

Topic

①

①

let initial velocity $u = 20 \text{ m/s}$

Final velocity $v = 40 \text{ m/s}$

time = 5 sec

$$\text{Acceleration } a = \frac{v-u}{t} = \frac{40-20}{5}$$

$$\Rightarrow a = \frac{20}{5} = 4 \text{ m/s}^2 \rightarrow B$$

②

Given that body starts from rest $u=0$

Final velocity $v = 15 \text{ m/s}$; $t = 3 \text{ sec}$

$$\therefore \text{Acceleration } a = \frac{v-u}{t}$$

$$\Rightarrow a = \frac{15-0}{3} = \frac{15}{3} = 5 \text{ m/s}^2 \rightarrow B$$

③

initial velocity $u = 30 \text{ m/s}$

Final velocity $v = 0$; time $t = 10 \text{ sec}$

$$\text{acceleration } a = \frac{v-u}{t} = \frac{0-30}{10} = \frac{-30}{10} = -3 \text{ m/s}^2 \rightarrow B$$

④

let the initial velocity $u = 50 \text{ m/s}$

Final velocity $v = 150 \text{ m/s}$; $t = 20 \text{ sec}$

$$\text{acceleration } a = \frac{v-u}{t} = \frac{150-50}{20}$$

$$\Rightarrow a = \frac{100}{20} = 5 \text{ m/s}^2 \rightarrow B$$

(5)

let the acceleration $a = 2 \text{ m/s}^2$; time = 8 sec

Final velocity $V = a \times t$

$$= 2 \times 8 = 16 \text{ m/s} \rightarrow B$$

(6)

let initial velocity $u = 30 \text{ m/s}$

Final velocity $V = 10 \text{ m/s}$; time = 4 sec

$$\text{Acceleration } a = \frac{V - u}{t} = \frac{10 - 30}{4} = \frac{-20}{4} = -5 \text{ m/s}^2 \rightarrow A$$

(7)

let initial velocity $u = 10 \text{ m/s}$

Final velocity $V = 30 \text{ m/s}$; time $t = 6 \text{ sec}$.

$$\therefore \text{Acceleration } a = \frac{V - u}{t} = \frac{30 - 10}{6} = \frac{20}{6} = 3.33 \text{ m/s}^2 \rightarrow A$$

(8)

we know acceleration $a = 4 \text{ m/s}^2$; time = 5 sec

$$\therefore \text{Acceleration} = \frac{\text{change in velocity}}{\text{time}}$$

$$\Rightarrow 4 = \frac{dv}{5} \Rightarrow dv = 4 \times 5 = 20 \text{ m/s}$$

(9)

let initial velocity $u = 50 \text{ kmph} = 50 \times \frac{5}{18} = \frac{250}{18} \text{ m/s}$

acceleration $a = 0.5 \text{ m/s}^2$; time = 32 sec.

Then the final velocity $V = u + at$

$$V = \frac{250}{18} + 0.5 \times 32$$

$$= 13.9 + 16$$

$$= 29.8 \text{ m/s} \rightarrow D$$



(10)

From 0-10 sec the body moves with constant velocity

$\therefore$ change in velocity $= dv = 0$

$$\text{acceleration} = a = \frac{dv}{dt} = \frac{0}{t} = 0 \text{ m/s}^2$$

(12), (13), (14)

If the speed of a body is decreasing,

Then ~~change~~ final velocity $v <$ initial velocity u

$\therefore$ change in velocity $= v - u = -ve$

$$\therefore \text{since } a = \frac{dv}{dt} = -ve$$

If speed = constant i.e. the body is in uniform motion

Final velocity = initial velocity

$$v = u$$

$\therefore$ change in velocity $dv = v - u = 0$

$$\therefore \underline{a = 0}$$

(15), (16), (17)

Given initial velocity $u = 2 \text{ m/s}$: $t_1 = 20 \text{ sec}$

Here body is moving with uniform velocity up to 20 sec.

$\therefore$ change in velocity $= 0$

$$\therefore \text{acceleration} = \frac{dv}{dt} = \frac{0}{15} = 0 \text{ m/s}^2$$

(16) If the final velocity $v = 4 \text{ m/s}$; initial velocity $u = 2 \text{ m/s}$

$$\therefore \text{acceleration } a = \frac{v - u}{t} = \frac{4 - 2}{10} = \frac{2}{10} = 0.2 \text{ m/s}^2$$

(17)

Given initial velocity $u = 2 \text{ m/s}$

After '20' sec the velocity of the body $v = 6 \text{ m/s}$.

$$\therefore \text{acceleration} = \frac{v-u}{t_2-t_1} = \frac{6-2}{40-20} = \frac{4}{20} = \underline{0.2 \text{ m/s}^2}$$

(18)

let initial velocity $u = 25 \text{ m/s}$

Final velocity $v = 10 \text{ m/s}$ time $= 5 \text{ sec}$

$\therefore$ Retardation $= -\text{acceleration}$

$$= - \left[\frac{v-u}{t} \right] = - \left[\frac{10-25}{5} \right]$$

$$\Rightarrow + \frac{15}{5} = 3 \text{ m/s}^2$$

(19)

