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Matric No 18/ENG03/052

Dept: Civil Engineering

Course: ENGINEERING MECHANICS

ASSIGNMENT

1) For Figure 12.3 (1)

$$V = (4t - 3t^2) \text{ m/s}$$

$$s = \int V dt$$

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

$$\text{when } t = 4s$$

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

$$= 32 - 64$$

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

$$\text{when } t = 0, P = 2$$

$$-2 = \frac{1}{3}(0)^3 - (0)^2 + C(0) + K$$

$$K = -2$$

$$\text{when } t = 2, P = 20, K = -2$$

$$-20 = \frac{1}{3}(2)^3 - 2^2 + C(2) - 2$$

$$-20 = -0.7 + 2C$$

$$C = -9.7$$

$$P = \frac{1}{3}t^3 - t^2 - 9.7t - 2$$

$$\text{when } t = 4$$

$$P = \frac{1}{3}(4)^3 - 4^2 - (9.7 \times 4) - 2$$

$$P = 28.7 \text{ m}$$

2) For figure 12.4 (2)

$$V = (0.5t^3 - 8t) \text{ m/s}$$

$$A = \frac{dv}{dt}$$

$$\frac{dv}{dt} = 3(0.5)t^2 - 8$$

$$A = \frac{dv}{dt} / t = 2$$

$$= 15(2)^2 - 8$$

$$= 6 - 8 = -2 \text{ m/s}^2$$

3) For Figure 12.7 (3)

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

$$V = \int A dt$$

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

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

$$s = \int V dt$$

$$= \int \left(\frac{4t^3}{3} - 2t + C \right) dt$$

$$= \frac{4t^4}{12} - \frac{2t^2}{2} + Ct$$

$$P = \frac{1}{3}t^4 - t^2 + Ct + K$$

4) For Figure 12.8 (4)

$$V = (20 - 0.5s) \text{ m/s}$$

$$dt = \frac{ds}{v} \text{ and } dt = \frac{dv}{a}$$

$$a = \frac{dv}{dt}, \frac{dv}{dt} = \frac{dv}{ds} \cdot \frac{ds}{dt}$$

$$\frac{dv}{ds} = -0.15, \frac{ds}{dt} = (20 - 0.5s)$$

$$A = (-0.15)(20 - 0.05s^2)$$

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

$$A = (-0.1 \times 15)(20 - 0.05(15)^2)$$

$$A = -13.125 \text{ m/s}^2$$