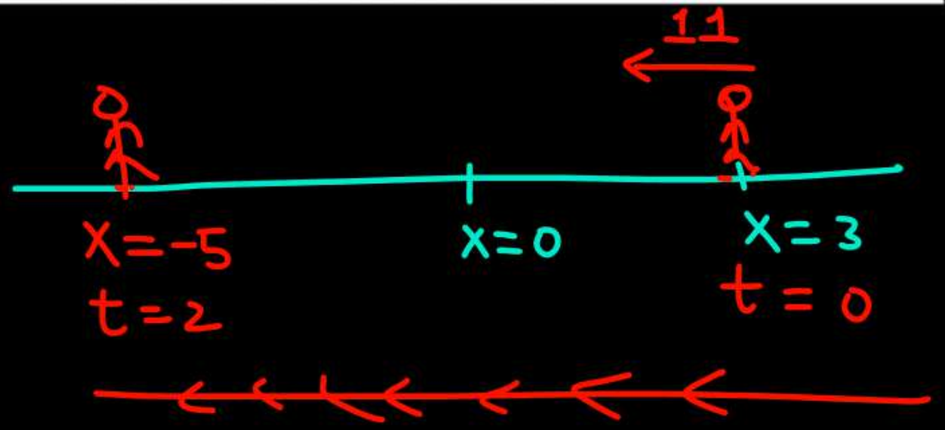


$\frac{1}{2} \times 75 \times 20$

Ans : (1)

Question - 24

A body moving with uniform acceleration has a velocity of –11 cm/s when its x coordinate is 3.00 cm. If its x coordinate 2 s later is –5 cm, what is the magnitude in cm/s² of its acceleration?



$$s = ut + \frac{1}{2}at^2$$

$$-8 = -11 \times 2 + \frac{1}{2} \times a \times 2^2$$

$$14 = 2a$$

$$a = 7$$

Ans : (7)

Level-02 will Discuss Later.

Moderate [Kpp Level – 02]

Question - 01

A car is moving in a straight line covers half the distance with a speed of 3 ms^{-1}. The other half of the distance is covered in two equal time intervals with speeds of 4.5 ms^{-1} and 7.5 ms^{-1}, respectively. Find the average speed of the car during this motion.

Ans : (4 ms^{-1})

Question - 02

A 200 m long train starts from rest at $t = 0$ with constant acceleration 4 cm s^{-2}. The head light of its engine is switched on at $t = 60$ s and its tail light is switched on at $t = 120$ s. Find the distance between these two events for an observer standing on platform.

Ans : (16 m)

Question - 03

A particle starts form rest and accelerates uniformly for 10 s to a velocity of 8 ms^{-1}. It then runs at a constant velocity and is finally brought to rest in 64 m with a constant retardation. The total distance covered by the car is 584 m. Find the value of acceleration, retardation, and total time taken.

