

4) F12-7

$$a = (4t^2 - 2)$$

$$v = \frac{1}{3}t^3 - 2t + C_1$$

$$s = \frac{1}{12}t^4 - t^2 + \frac{1}{3}t^3 - t^2 + C_2$$

when $t=0$ located 2m to the left

$$-2 = \frac{1}{12}(0)^4 - 0^2 + C_1 - 0 + C_2$$

$$-2 = C_2$$

$$C_2 = -2$$

when $t=2$, $s=20m$

$$-20 = \frac{1}{12}(2)^4 - 2^2 + 2 \cdot C_1 - 2$$

$$-18 = \frac{8}{12} - 4 + 2C_1$$

$$C_1 = -9.667 \approx -9.67$$

using C_1 and C_2

$$\frac{1}{10}4^4 - 4^2 - (4 \cdot 9.67) - 2$$

$$= 28.667$$

$$\therefore s = 28.667 m$$

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

$$= 1.5t^2 - 8$$

$$\text{Recall } t = 2s$$

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

$$a = 6 - 8$$

$$a = -2m/s^2$$

5) F12-8

$$a = (20 - 0.05t^2) m/s^2$$

$$s = 15m$$

Determine the acceleration

$$a = \frac{dv}{dt} = -0.1t$$

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

$$\therefore a = -0.1(5) \times v = 0.15(20 - 0.05(5)^2)$$

$$a = -25 + 0.005^2$$

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

$$a = -2(15) + 0.005(15^2)$$

$$a = -30 + 16.875$$

$$a = -13.125 m/s^2 \approx -13.13 m/s^2$$

Name: Erencaza Hope

Department: Mechatronics Engineering

Matric No: 18/ENIG05/018

Course: Mechanics

1) F12-3

$$v = (4t^2 - 3t^3) m/s$$

determine the position

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

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

$$v = ds/dt \Rightarrow 4t^2 - 3t^3$$

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

$$s = \frac{4t^3}{3} - \frac{3t^4}{4} \cdot \text{Recall } t = 4s$$

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

$$= 92 - 64 = 28m$$

2) F12-4

$$v = (0.5t^2 - 8t) m/s$$

$$t = 2s$$

Determine the acceleration

