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Course Code: ENG 234

1) for figure 12.3(1)

$$v = (4t - 3t^2) \text{ m/s}$$

$$s = \int v dt$$

$$\begin{aligned} s &= \int (4t - 3t^2) dt \\ &= 2t^2 - t^3 \end{aligned}$$

When $t = 4$

$$s = 2(4)^2 - (4)^3$$

$$= 32 - 64$$

$$s = -32 \text{ m}$$

2) for figure 12.4(2)

$$v = (0.5t^3 - 8t) \text{ m/s}$$

$$a = dv/dt$$

$$\frac{dv}{dt} = 3(0.5)t^2 - 8$$

$$= 1.5t^2 - 8$$

$$= 6 - 8 = -2 \text{ m/s}^2$$

For figure 12-7 (3)

$$A = (4t^2 - 2) \text{ m/s}$$

$$V = \int A dt$$

$$V = \int (4t^2 - 2)$$

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

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

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

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

When $t = 0$ $P = -2$

$$-2 = \frac{1}{3}(0) - (0)^2 + C(0) + K$$

$$K = -2$$

When $t = 2$ $P = 20$ $K = -2$

$$-20 = -0.7 + 2C$$

$$C = -9.7$$

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

When $t = 4$

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

$$P = 28.7$$

4) For figure 12.8

$$v = (20 - 0.55s) \text{ m/s}$$

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

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

$$\frac{dv}{ds} = -0.55 \quad \frac{ds}{dt} = (20 - 0.55s^2)$$

$$A = (-0.55) (20 - 0.55^2)$$

$$\text{When } s = 15$$

$$A = (-0.55 \times 15) (20 - 0.55(15^2))$$

$$A = -13.125 \text{ m/s}^2$$