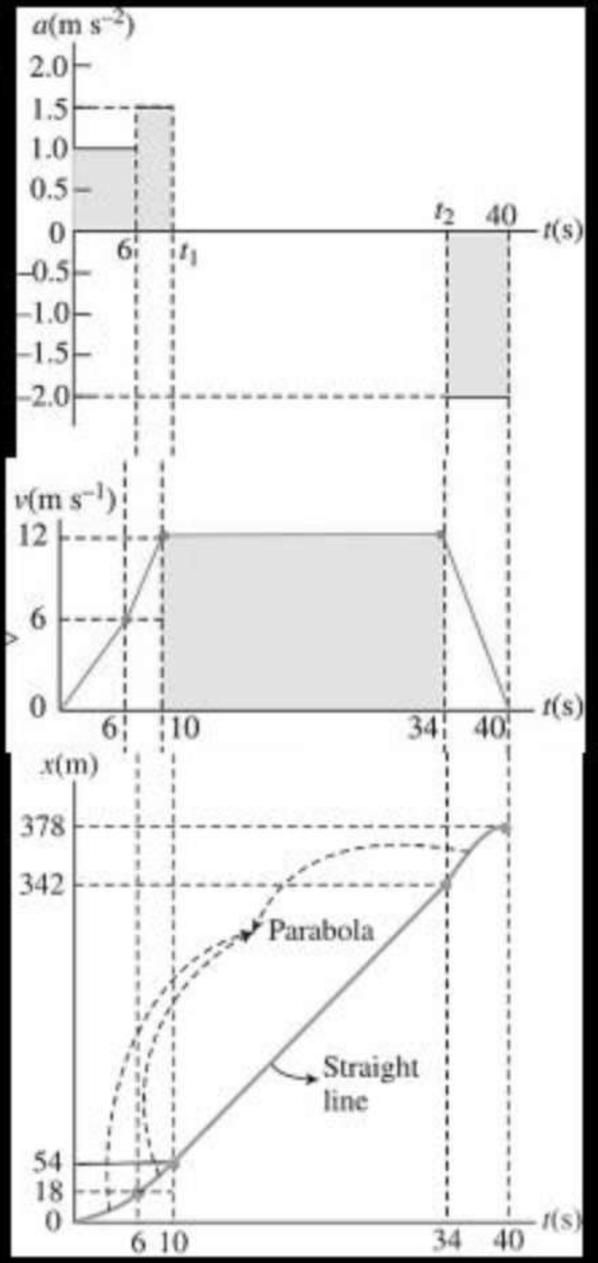
Ans : (0.8 ms^{-2}, –0.5 ms^{-2}, 86 s)

Question - 04

A train leaves station A; it gains speed at the rate of 1 ms^{-2} for first 6 s and then at the rate of 1.5 ms^{-2} until it has reached the speed of 12 ms^{-1}. The train maintains the same speed until it approaches station B; brakes are then applied, giving the train a constant deceleration and bringing it to a stop in 6 s. If the total running time of train is 40 s. Find (a) the distance between stations A and B. (b) Draw accelerationtime, velocity-time, and position-time relation of motion.

Ans: (a) 378 m,

(b)


a(m s⁻²)
2.0
1.5
1.0
0.5
0
-0.5
-1.0
-1.5
-2.0
6
t1
t2
40
t(s)
v(m s⁻¹)
12
6
0
6
10
34
40
t(s)
x(m)
378
342
Parabola
Straight line
54
18
0
6 10
34
40
t(s)

Question - 05

A car starts moving rectilinearly, first with acceleration $\alpha = 5\ ms^{-2}$ (the initial velocity is equal to zero), then uniformly, and finally, decelerating at the same rate α comes to a stop. The total time of motion equals $t = 25$ s. The average velocity during this time is equal to $\langle v \rangle = 72\ kmh^{-1}$. How long does the car move uniformly?

Ans : (15 s)

Question - 06

A motorcycle and a car start their rectilinear motion from rest from the same place at the same time and travel in the same direction. The motorcycle accelerates at 1.0 m/s^2 up to a speed of 36 km/hr and the car at 0.5 m/s^2 up to a speed of 54 km/hr. Their velocities remain constant after that. Draw *v*-*t* graph of both. Calculate the distance at which the car would overtake the motorcycle.

(1) 150 m (2) 900 m

(3) 300 m (4) 100 m

Ans : (3)

