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Matric NO. - 18/ENG 06/828

Dept - Mechanical

Course Name - Engineering Mechanics II

Fr 2.3

solution

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

$$s(t) = \int v(t) dt$$

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

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

$$s(t) = \int 2t^2 - t^3 + C$$

when $t = 4s$

$$s(4) = \int 2(4)^2 - 4^3 + C$$

$$= 32 - 64 + C$$

$$= -32 + C = -32m$$

when $t = 0$

$$s(0) = \int 2(0)^2 - 0^3 + C$$

$$= 2 - 0 + C$$

$$= 1 + C$$

$$= 1m$$

F12.4

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

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

$$a(t) = v(t) \frac{d}{dt}$$
$$= \frac{dv}{dt}$$

$$= \left(\frac{3}{2}t^2 - 8 \right)$$

$$a(t) = \left(\frac{3}{2}t^2 - 8 \right) \text{ m/s}^2$$

when $t = 2 \text{ s}$

$$\frac{3}{2} \times (2)^2 - 8$$

$$\frac{3 \times 4 - 8}{2}$$

$$3 \times 2 - 8$$

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

F12.7

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

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

$$v(t) = \int a(t) dt$$

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

=

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

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

$$s(t) = \int v(t) dt$$

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

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

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

When $t = 2$

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

$$C = \frac{-20 - 10.3}{3} = -7.01$$

∴ at $t = 4s$

$$s = \frac{4^4}{3} - 4^2 + (4 \times -7.01) + (-7.01)$$

$$s = \frac{256}{3} - 16 - 28.04 - 7.01$$

$$s = 33.8 \text{ m}$$

F12.8

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

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

$$a(s) = \frac{dv(s)}{dt}$$

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

$$= 20 - 0.1s$$

$$= -0.1s$$

$$a(s) = -0.1s$$

when $s = 15\text{m}$

$$a(15) = -0.1(15)$$
$$= -1.5 \text{ m/s}^2$$