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Civil Engineering

1). For figure 12.3(i)

$v = \langle 4t - 3t^2 \rangle \, m/s$

$s = \int v \, dt$

$s = \int (4t - 3t^2) \, dt$

$s = 2t^2 - t^3$ when $t = 4s$

$s = 2(4)^2$

$s = 32 - 64$

$s = -32 \, m$

2) For figure 12.4 (2)

$v = \langle 0.5t^3 - 8t \rangle \, m/s$

$A = dv/dt$

$dv/dt = 3(0.5)t^2 - 8$

$s = 1.5t^2 - 8$

$A = dv/dt / t = 2$

$s = 1.5(2)^2 - 8$

$s = 6 - 8 s = -2 \, m/s$

3) For figure 12.7 (h)

$A = (4t^2 - 2) \, m/s^2$

$V = \int A \, dt$

$V = \int 4t^2 - 2 = \frac{4t^2}{3} - 2t + C$

$S = \int V \, dt$

$S = \int \frac{4t^2}{3} - 2t + C$

$S = \int V \, dt$

$S = \int \frac{4t^2}{3} - 2t + C$

$S = \int V \, dt \qquad S = \int \frac{4t^2}{3} - 2t + C$

$S = \frac{4t^3}{12} - \frac{2t^2}{2} + Ct$

$P = \frac{1}{3} t^4 - t^2 + Ct + h$

When $t = 0$, $P = 2$

$-2 = \frac{1}{3}(0)^4 - (0)^2 + C(0) + h \qquad , h \to -2$

When $t = 2$, $P = 20$, $h = -2$

$-20 = \frac{1}{3}(2)^4 - 2^2 + (C2) - 2$

$-20 = -0.7 + 2c$

$C = -9.7$

$P = \frac{1}{3} t^4 - t^2 - 9.7t - 2$

When $t = 4$

$P = \frac{1}{3}(4)^4 - 4^2 - (9.7 \times 4) - 2$

$P = 28.7 \, m$

4 For figure 12·8 ⟨4⟩

$V = \langle 20 - 0.55 \rangle \, m/s$

$dt = \dfrac{dy}{V}$ and $dt = \dfrac{dv}{a}$

$a = \dfrac{dy}{dt},\ \dfrac{dv}{dt} = \dfrac{dy}{ds} \cdot \dfrac{ds}{dt}$

$\dfrac{dv}{ds} = -0.15,\ \dfrac{ds}{dt} = (20 - 0.55^2)$

$A = (-0.15)(20 - 0.055^2)$

When $s - 15$

$A = (-0.1 \times 15)(20 - 0.05(15^2)$

$A = -13.125 \, m/s^2$