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DEPT: CHEMICAL ENGINEERING

MAT NO: 18/ENG01/014

$$(1) V = (4t - 3t^2) \text{ms}^{-1}, \quad S = \int V dt$$

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

when $t = 4$

$$S = 2(4) - (4)^3$$
$$= -32m$$

$$(2) V = (0.5t^3 - 8t) \text{ms}^{-1}$$

$$A = \frac{dV}{dt}$$

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

$$= 1.5t^2 - 8$$

$$A = \frac{dV}{dt} \Big|_{t=2}$$

$$= 1.5(2)^2 - 8 = 6 - 8$$

$$= -2 \text{ms}^{-2}$$

$$(3) A = (4t^2 - 2) \text{ms}^{-2}$$

$$V = \int A dt$$

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

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

$$S = \int v dt$$

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

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

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

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

$$-2 = \frac{1}{3} (0)^4 - (0)^2 + C(0) + k$$

$$k = -2$$

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

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

$$-20 = 0.7 + 2C$$

$$C = -9.7$$

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

When $t = 4$

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

$$P = 28.7m$$

$$v = (20 - 0.55s) \text{ms}^{-1}$$

$$dt = \frac{dv}{v}$$

$$dt = \frac{dv}{a}, \quad a = \frac{dv}{dt}$$

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

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

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

when $s = 15$

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

$$A = -13.125 \text{ms}^{-2}$$