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MATRIC NO: **19/ENG08/009**

DEPARTMENT: **BIOMEDICAL ENGINEERING**

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1. $V = (4t - 3t^2)$ m/s

To find position, we integrate velocity

$ds = v\,dt$

$\int v\,dt = \int_0^t (4t - 3t^2)$

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

$ds = 2t^2 - t^3 + C$

$s = 0$ when $t = 0$

$s = 2t^2 - t^3 + C$

$C = s - 2t^2 + t^3$

$= 0 - 2(0)^2 + (0)^3$

$= 0 - 0 + 0$

$C = 0$

$s = ?$ when $t = 4$

$s = 2t^2 - t^3 + 0$

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

$= 32 - 64$

$s = -32$

The position is 32m in the opposite direction

2. $v = (0.5t^3 - 8t)$ m/s

To find accelerate, differentiate velocity

$a = dv/dt$

$a = \frac{dv}{dt} = 1.5t^2 - 8$

when $t = 2$

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

$= -2 m/s^2$

$= 2 m/s^2$ in the opposite direction

3. $a = (4t^2 - 2)\ m/s^2$

Velocity is gotten by integrating acceleration

$V = \int a\,dt$

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

$= \frac{4t^3}{3} - \frac{2t}{1} + C$

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

S is integration of v

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

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

$S = \frac{4t^4}{4 \times 3} - \frac{2t^2}{2} + tCv + Cs$

at $t = 0, s = -2m$

When $t = 0$

$-2 = \frac{4(0)^4}{12} - \frac{2(0)^2}{2} + 0(Cv) + Cs$

$Cs = -2$

at $t = 2, s = -20m$

When ~~$t \neq 0$~~ $t = 2$

$-20 = \frac{4(2)^4}{12} - \frac{2(2)^2}{2} + (2)Cv - 2$

$-20 = \frac{16}{3} - 4 + 2Cv - 2$

$2Cv = -20 - \frac{16}{3} + 4 + 2$

$2Cv = -19.33$

$Cv = -9.665$ $Cv = -9.67$

At $t=4$

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

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

$S =$ 28.7 m

4- $V = (20 - 0.05s^2)$ m/s

$S_0 = 0 \quad V_0 = ?$

$V = 20 - 0.05(0)^2$

$= 20 - 0$

$= 20$ m/s

$V_0 = 2$

MISTAKE

4. $V = (20 - 0.05s^2)$ m/s

$V = ds/dt \qquad a = dv/dt$

$dt = ds/V \qquad dt = dv/a$

$dt = dt$

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

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

$v = (20 - 0.05s^2)$

$\frac{dv}{ds} = -0.1s$

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

$= -2s + (5 \times 10^{-3} s^3)$

when $S = 15$

$= -2(15) + 5 \times 10^{-3}(15)^3$

$a = 16.875 - 30$

$= -13.125$

$a = 13.125$ m/s² in opposite direction