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COURSE: FLUID MECHANICS

MATRIC NUMBER: 18/SCI05/003

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Course: ~~Fluid Mechanics~~ Engineering Mechanics

1 $S = 0.5t^3$

$at = 0 < t < 6$ secs

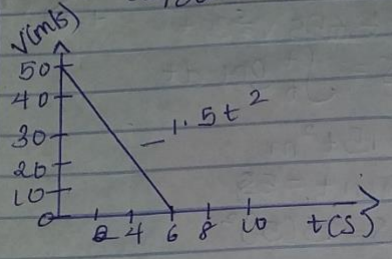
$V = \frac{ds}{dt} = 1.5t^2 m/s$

$v = 15(6)^2 = 54 m/s$

$6 < t < 10$ secs

$S = 10t$

$V = ds/dt = 0 m/s$



2 $V = -4t + 80$

$S = \int_0^5 ds = \int_0^t dt$

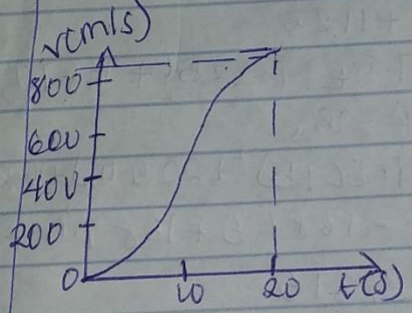
$S = \int_0^4 (-4t + 80)$

$S = (-2t^2 + 80t)_0^{20}$

$-2(20)^2 + 80 \times 20$

$= -800 + 1600$

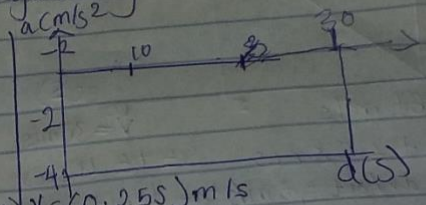
$= 800m$



$V = (-4 + 80)$ ft/s

$0 < t < 20s$

$a = dV/dt = -4 ft/s^2$



3) $V = (0.25s) m/s$

$ads = vdv$

$a = V(dv/ds)$

$dv/ds = 0.25$

$a = (0.25s)(0.25)$

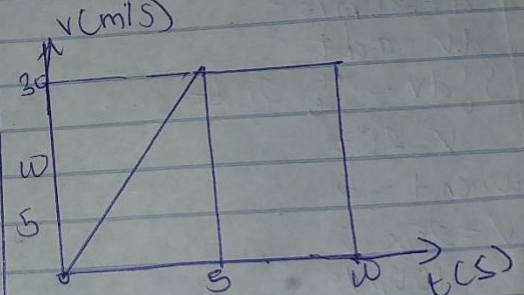
$a = 0.0625s\ m/s^2$

At $S = 40m$

$a = 0.0625 \times 40$

$a = 2.5 m/s^2$

a - S graph



4 $S = 6t^2$

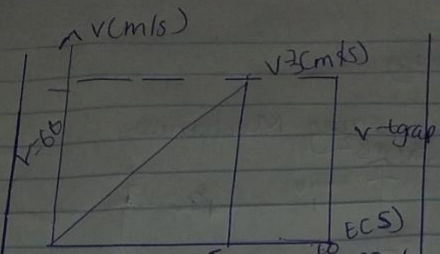
$0 < t < 5$ secs

$V = ds/dt = 6t / V = 6 \times 5 = 30 m/s$

$5 < t < 10$ secs

$S = 30t - 75$

$V = 30 m/s$

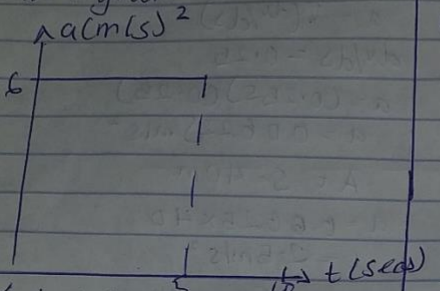


$V = 6t\ m/s$