Given velocity $= 36 \text{ kmph}$

$$= 36 \times \frac{5}{18}$$

$$= 10 \text{ m/s}$$

time $= 10 \text{ sec}$

$$\text{acceleration} = \frac{\text{Velocity}}{\text{time}}$$

$$= \frac{10}{10}$$

$$= \underline{1 \text{ m/s}^2}$$

(1)

According to given question

Initial velocity $u = 0$

Final velocity $v = 30 \text{ m/s}$; $t_{\text{time}} = 6 \text{ sec}$

$$\therefore \text{Acceleration } a = \frac{v-u}{t} = \frac{30-0}{6} = 5 \text{ m/s}^2$$

(2)

Given Initial velocity $u = 10 \text{ m/s}$

Final velocity $v = 30 \text{ m/s}$ $\rightarrow t_{\text{time}} = 5 \text{ sec}$

$$\therefore \text{Acceleration } a = \frac{v-u}{t} = \frac{30-10}{5} = \frac{20}{5} = 4 \text{ m/s}^2$$

(3)

Given Initial velocity $u = 12 \text{ m/s}$

Final velocity $v = 36 \text{ m/s}$ $t_{\text{time}} = 4 \text{ sec}$

$$\text{Acceleration } a = \frac{v-u}{t} = \frac{36-12}{4} = \frac{24}{4} = 6 \text{ m/s}^2$$

(4)

Given acceleration $a = 8 \text{ m/s}^2$; $t = 10 \text{ sec}$

$$\therefore \text{ we know acceleration } a = \frac{dv}{dt}$$

$$\Rightarrow dv = a \times t_{\text{time}} = 8 \times 10 = 80 \text{ m/s}$$

(5)

Given Initial velocity $u = 20 \text{ m/s}$; acceleration $a = 5$

$t = 6 \text{ sec}$

$$a = \frac{v-u}{t} \Rightarrow v = u + at$$

$$= 20 + 5 \times 6 = 20 + 30$$

$$= 50 \text{ m/s}$$

⑥

Given initial velocity $u = 25 \text{ m/s}$

Final velocity $v = 15 \text{ m/s}$; $t_{\text{time}} = 5 \text{ sec}$

$$\therefore \text{Acceleration } a = \frac{v-u}{t} = \frac{15-25}{5} = -\frac{10}{5} = -2 \text{ m/s}^2$$

⑦

Given initial velocity $u = 4 \text{ m/s}$

Final velocity $v = 10 \text{ m/s}$; $t_{\text{time}} = 2 \text{ sec}$

$$\therefore \text{Acceleration } a = \frac{v-u}{t} = \frac{10-4}{2} = \frac{6}{2} = 3 \text{ m/s}^2$$

⑧

Given initial velocity $u = 8 \text{ m/s}$

Acceleration $a = 2 \text{ m/s}^2$; $t_{\text{time}} = 4 \text{ sec}$

$$\therefore \text{From } a = \frac{v-u}{t} \Rightarrow v = u + at$$

$$\Rightarrow v = 8 + 2 \times 4$$

$$= 8 + 8 = 16 \text{ m/s}$$

⑨

Let initial velocity $u = 50 \text{ kmph}$

Final velocity $v = 100 \text{ kmph}$; $a = 1 \text{ m/s}^2$

$$\therefore \text{change in velocity} = dv = v - u = 100 - 50$$

$$= 50 \text{ kmph} = 50 \times \frac{5}{18} = \frac{250}{18} \text{ m/s}$$

$$\text{From acceleration } a = \frac{dv}{dt}$$

$$\Rightarrow dt = \frac{dv}{a} = \frac{250}{18} = 13.8 \text{ sec.}$$

(4)

(16)

From the $v-t$ graph

$$\text{Acceleration} = \frac{dv}{dt} = \text{slope of graph}$$

$$= \frac{20-0}{20-10} = \frac{20}{10} = 2 \text{ m/s}^2$$

(15)

From graph.

For 5 sec.

$$\text{change in velocity} = v - u = 10 - 0 = 10 \text{ m/s}$$

$$\text{Acceleration} = \frac{dv}{dt} = \frac{10}{5} = 2 \text{ m/s}^2$$

(16)

In the graph from 15 to 20 sec

$$\text{Initial velocity } u = 10 \text{ m/s}$$

$$\text{Final velocity } v = 7.5 \text{ m/s}$$

$$\therefore \text{Acceleration} = \frac{v-u}{t} = \frac{7.5-10}{20-15} = \frac{-2.5}{5} = -0.5 \text{ m/s}^2$$

(17)

Bus starts from rest i.e. initial velocity $u=0$

$$\text{Final velocity } v = 5 \text{ m/s ; time } t = 5 \text{ sec.}$$

$$\therefore \text{acceleration} = \frac{v-u}{t} = \frac{5-0}{5} = \frac{5}{5} = 1 \text{ m/s}^2$$