DATE:

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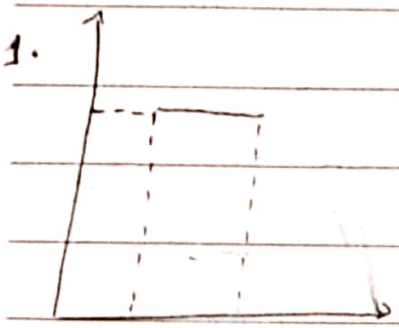
18/ENG10/16044

CIVIL ENGINEERING

1.



$a = dv/dt$

$v = 1.5t^2$, at $t = 6s$

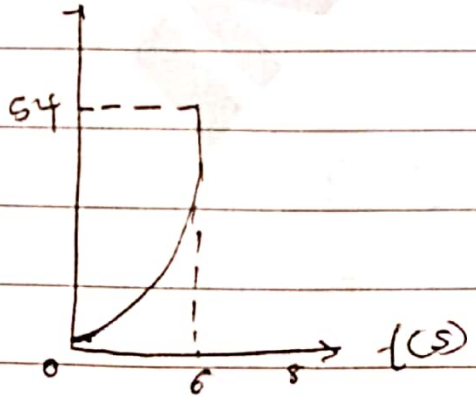
$v = 1.5 \times 6^2 = 1.5 \times 36$

$v = 54 m/s$

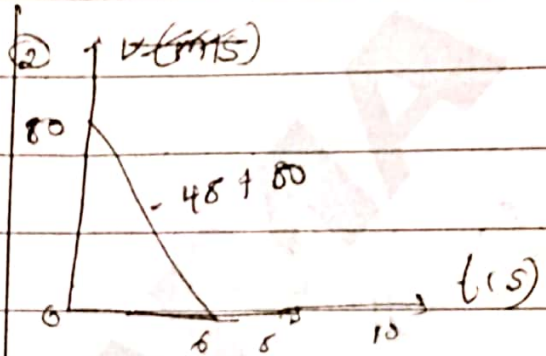
From $t = 6s - 10s$ $\quad s = 108$

$v = 0$

v-t graph



2.



i) $s = \int v\,dt$, $v =$

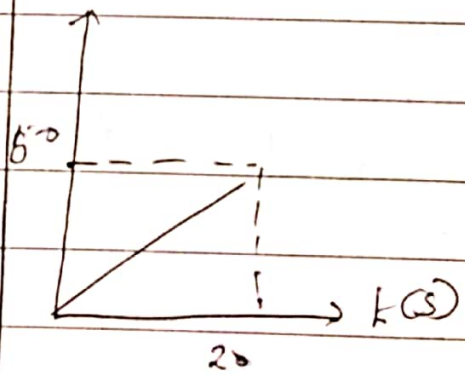
$s = \int (-4t - 80)$, $s = -2t^2 + 80t$

at $t = 20s$

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

$s = 1600 - 1600 = 800m$

s-t graph

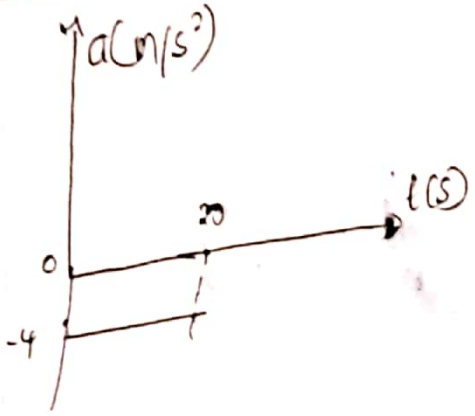


2(ii) Acceleration

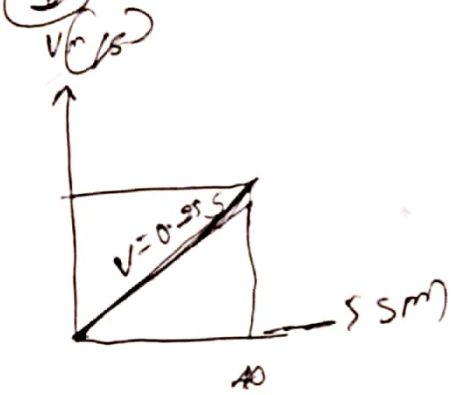
$a = dv/dt$, $\therefore a = -4 m/s^2$

at $t = 20s$, $a = -4 m/s^2$

a-t graph



(3)