$0 \le t \le 5\ secs \qquad 5 \le t \le 10\ secs$

$a = dv/dt = 6\ m/s^2 \qquad a = dv/dt = 0\ m/s^2$

a-t graph



5) $0 \le t < 5\ secs$

$a = 20\ m/s^2$

$dv = a\,dt$

$\int_0^v dv = \int_0^t 20\,dt$

$V = 20t$

when $t = 5$

$V = 20 \times 5$

$= 100\ m/s$

$5 \le t \le 10\ secs$

$a = -10\ m/s$

$\int_{100}^{V} dv = \int_5^t -10\,dt$

$V - 100 = -10t - (-10t)$

$V - 100 = -10t - (-10 \times 5)$

$V - 100 = -10t + 50$

when $V = 0$

$0 = -10t + 150$

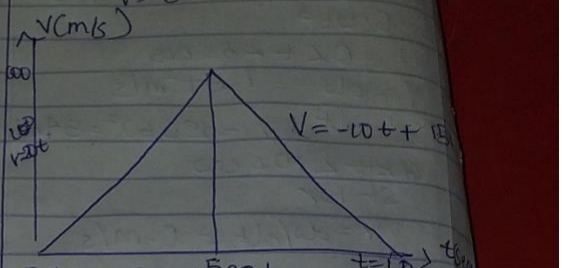
$10t = 150$

$t = 150/10 = 15\ secs$

$5 \le t \le t' \qquad t' = 15\ secs$

$V = -10 \times 15 + 150$

$V = 0$



6 $0 \le t < 5s \qquad V = 30t$

$\int_0^S S = \int_0^t 30t\,dt$

$S = 15t^2\ m$

when $t = 5s$

$S = 15(5)^2$

$S = 375\ m$

$5s \le t < 15s$

$\int_{375}^{S} S' = \int_5^t (-15t + 225)$

$S - 375 = -15/2\,t^2 + 225t$

$-(-15/2(5)^2 + 225(5)]$

$S - 375 = -7.5t^2 + 225t +$

$187.5 + 1125$

$S = -7.5t^2 + 225t + 1687.5$

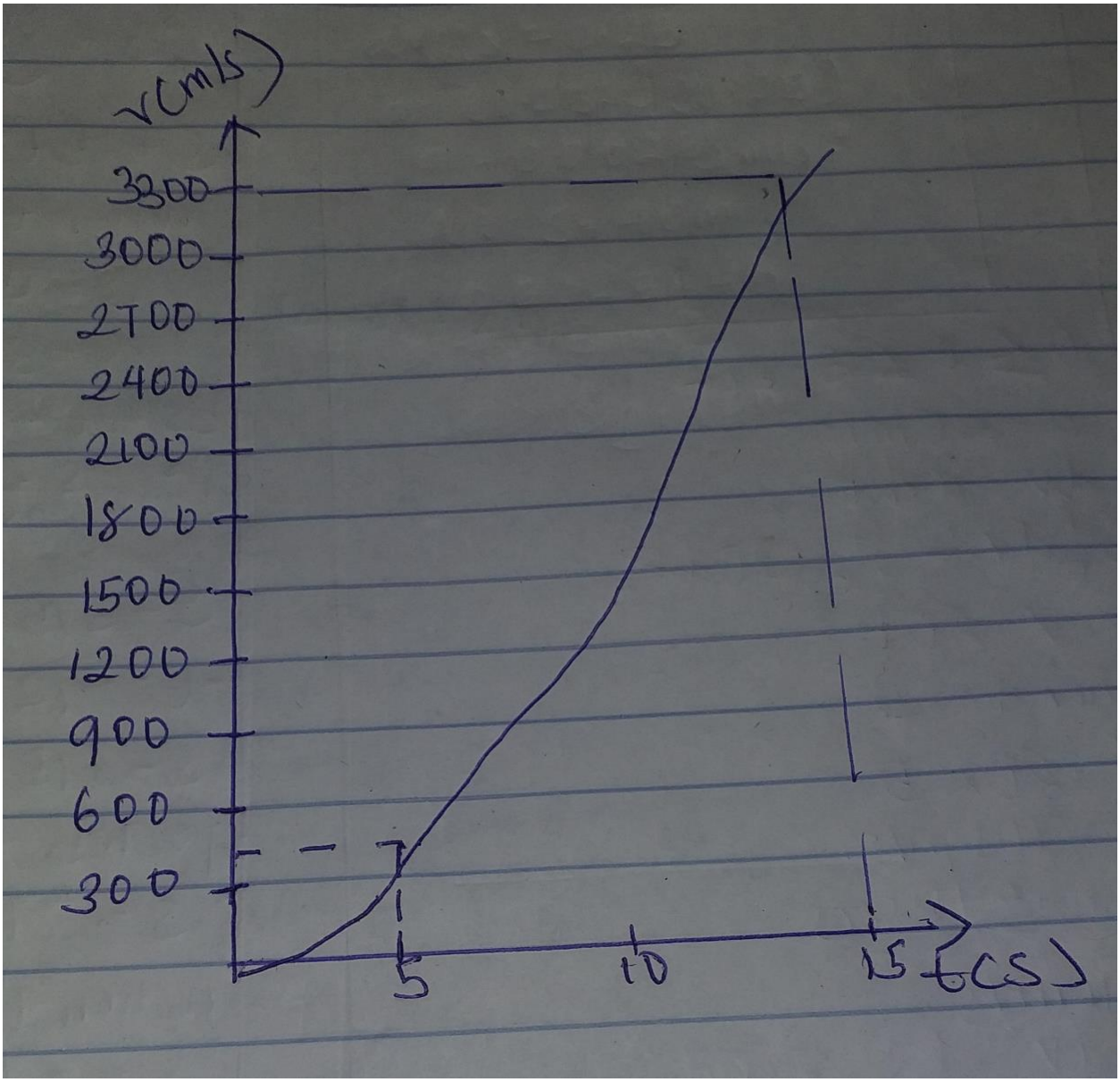
when $t' = 15s$

$S = -7.5(15)^2 + 225(15) + 1687.5$

$S = -1687.5 + 1687.5 +$

$3,375$

$S = 3,375\ m$


v(m/s)
3300
3000
2700
2400
2100
1800
1500
1200
900
600
300
5
10
15
t(s)