

January

6

Monday
6-360

NAME: Miracle Ray-Elewa
7.00 MAT No: 19/ENG05/072
DEPT: Mechatronics
8.00 COURSE CODE: ENG 234

9.00 (1) $V = (4t - 3t^2) \text{ms}^{-1}$
 $S = \int V dt$
10.00 $= \int (4t - 3t^2) dt$
 $= 2t^2 - t^3$

11.00 When $t = 4\text{s}$
 $S = 2(4^2) - 4^3 = 32 - 64$
12pm $= -32\text{m}$

1.00 (2) $V = (0.5t^3 - 8t) \text{ms}^{-1}$
2.00 $A = \frac{dv}{dt}$
3.00 $\frac{dv}{dt} = 3(0.5)t^2 - 8$
 $= 1.5t^2 - 8$
4.00 \therefore at $t = 2\text{s}$
5.00 $A = 1.5(2^2) - 8$
 $= 6 - 8$
6.00 $= -2\text{ms}^{-2}$

7.00 (3) $A = (4t^2 - 2) \text{ms}^{-2}$
8.00 $v = \int A dt$
 $v = \int (4t^2 - 2) dt$
 $= \frac{4t^3}{3} - 2t + c$
 $S = \int v dt$
Notes $= \int \left(\frac{4t^3}{3} - 2t + c \right) dt$
 $= \frac{4t^4}{12} - t^2 + ct$

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

When $t = 0$ and $P = 2$

$$2 = -K$$

$$\therefore K = -2$$

at $t = 2$, $P = 20$, $K = -2$
 $-20 = \frac{1}{3}(2)^4 - 2^2 + c(2) - 2$
 $-20 = -0.7 + 2c$
 $c = -9.7$

$$P = \frac{1}{3}t^4 - t^2 - 9.7t - 2$$

So, when $t = 4$

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

 $= 28.7\text{m}$

(4) $V = (20 - 0.05s) \text{ms}^{-1}$
 $\frac{ds}{dt} = \frac{dv}{a}$; $dt = \frac{dv}{a}$ $\therefore a = \frac{dv}{dt}$
 $\therefore \frac{dv}{dt} = \frac{dv}{ds} \cdot \frac{ds}{dt}$

$$\frac{dv}{ds} = -0.15$$
; $\frac{ds}{dt} = 20 - 0.05s^2$

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

When $s = 15$

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

 $= -13.125\text{ms}^{-2}$