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BIOMEDICAL ENGINEERING

18/ENL02 (087)

ENL 234 ASSIGNMENT

① F12-3

Solution

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

$$V = ds/dt$$

$$ds = v dt$$

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

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

$$S = \left( \frac{4}{2}t^2 - \frac{3}{3}t^3 \right) \Big|_0^4$$

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

$$S = \underline{\underline{-32m}}$$

② F12-4

Solution

$$V = (0.5t^3 - 8t)$$

$$a = dv/dt$$

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

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

$$\text{if } t = 2,$$

$$a = 1.5(2)^2 - 8 = \underline{\underline{-2m/s^2}}$$

③ F12-7

Solution

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

$$S(0) = -2, S(2) = -20, S(4) = ?$$

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

$$\int v dt = S = \frac{4t^4}{12} - t^2 + C \cdot t + A$$

$$\Rightarrow \frac{t^4}{3} - t^2 + C \cdot t + A$$

$$\text{at } S(0) = -2$$

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

$$A = -2$$

$$\text{at } S(2) = -20$$

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

$$C = -9.67$$

$$\therefore S(4) = \frac{t^4}{3} - t^2 - 9.67t - 2$$

$$\Rightarrow \frac{4^4}{3} - 4^2 - 9.67(4) - 2$$

$$S(4) = \underline{\underline{28.65m}}$$

④ F12-8

Solution

$$V = (20 - 0.05s^2) \text{ m/s}, a ds = v dv$$

$$dv/ds = -0.15$$

$$a = (20 - 0.05s^2) \cdot -0.15$$

$$a = (20 - 0.05(15)^2) \cdot -0.15 \times 15 \text{ at } s = 15$$

$$a(15) = \underline{\underline{-13.125m/s^2}}$$