Question - 07

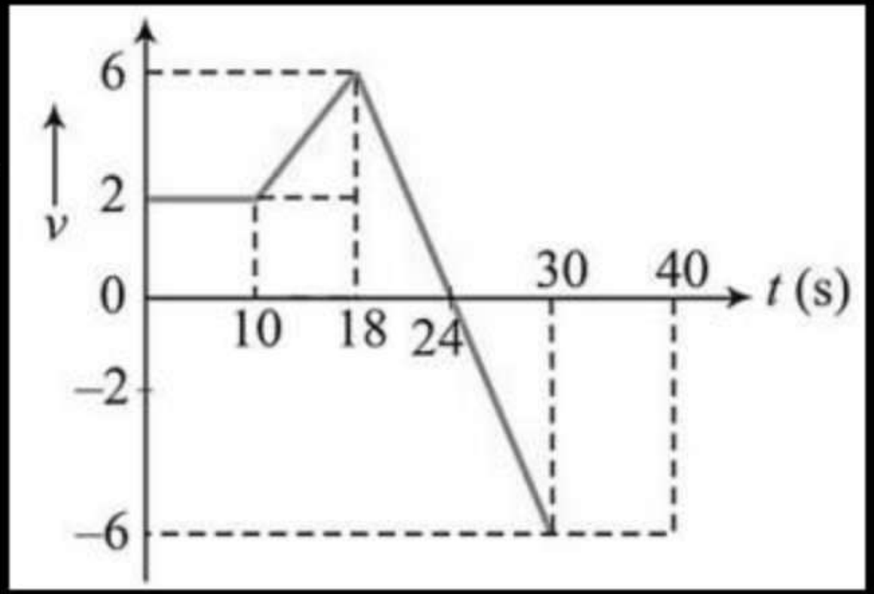
A particle moves in a straight line with the velocity as shown in figure. At $t = 0, x = -16$ m.

(1) The maximum value of the position coordinate of the particle is 54 m.

(2) The maximum value of the position coordinate of the particle is 36 m.

(3) The particle is at the position of 36 m at $t = 18$ s.

(4) The particle is at the position of 36 m at $t = 30$ s.



Ans : (1, 3, 4)

Paragraph for question nos. 8 to 10

The velocity-time graph of a particle moving along a straight line is shown in figure The rate of acceleration and deceleration is constant and it is equal to 5 ms^{-2} If the average velocity during the motion is 20 ms^{-1} then.

Question - 08

The value of t is:

(1) 5 s

(2) 10 s

(3) 20 s

(4) $5\sqrt{2}$ s

Ans : (1)

Question - 09

The distance travelled with uniform velocity is

(1) 375 m (2) 125 m

(3) 300 m (4) 450 m

Ans : (1)

Question - 10

The maximum velocity of the particle is

(1) $20\ ms^{-1}$ (2) $25\ ms^{-1}$

(3) $30\ ms^{-1}$ (4) $40\ ms^{-1}$

Ans : (2)

Question - 11

A trolley is moving away from a stop with an acceleration $a = 0.2\ \text{m/s}^2$. After reaching the velocity $u = 36\ \text{km/h}$, it moves with a constant velocity for the time of 2 min. Then, it uniformly slows down, and stops after further travelling a distance of 100 m. Find the average speed all the way between stops.

(1) $\frac{76}{17}\text{m/s}$

(2) $\frac{208}{21}\text{m/s}$

(3) $\frac{85}{12}\text{m/s}$

(4) $\frac{155}{19}\text{m/s}$

Ans : (4)

