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18/mhs01/118
Elect/Elec Engineering
ENG234

1. For v-t graph.

Since $v = ds/dt$, the v-t graph can be determined by differentiating the equation defining the s-t graph.

Equation: $S = 0.5t^3$, $S = 108$

$V = ds/dt = 3 \times 0.5t^2 = 1.5t^2$

to find t, $108 = 0.5t^3$

$216 = t^3$, $t = 6s$

into velocity equation $= 1.5 \times 6^2$

$= 1.5 \times 36 = 54 m/s$

For a-t graph

Since $a = dv/dt$, the a-t graph can be determined by differentiating the defining the v-t graph Equation: $V = 1.5t^2$, $V = 54 m/s$, $a = 3t$,

$a = 3 \times 6 = 18 m/s^2$

F12/10)

For s-t graph

s-t graph can be determined by integrating the equation defining the v-t graph. Equation: $V = -4t + 80$

$$s = \int -4t + 80 = -4t^2/2 + 80t$$

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

Substituting the values of $t = 20s$

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

$s = -800 + 1600$

$s = 800m$

For a-t graph

$a = dv/dt$

$a = -4 m/s^2$.

F12-11)

a-s graph can be determined by differentiating the equation defining the v-s graph, $a = dv/ds$

Equation: $V = 0.25s$

$a = 0.25 m/s$.

F12-12)

$0 \leq t \leq 10s$ From 75m, Equation: $S = 30t - 75$

$V = ds/dt = 30 m/s$, For a-t, $a = dv/dt = 0$

From 0-75m

Equation: $S = 3t^2$

$V = ds/dt = 6t$

$t = 5$, $V = 30 m/s$

$a = dv/dt = 6 m/s^2$

F12-13)

The v-t graph can be determined by integrating the a. Since $a = 20$ $\therefore V = 20t$, where $t = 5$

$V = 100 m/s$.

F12-14)

$s = sv$. The s-t graph can be determined by integrating the equation for the v-t graph

from initial to 150m/s eqn $= V = 30t$

$$s. \int 30t = 30t^2/2 = 15t^2$$

From 150m/s to initial $V = -15t + 225$

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

$$S_2 = -7.5t^2 + 225t$$

For total distance $S_1 + S_2$

$15 \times 5^2 = S_1 = 375$

$-7.5 \times 10^2 + 2250$, $-750 + 2250$

$= 1500m$

$S_1 + S_2 = 375 + 1500$

Total distance $= 1875 m$.