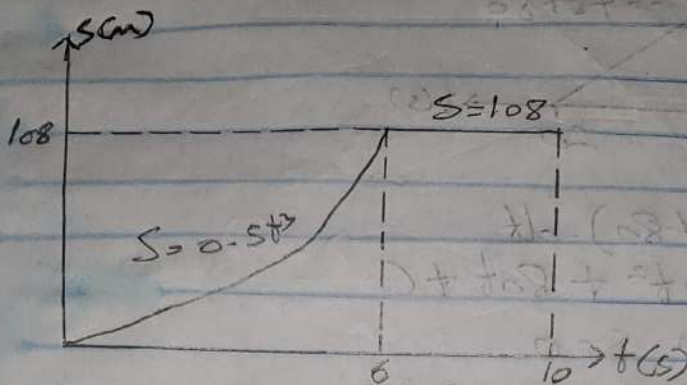


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 MATRIC :- 19/ENG06/065
 DEPT :- MECHANICAL ENGINEERING



Between $t = 0s$; and $t = 6s$

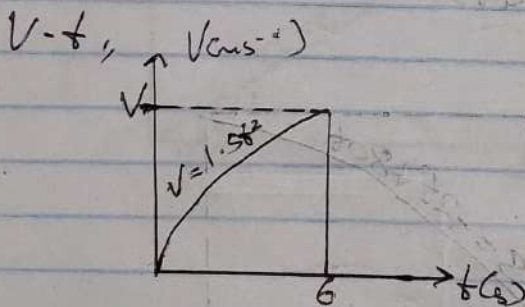
$$S = 0.5t^3$$

$$V = \frac{d(0.5t^3)}{dt} = 3 \times 0.5t^2$$

$$= 1.5t^2 \text{ ms}^{-1}$$

when $t = 6s$, $t = 10s$ and $S = 108m$

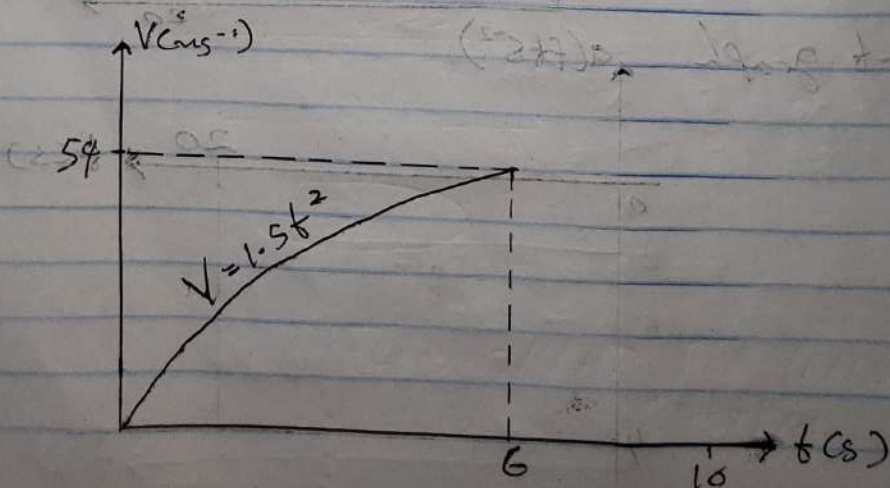
$$V = \frac{ds}{dt} = 0 \text{ ms}^{-1}$$