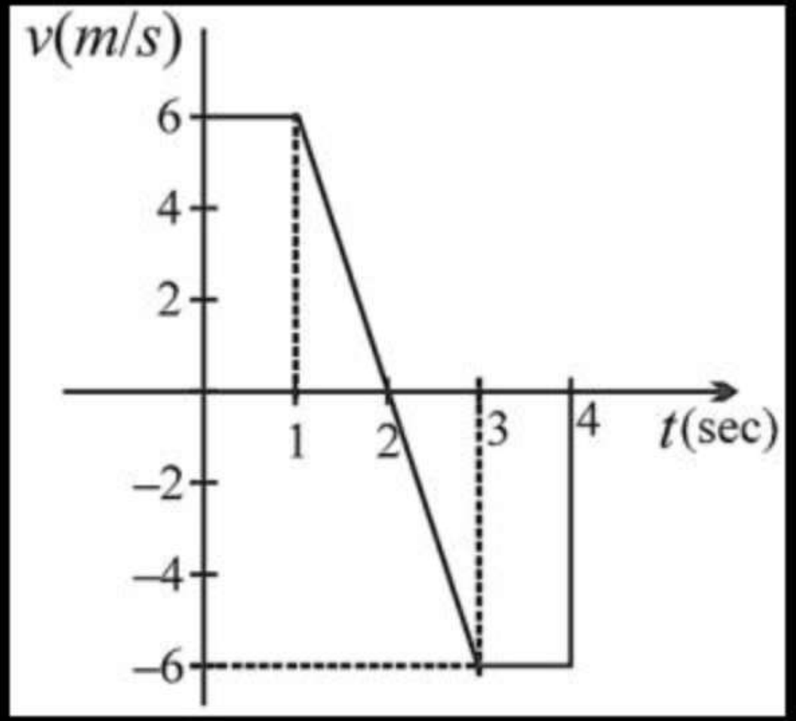
Question - 12

A passenger is standing on the platform at the beginning of the n^{th} $(= 3^{rd})$ coach of a train. The train starts moving with constant acceleration. The third coach passes by the passenger in $\Delta t_1 = 5.0$ s and rest of the train (including the 3^{rd} coach) in $\Delta t_2 = 20$ s. In what time interval Δt (in sec) did the last coach passed by the passenger?

Ans : (0.64)

Paragraph for question nos. 13 to 16

A particle moves along a straight line along x-axis. At time $t = 0$, its position is at $x = 0$. The velocity v m/s of the object changes as a function of time t seconds as shown in the figure.



Question - 13

What is the average speed between $t = 0$ and $t = 3$ sec?

(1) 8 m/s (2) 4 m/s

(3) 2 m/s (4) 1 m/s

Ans : (2)

Question - 14

What is x at $t = 1$ sec?

(1) 2 m (2) 4 m

(3) 6 m (4) 8 m

Ans : (3)

Question - 15

What is x at $t = 4$ sec?

(1) 0 m (2) 1 m

(3) 5 m (4) 10 m

Ans : (1)

Question - 16

What is the acceleration at $t = 2$ sec?

(1) $10\ m/s^2$ (2) $20\ m/s^2$

(3) $-12\ m/s^2$ (4) $-6\ m/s^2$

Ans : (4)

Question - 17

A man walking from town A to another town B at the rate of 4 km/hour starts one hour before a coach (also travelling from A to B). The coach is travelling at the rate of 12 km/hr and on the way he is picked up by the coach. On arriving at B, he finds that his coach journey lasted 2 hours. Find the distance (in km) between A and B.

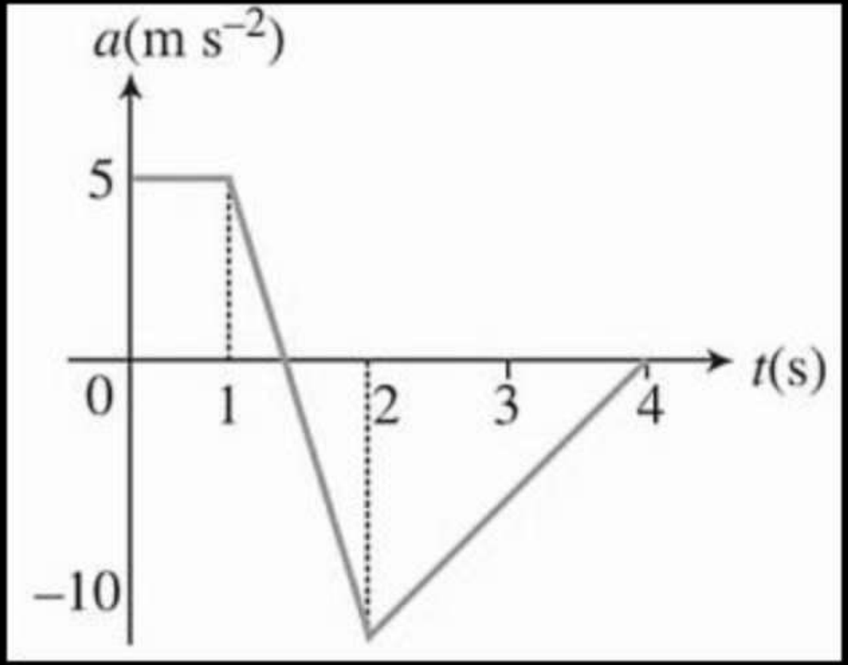
Ans : (30)

