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CIVIL ENGINEERING
19EN0031036
MECHANICS

① $V = (4t - 3t^2)$ m/s
determine the position

$t = 4$ sec

$S = 0$ when $t = 0$

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

$= 4t - 3t^2$

$\int_0^s ds = \int_0^t (4t - 3t^2) dt$

$S = 4t^2 - t^3$

Recall $t = 4$ s

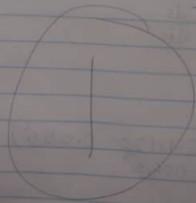
~~$S = 4(4)^2 - (4)^3$~~
 ~~$S = 64 - 64$~~
 ~~$S = 0$~~

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

$S = 32 - 64$

$S = -32$ m

Question



7 F12-4

$$v = (0.5t^3 - 9t) \text{ m/s}$$

$$t = 2 \text{ s}$$

Determine the acceleration

$$a = \frac{dv}{dt} = \frac{d}{dt}(0.5t^3 - 9t)$$

$$= 1.5t^2 - 9$$

Recall $t = 2 \text{ s}$

$$a = 1.5(2)^2 - 9$$

$$= 6 - 9$$

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

8 F12-8

$$q = (20 - 0.05s^2) \text{ m/s}^2$$

$$s = 16 \text{ m}$$

Determine the acceleration

$$a = \frac{dq}{dt} = \frac{d}{dt}(20 - 0.05s^2)$$

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

$$\therefore a = -0.1s \times v = -0.1s(20 - 0.05s^2)$$

$$a = -0.2s + 0.005s^3$$

$$\text{at } s = 16$$

$$a = -2(16) + 0.005(16^3)$$

$$a = -32 + 16.625$$

$$a = -15.375 \text{ m/s}^2$$

$$\approx -15.38 \text{ m/s}^2$$

Q12-7

$$a = (4t^2 - 2)$$

$$v = \frac{4}{3}t^3 - 2t + c_1$$

$$s = \frac{4}{12}t^4 - t^2 = \frac{1}{3}t^4 - t^2 + c_2$$

when $t=0$ located 2m to the left

$$-2 = \frac{1}{3}(0)^4 - 0^2 + c_1 \cdot 0 + c_2$$

$$-2 = c_2$$

$$c_2 = -2$$

when $t=2$ $s=20$ m

$$-20 = \frac{1}{3}(2)^4 - 2^2 + 2 \cdot c_1 - 2$$

$$-18 = \frac{8}{3} - 4 + 2c_1$$

$$c_1 = -9.667 \approx -9.67$$

using c_1 and c_2

$$\frac{4}{12}4^4 - 4^2 = (-9.667) - 2$$

$$= 28.667$$

$$s = 28.667 \text{ m}$$