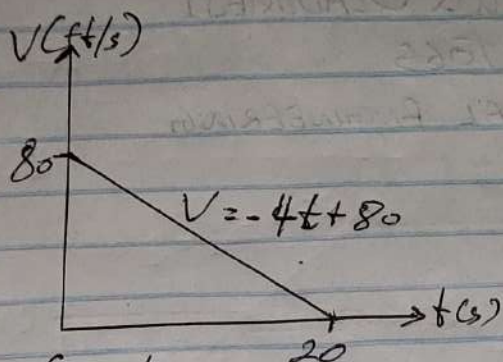


$$V = 1.5(6)^2$$

$$= 1.5 \times 36$$

$$= 54 \text{ ms}^{-1}$$





$$s = \int v \cdot dt$$

$$= \int (-4t + 80) \cdot dt$$

$$= -2t^2 + 80t + C$$

when $t=0$, $s=0$

$$0 = -2(0)^2 + 80(0) + C$$

$$C = 0$$

$$\therefore s = -2t^2 + 80t$$

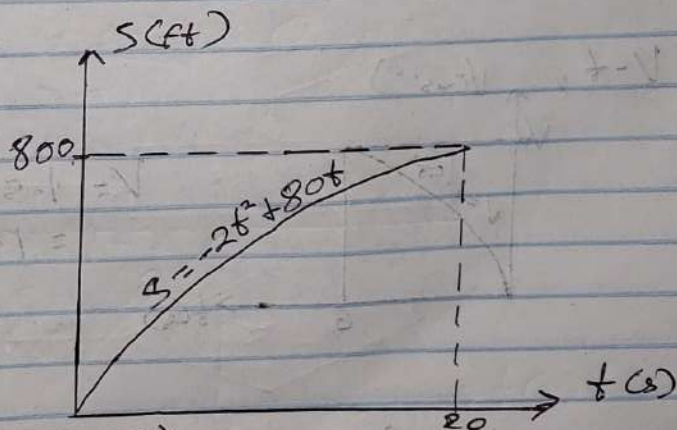
when $t = 20$

$$s = -2(20)^2 + 80(20)$$

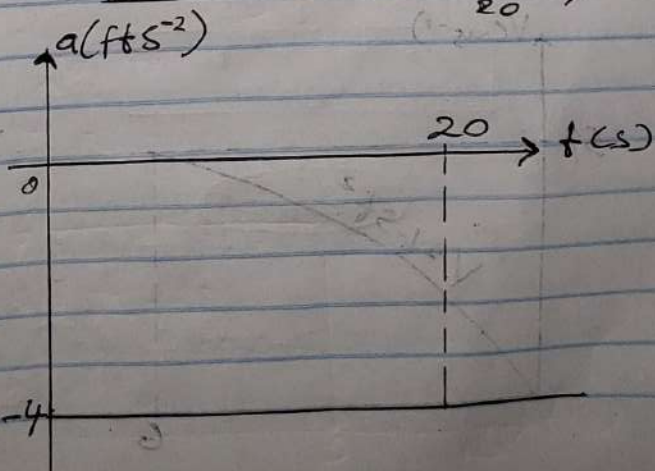
$$= -2 \times 400 + 80 \times 20 = 800 \text{ ft.}$$

$$a = \frac{dv}{dt} = \frac{d(-4t + 80)}{dt} = -4 \text{ ft/s}^2$$

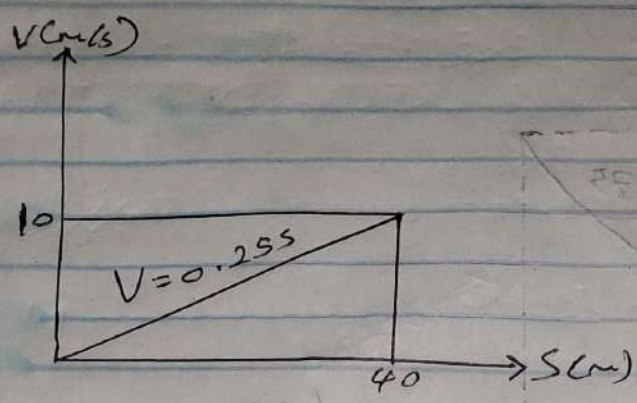
S-t graph;



