

ECHEREBOR EFE CHRISTIAN

18/ENG05/014

ENG 234 (MECHANICS)

MECHATRONIC ENGINEERING

$$1.) V = (4t - 3t^2) \text{ m/s} \quad (0.5t^3 - 8t) \text{ m/s}$$

$$t_1 = 2 \text{ s}$$

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

~~15t^2 - 8~~

$$= 15t^2 - 8$$

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

$$\left. \frac{dV}{dt} \right|_{t=2} = 6 - 8 = -2 \text{ m/s}^2$$

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

$$S = \int V dt$$

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

when $t = 4 \text{ s}$

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

$$= 32 - 64$$

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

$$3.) V = (20 - 0.5t^2) \text{ m/s}$$

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

2.)

$$\frac{dV}{dt} = \frac{dV}{ds} \cdot \frac{ds}{dt}$$

$$\frac{dV}{ds} = 0.15, \quad \frac{ds}{dt} = (20 - 0.5t^2)$$

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

when $S = 15$

$$A = (-0.1 \times 15) (20 - (0.05 \times (5^2)))$$

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

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

$$V = \int A dt$$

$$V = \int 4t^2 - 2$$
$$= 4t^3/3 - 2t + C$$

$$S = \int V dt$$

$$= \int 4t^3/3 - 2t + C$$

$$= 4t^4/12 - 2t^2/2 + Ct^2$$

$$P = 1/3 t^4 - t^2 + Ct + k$$

$$\text{when } t = 0$$

$$P = -2$$

$$-2 = 1/3(0)^4 - (0)^2 + C(0) + k$$

$$k = -2$$

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

$$-20 = 1/3(2)^4 - 2^2 + C(2) - 2$$

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

$$C = -9.7$$

$$P = 1/3 t^4 - t^2 - 9.7t - 2$$

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

$$P = 1/3(4)^4 - 4^2 - (9.7 \times 4) - 2$$

$$= 28.7 \text{ m}$$