①

let initial velocity $u = 20$ m/s
Final velocity $v = 40$ m/s
time $= 5$ sec

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 $v = 15$ m/s ; $t = 3$ sec

$\therefore$ 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 $u = 30$ m/s
Final velocity $v = 0$; time $t = 10$ sec

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 $u = 50$ m/s
Final velocity $v = 150$ m/s ; $t = 20$ sec

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 $a = 2\ m/s^2$; time $= 8$ sec

Final velocity $V = a \times t$

$= 2 \times 8 = 16\ m/s$ → B

(6)

let initial velocity $u = 30\ m/s$

Final velocity $v = 10\ m/s$; time $= 4$ sec

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

(7)

let initial velocity $u = 10\ m/s$

Final velocity $v = 30\ m/s$; time $t = 6$ sec.

∴ Acceleration $a = \frac{v-u}{t} = \frac{30-10}{6} = \frac{20}{6} = 3.33\ m/s^2$ → A

(8)

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

∴ Acceleration $= \frac{\text{Change in velocity}}{\text{time}}$

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

(9)

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

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

Then the final velocity $v = u + at$

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

$= 13.9 + 16$

$= 29.8\ m/s$ → D

From 0→10 sec the body moves with constant velocity

∴ change in velocity = dv = 0

acceleration = $a = \frac{dv}{t} = \frac{0}{t} = 0$ m/s

(12), (13), (14)

If the speed of a body is decreasing,

Then Final velocity (v) < Initial velocity (u)

∴ change in velocity = v − u = −ve.

Since $a = \frac{dv}{dt}$ = −ve.

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

Final velocity = Initial velocity

v = u

∴ change in velocity dv = v − u = 0

∴ a = 0

(15), (16), (17)

Given Initial velocity u = 2 m/s ; t_1 = 20 sec

Here body is moving with uniform velocity upto 20 sec.

∴ change in velocity = 0.

∴ acceleration = $\frac{dv}{dt} = \frac{0}{15} = 0$ m/s²

(16) If the final velocity v = 4 m/s ; Initial velocity u = 2 m/s

∴ acceleration $a = \frac{v-u}{t} = \frac{4-2}{10} = \frac{2}{10} = 0.2$ m/s²

(17)

Given initial velocity $u = 2$ m/s

After '20' sec the velocity of the body $v = 6$ m/s (1)

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

(18)

Let initial velocity $u = 25$ m/s

Final velocity $v = 10$ m/s time $= 5$ sec

$\therefore$ Retardation $=$ $-$ 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 $= 36$ kmph

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

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

time $= 10$ sec

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

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

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

(1)

According to given question

initial velocity $u=0$

Final velocity $v=30\ m/s$; time $=6\ sec$

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

(2)

Given initial velocity $u=10\ m/s$

Final velocity $v=30\ m/s \rightarrow time = 5\ sec$

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

(3)

Given initial velocity $u=12\ m/s$

Final velocity $v=36\ m/s$ $time = 4\ sec$

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

(4)

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

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

$\Rightarrow dv = a \times time = 8 \times 10 = 80\ m/s$

(5)

Given initial velocity $u=20\ m/s$; acceleration $a=5$

$t=6\ sec$ $a = \frac{v-u}{t} \Rightarrow v = u+at$

$= 20+5\times6 = 20+30$

$= 50\ m/s$

(6)

Given initial velocity $(u) = 25$ m/s

Final velocity $(v) = 15$ m/s ; time $= 5$ sec

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

(7)

Given initial velocity $u = 4$ m/s

Final velocity $v = 10$ m/s ; time $= 2$ sec

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

(8)

Given Initial velocity $u = 8$ m/s

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

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

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

$= 8 + 8 = 16$ m/s

(9)

let initial velocity $u = 50$ kmph

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

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

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

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

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

(10)

From the v-t graph

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

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

(15)

From graph.

For 5 sec.

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

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

(16)

In the graph from 15 to 20 sec

initial velocity $u = 10\ m/s$

Final velocity $v = 7.5\ m/s$

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

(17)

Bus starts from rest ie initial velocity $u=0$

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

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