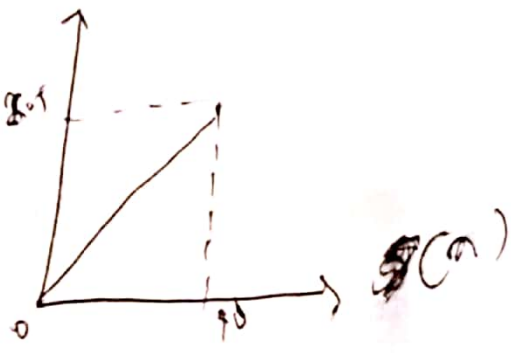


$a = (dv/ds)v$

$v = 0.625s$ $a = 10 \times d(0.625s)/ds$

$a = 10 \times 0.25$ $a = 2.5 m/s^2$

a-s graph



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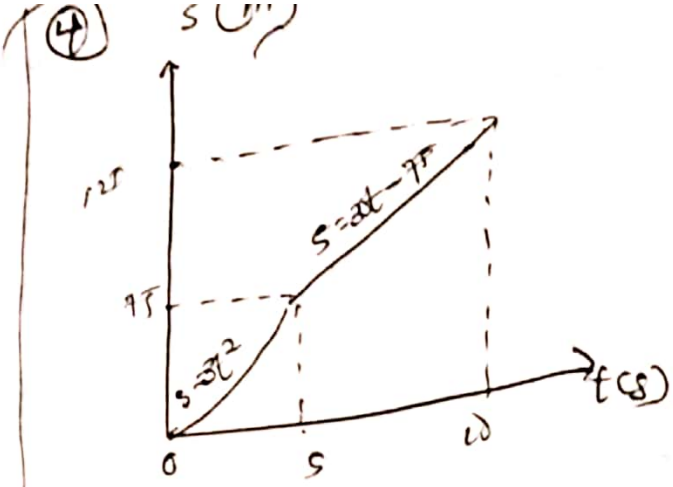
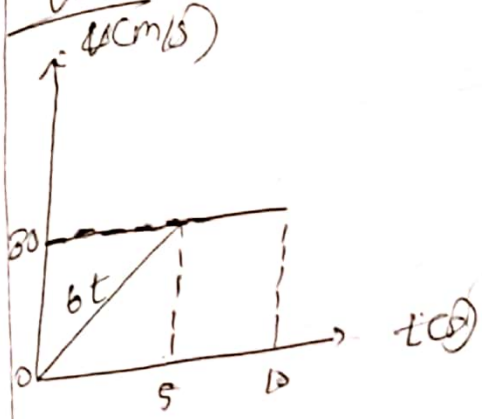


(i) $v = ds/dt$

at $t = 5s$, $v = 6t = 6 \times 5 = 30 m/s$

at $t = 12s$ $v = 30 m/s$

v-t graph

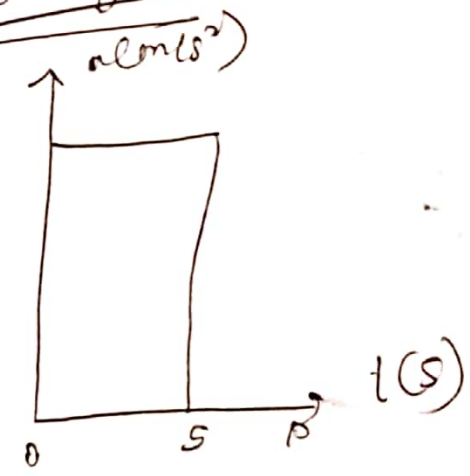


(k) $a = dv/dt$, at $t = 5s$

$a = 6 m/s^2$ at $t = 12s$

$a = 0 m/s$.