a-t graph



8

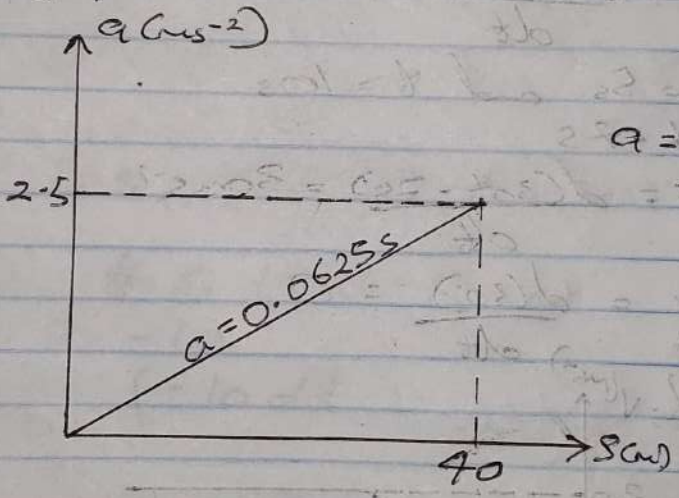


$$a = v \cdot \frac{dv}{ds}$$

$$a = 0.25s \cdot (0.25s)$$

$$= 0.0625s$$

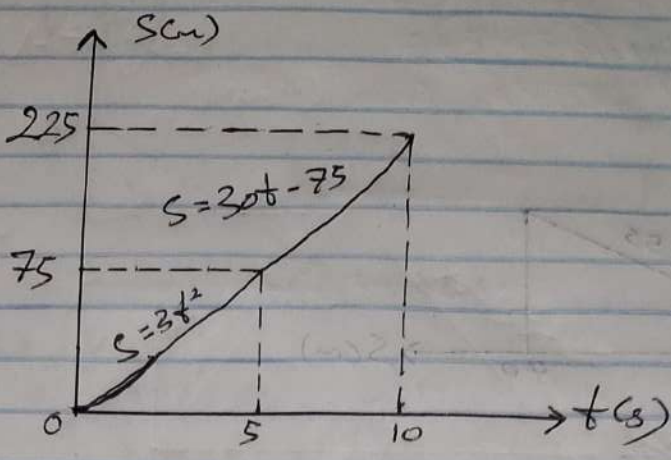
a - s graph,



$$a = 0.0625(40)$$

$$= 2.5 \text{ m/s}^2$$

4



Between $t=0s$ and $t=5s$

$$S = 3t^2$$

$$V = \frac{ds}{dt} = \frac{d(3t^2)}{dt} = 6t \text{ ms}^{-1}$$

$$a = \frac{dv}{dt} = \frac{d(6t)}{dt} = 6 \text{ ms}^{-2}$$

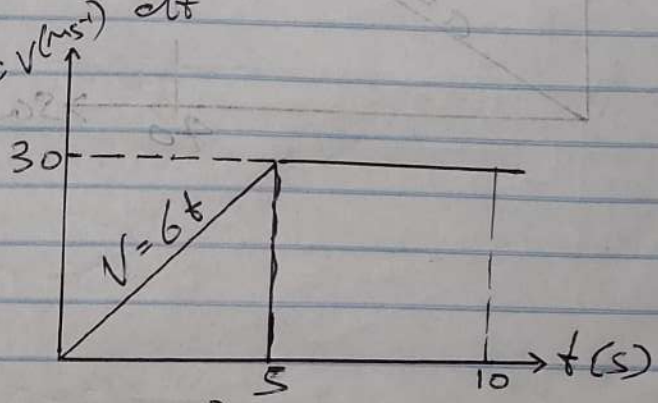
Between $t=5s$ and $t=10s$

$$S = 30t - 75$$

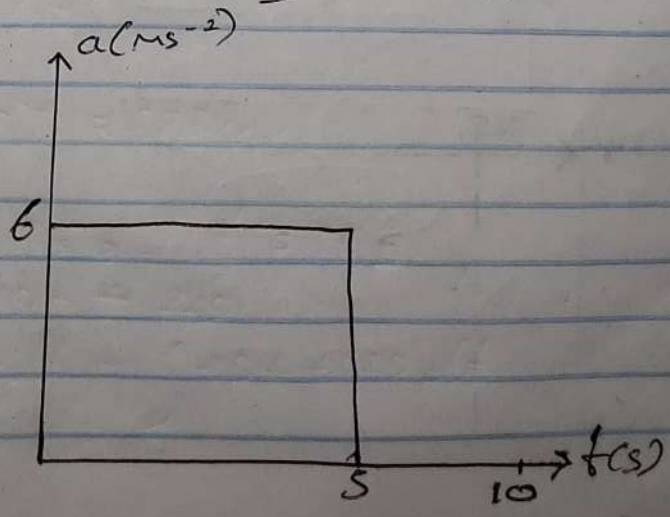
$$v = \frac{ds}{dt} = \frac{d(30t - 75)}{dt} = 30 \text{ ms}^{-1}$$

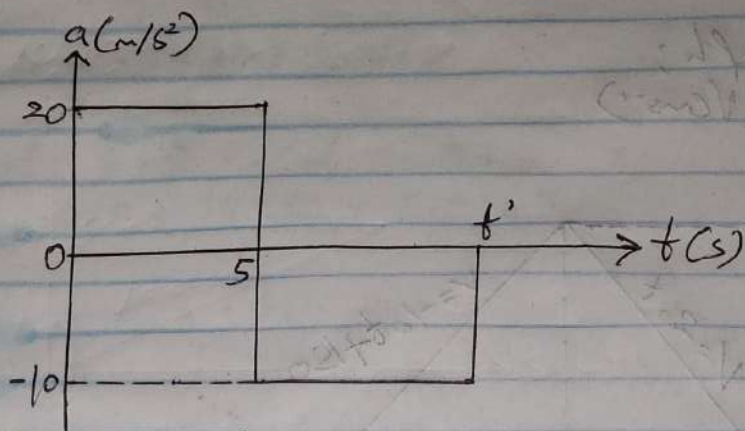
$$a = \frac{dv}{dt} = \frac{d(30)}{dt} = 0$$

v-t graph; $v(\text{ms}^{-1})$



a-t graph;





