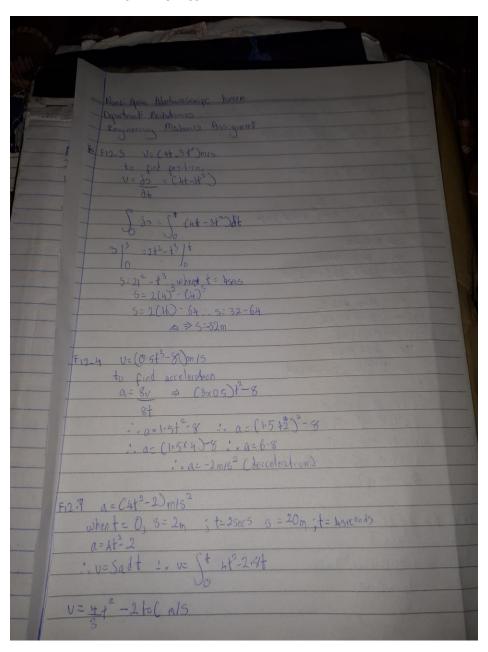**NAME:** APENA ADEOLUWASEMIPE KAREEM

MATRIC. NO.: 18/ENG05/010

COURSE: ENGINEEERING MECHANICS

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Engineering Mechanics Assignment

F12-3 $\quad v = (4t - 3t^2) \, m/s$

to find position,

$$v = \frac{ds}{dt} = (4t - 3t^2)$$

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

$$s \Big|_0^s = 2t^2 - t^3 \Big|_0^t$$

$s = 2t^2 - t^3 \quad$ when $t = 4 secs$

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

$s = 2(16) - 64 \quad \therefore \quad s = 32 - 64$

$\therefore \Rightarrow s = -32m$

F12-4 $\quad v = (0.5t^3 - 8t) \, m/s$

to find acceleration

$a = \frac{\delta v}{\delta t} \quad \Rightarrow \quad (3 \times 0.5) t^2 - 8$

$\therefore a = 1.5t^2 - 8 \quad \therefore a = (1.5 \times 2^2) - 8$

$\therefore a = (1.5 \times 4) - 8 \quad \therefore a = 6 - 8$

$\therefore a = -2 \, m/s^2 \quad (decceleration)$

F12-8 $\quad a = (4t^2 - 2) \, m/s^2$

when $t = 0, \ s = 2m \quad ; t = 2 secs \quad s = 20m \ ; t = 4 seconds$

$a = 4t^2 - 2$

$\therefore v = \int a \, dt \quad \therefore v = \int_0^t 4t^2 - 2 \cdot dt$

$v = \frac{4t^3}{3} - 2t + c \quad m/s$

$s = \int v \, dt \quad \therefore \quad s = \int_0^t \frac{4}{3} t^3 - 2t + c \, dt$

$s = \frac{1}{4} \cdot \frac{4}{3} t^4 - \frac{2t^2}{2} + ct + A$

$s = \frac{1}{3} t^4 - t^2 + ct + A$

$\therefore$ when $t = 0, \ s = 2$

$\Rightarrow -2 = \frac{1}{3} (0)^4 - (0)^2 + c(0) + A$

$\Rightarrow A = -2$

when $t = 2, \ s = 20$

$-20 = \frac{1}{3} (2)^4 - (2)^2 + c(2) - 2$

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

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

$-20 = -0.67 + 2c$

$2c = -20 + 0.67$

$c = -19.33/2, \quad c = -9.665$

$\therefore$ General equation

$s = \frac{1}{3} t^4 - t^2 - 9.665t - 2$

when $t = 4 \sec, \ s = ?$

$s = 85.333 - 16 - 38.66 - 2$

$\Rightarrow s = 28.673 m$

FP 8 $\quad a = v \left(\frac{dv}{ds} \right)$

$v = (20 - 0.05 s^2) \, m/s$

$\frac{dv}{ds} = 0.15$

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

$S = 15m$

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

$a = [20 - 0.05 (15)^2] [-0.1 (15)]$

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

$= 8.75 (-1.5)$

$a = -13.125 \, m/s^2$