

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

$$S a dt = v$$

$$\int v dt = s$$

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

$$\int v dt = \frac{4t^4}{12} - \frac{2t^2}{2} + ct$$

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

when $t = 0, s = -20 \text{ m}$

$$-20 = \frac{0^4}{3} - 0^2 + c(0) + 2$$

$$2 = -2$$

when $t = 2, s = -20 \text{ m}$

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

$$-20 = 5.33 - 4 + 2c - 2$$

$$-20 = -0.67 + 2c$$

$$c = -9.67$$

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

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

$$= 85.33 - 16 - 36.68 - 2$$

$$s = 28.65 \text{ m}$$

$$s = \frac{v}{3} - t \quad \left(\frac{4}{3} - t \right)$$

$s = 81.33 \text{ m}$ to the left of the

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

Determine the acceleration of

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

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

$$a = 1.5t^2 - 8 \text{ m/s}^2$$

At $t = 2 \text{ secs}$

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

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

$$(4) \quad v = (20 - 0.05s^2) \text{ m/s}$$

Determine the acceleration of the particle at

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

Soln.

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

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

$$a \, ds = v \, dv$$

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

$$a = (20 - 0.05s^2) (-0.1s)$$

At 15m

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

$$a = (20 - 11.25) (-1.5)$$

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

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DEPT: CIVIL ENGINEERING

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COURSE: ENGINEERING MECHANICS

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Assignment.

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

Determine the position of the particle when $t = 4$ s.

Soln.

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

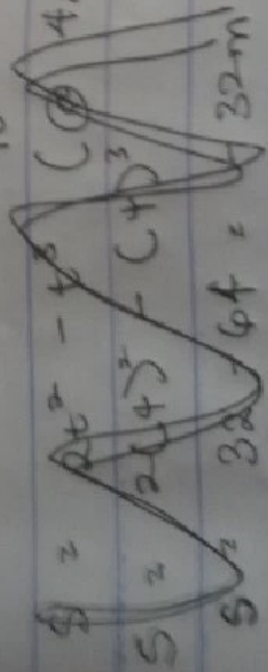
$$v = \frac{ds}{dt}$$

$$ds = v \cdot dt$$

$$\int ds = \int v \cdot dt$$

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

$$s = \left[\frac{4t^2}{2} - \frac{3t^3}{3} \right]_0^4$$

$$s = \left[2(4)^2 - (4)^3 \right] - \left[2(0)^2 - (0)^3 \right]$$
$$s = 32 - 64 = -32 \text{ m}$$


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