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Department BIOMEDICAL ENGINEERING

Course ENG234 Engineering mechanics II

① F12-3

Solution

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

$$v = ds/dt$$

$$ds = v dt$$

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

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

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

$$S = -32m$$

② F12-4

Solution

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

$$a = dv/dt$$

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

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

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

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

$$\therefore a = -2m/s$$

③ F12-7

Solution

$$a = (At^2 - 2) m/s^2$$

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

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

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

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

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

$$-2 = (0)^4 - 0^2 + C \cdot (0) + A$$

$$A = -2$$

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

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

$$\therefore C = -9.67$$

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

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

$$S(4) = 28.65m$$

Fr2-8

solution

$$v = (20 - 0.5s^2) \text{ m/s}$$

$$a ds = v ds$$

$$a = v \cdot \frac{dv}{ds}$$

$$\frac{dv}{ds} = -0.15$$

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

$$a = (20 - 0.05(15)^2) - 0.1 \times 15 \text{ at } s=15$$

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