Between $t=0$ and $t=5$;

$$a = 20$$

$$V = \int a dt = \int 20 dt$$

$$= 20t + C$$

when $V=0$, $t=0$

$$0 = 20(0) + C$$

$$C = 0$$

$$\therefore V = 20t$$

$$\text{At } t=5; V = 20(5) = 100 \text{ ms}^{-1}$$

\therefore When $t=5$, $t=t'$

$$a = -10$$

$$V = \int -10 dt$$

$$V = -10t + C$$

$$\text{At } t=5, V=100$$

$$100 = -10(5) + C$$

$$C = 100 + 50 = 150$$

$$\therefore V = -10t + 150$$

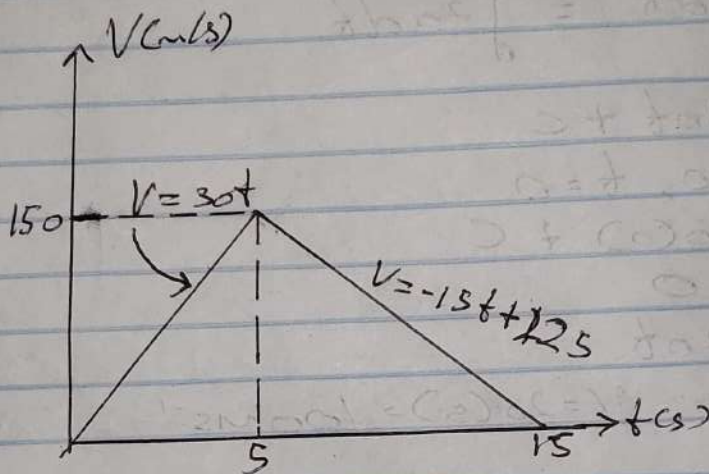
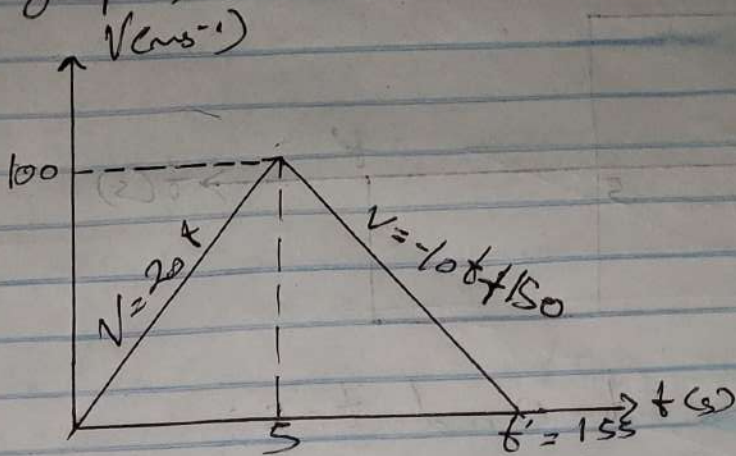
when $V=0$, $t=t'$

$$0 = -10t' + 150$$

$$10t' = 150$$

$$t' = 15 \text{ s}$$

V-t graph;



$t = 0\text{ s}$ and $t = 5\text{ s}$;

$$V = 30t$$

$$S = \int V dt = \int 30t dt$$

$$= 15t^2 + C$$

At $t = 0$, $S = 0$;

$$0 = 15(0) + C$$

$$C = 0$$

$$\therefore S = 15t^2$$

At $t = 5$

$$S = 15(5)^2 = 375\text{ m}$$

Between $t = 5\text{ s}$ and $t = 15\text{ s}$

$$V = -15t + 225$$

$$S = \int v dt = \int -15t + 225 dt$$

$$S = \frac{-15t^2 + 225t + C}{2}$$

when $t = 5$ and $S = 375$ m

$$\therefore 375 = \frac{-15(5)^2 + 225(5) + C}{2}$$

$$C = -562.5$$

$$\therefore S = \frac{-15t^2 + 225t - 562.5}{2}$$

when $t = 15$

$$S = \frac{-15(15)^2 + 225(15) - 562.5}{2}$$

$$= 1125 \text{ m}$$

S-t graph