Question - 18

A particle moves along x-axis with an initial speed $v_0 = 5\ ms^{-1}$. If its acceleration varies with time as shown in a-t graph in figure,

(a) Find the velocity of the particle at t = 4s.

(b) Find the time when the particle starts moving along $-x$ direction.



Ans : (a) $-2.5\ ms^{-1}$, (b) $-7.5\ ms^{-1}$

Question - 19

A particle starts from rest at $t = 0$ and $x = 0$ to move with a constant acceleration $= +2\ m/s^2$, for 20 seconds. After that, it moves with $-4\ m/s^2$ for the next 20 seconds. Finally, it moves with positive acceleration for 10 seconds until its velocity becomes zero.

(a) What is the value of the acceleration in the last phase of motion?

(b) What is the final x-coordinate of the particle?

(c) Find the total distance covered by the particle during the whole motion.

Ans : (a) $4\ m/s^2$, (b) 200 m, (c) 1000 m

Question - 20

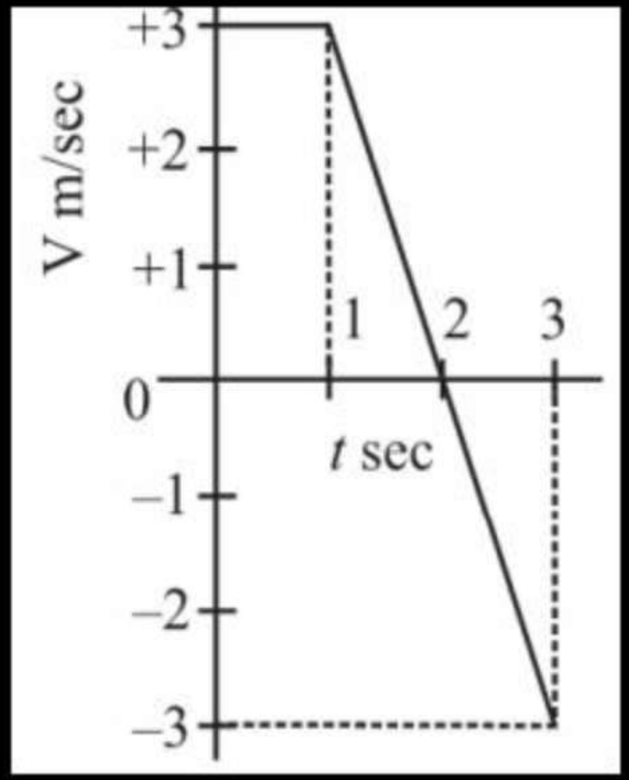
A particle moves along a straight line, x. At time $t = 0$, its position is at $x = 0$. The velocity, V, of the object changes as a function of time t, as indicated in the figure; t is in seconds, V in m/sec and x in meters.

(a) What is x at $t = 3$ sec?

(b) What is the instantaneous acceleration (in m/sec^2) at $t = 2$ sec?

(c) What is the average velocity (in m/sec) between $t = 0$ and $t = 3$ sec?

(d) What is the average speed (in m/sec) between $t = 1$ and $t = 3$ sec?



Ans : (a) 3 m, (b) -3 m/s^2, (c) 1 m/s, (d) 3/2 m/s

THANK YOU