

Question 1

$$v = (4t - 3t^2)$$

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

$$\int ds = \int v dt$$

$$s = \int v dt$$

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

$$= 2t^2 - t^3 \Big|_0^4$$

$$s = [2(4)^2 - (4^3)] - [0]$$

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

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Question 2
 $A = [4t^2 - 2] \text{ ms}^{-2}$

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$$V = \int A dt$$
$$= \int \left[\frac{4t^3}{3} - 2t + C \right]$$
$$\therefore V = \frac{4t^3}{3} - 2t + C$$

recall

$$s = \int v dt$$
$$= \int \left[\frac{4t^3}{3} - 2t + C \right]$$
$$= \frac{4t^4}{12} - \frac{2t^2}{2} + Ct + m$$

where C and m = constants.

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

From question when $t=0$ $s = -2m$
[Left of origin is -ve]

$$-2 = \frac{0^4}{3} - 0^2 + (0) + m$$

$$m = -2$$

When $t = 2s$ $S = -20m$.

$$\therefore -20 = \frac{2^4}{3} - 2^2 + 2C + [-2]$$

$$-20 = -\frac{2}{3} + 2C$$

$$2C = -20 + \frac{2}{3}$$

$$2C = -\frac{58}{3}$$

$$C = -9.7$$

Hence when $t = 4s$ $S = xm$.

$$x = \frac{4^4}{3} - 4^2 + 2(-9.7) + [-2]$$

$$= 47.93$$

$\therefore S$ at $t = 4s$

$$= 47.93m$$

(Contd)

Question 3
 $v = [0.5t^3 - 8t]$

recall $v = \int A dt$

$$\therefore A = \frac{d}{dt} [v]$$

$$\therefore A = \frac{d}{dt} [0.5t^3 - 8t]$$

$$= 1.5t^2 - 8$$

\therefore Acceleration at $t = 2s$

$$= 1.5[2]^2 - 8$$

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

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Question 4

$$v = \{20 - 0.05s^2\}$$

where $s = 15 \text{ m}$

$$\text{recall } a = \frac{d}{ds} [v]$$

$$\therefore a = \frac{d}{ds} \{20 - 0.05s^2\}$$

$$= \cancel{0} - 0.1s$$

where $s = 15$

$$\therefore a = -0.1[15]$$

$$a = -1.5 \text{ m s}^{-2}$$

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