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ENGINEERING MECHANICS
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COMPUTER ENGINEERING

1) FOR FIGURE 12.3(1)

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

$s = \int v\,dt$

$s = \int \langle 4t - 3t^2 \rangle dt$

$= 2t^2 - t^3$

when $t = 4s$

$s = 2\langle 4 \rangle^2 - \langle 4 \rangle^3$

$= 32 - 64$

$s = -32m$ //

2) FOR FIGURE 12.4 (2)

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

$A = dv/dt$

$dv/dt = 3\langle 0.5 \rangle t^2 - 8$

$= 1.5t^2 - 8$

$A = dv/dt\,|\,t = 2$

$= 1.5(2)^2 - 8$

$= 6 - 8 = -2m/s^2$ //

3) FOR FIGURE 12.7 (3)

$A = \langle 4t^2 - 2 \rangle m/s^2$

$v = \int A\,dt$

$v = \int 4t^2 - 2$

$= 4t^2/3 - 2t + c$

$s = \int v\,dt$

$= \int 4t^2/3 - 2t + c$

$= 4t^3/12 - 2t^2/2 + ct$

$P = 1/3t^4 - t^2 + ct + k$

when $t = 0$, $P = 2$

$-2 = 1/3(0)^4 - (0)^2 + c(0) + k$

$k = -2$

when $t = 2$, $P = 20$, $k = -2$

$-20 = 1/3(2)^4 - 2^2 + c(2) - 2$

$-20 = 0.7 + 2c$

$c = -9.7$

$P = 1/3t^4 - t^2 - 9.7t - 2$

when $t = 4$

$P = 1/3(4)^4 - 4^2 - (9.7 \times 4) - 2$

$P = 28.7m$ //

4) FOR FIGURE 12.8 (4)

$v = \langle 20 - 0.5s^2 \rangle m/s$

$dt = \frac{ds}{v}$ and $dt = \frac{dv}{a}$

$a = \frac{dv}{dt}$, $\frac{dv}{dt} = \frac{dv}{ds} \cdot \frac{ds}{dt}$

$\frac{dv}{ds} = 0.15$, $\frac{ds}{dt} = (20 - 0.5s^2)$

$A = (-0.15)(20 - 0.5s^2)$

when $s = 15$

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

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