a-t graph



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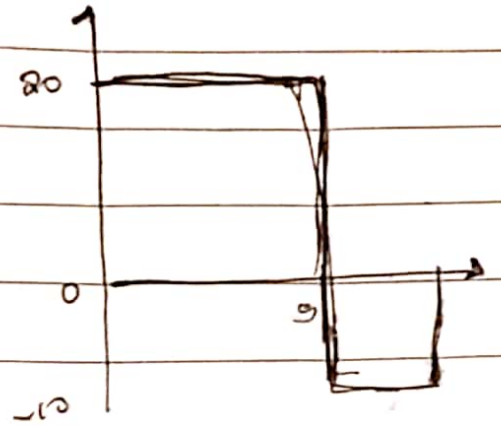


$v = \int a\,dt \quad v = \int 20\,dt \quad v = 20t$

at $t = 5\ s_{ec}$; $v = 20 \times 5 = 100\ m/s$

$5s \leq t \leq t'$

~~$\int dv = 8s/k. - 10dt$~~

$\int_{100}^{v} dv = \int_{5}^{t'} -10\,dt$

$v - 100 = -10t' + 10(5)$

$v - 100 = -10t' + 50$

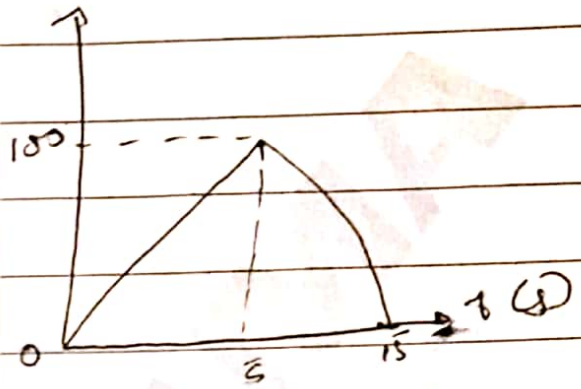
at t', $v = 0$

$0 - 100 = -10(t' + 5)$

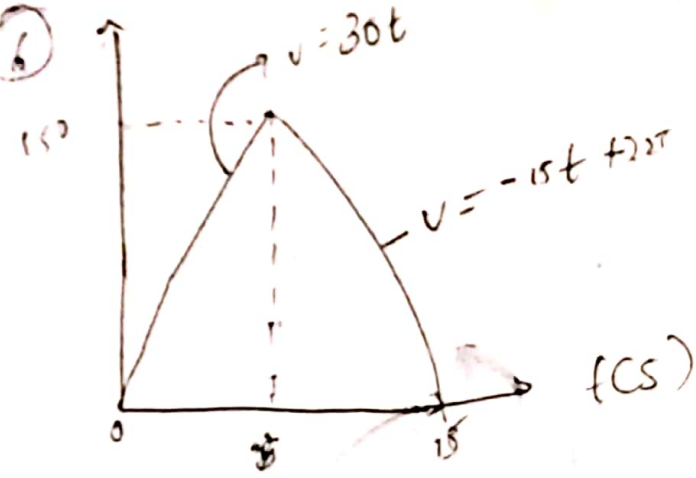
$10t' = 150$

$t' = 15\ sec$

v-t graph



(6)



$0 \le t \le 5$, $v = 30t$ $\int_0^s ds = \int_0^5 30t$, $s = 15(5)^2 - 15(0)^2$

$s = 75 + 25 = 375$

$5 \le t \le 15$

$v = -15t + 225$

$\int_{375}^{s} ds = \int_5^t (-15t + 225)dt \Rightarrow s - 375 = \frac{15t^2}{2} + 225t \Big|_5^{15}$

$s - 375 = \left[\frac{15(15)^2}{2} + 225(15)\right] - \left[\frac{15(5)^2}{2} + 225(5)\right]$

$s - 375 = (-1687.5 + 3375) - (-187.5 + 1125)$

$s - 375 = 750$

$s = 1125$ m

s-t graph