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18/ENUG03/046.

MECHANICS.

(11) $v = (4t - 3t^2) \text{ ms}^{-1}$ Fig - 3

Determine the position.

$t = 4 \text{ sec.}$

$S = 0$ 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 $t = 4s$

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

$$s = 32 - 64$$

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

2. F12 - 4

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

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

Determine the acceleration.

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

$$= 1.5t^2 - 8$$

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

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

$$a = 6 - 8$$

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

3. F12 - 8

$$a = (20 - 0.05s^2) \text{ ms}^{-2}$$

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

Determine the acceleration.

$$a = \frac{dv}{dt} = -0.1s \frac{ds}{dt}$$

$$\frac{ds}{dt} = 4$$

$$\therefore a = -0.15 \times 4 = 0.15(20 - 0.05s^2)$$

$$a = -2s + 0.005s^3$$

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

$$a = -2(15) + 0.005(15)^3$$

$$a = -30 + 16.875$$

$$= -13.125 \text{ ms}^{-2} \Rightarrow \underline{\underline{-13.13 \text{ ms}^{-2}}}$$

Q11) F12 - 7

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

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

$$s = \frac{4}{12}t^4 - t^2 = \frac{1}{3}t^4 - t^2 + C_2$$

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

$$-2 = \frac{1}{3}(0)^4 - 0^2 + C_1 - 0 + C_2$$

$$-2 = C_2$$

$$\therefore C_2 = -2$$

when $t=2$, $S=20m$.

$$-20 = \frac{1}{3}(2)^4 - 2^2 + 2 \cdot C_1 - 2$$

$$-18 = \frac{16}{3} - 4 + 2C_1$$

$$C_1 = -9.667 \approx \underline{\underline{-9.67}}$$

Using C_1 & C_2 .

$$\frac{4}{12} \cdot 2^4 - 2^2 - (4.967) - 2$$

$$= 28.667.$$

$$S = \underline{\underline{28.667m}}$$