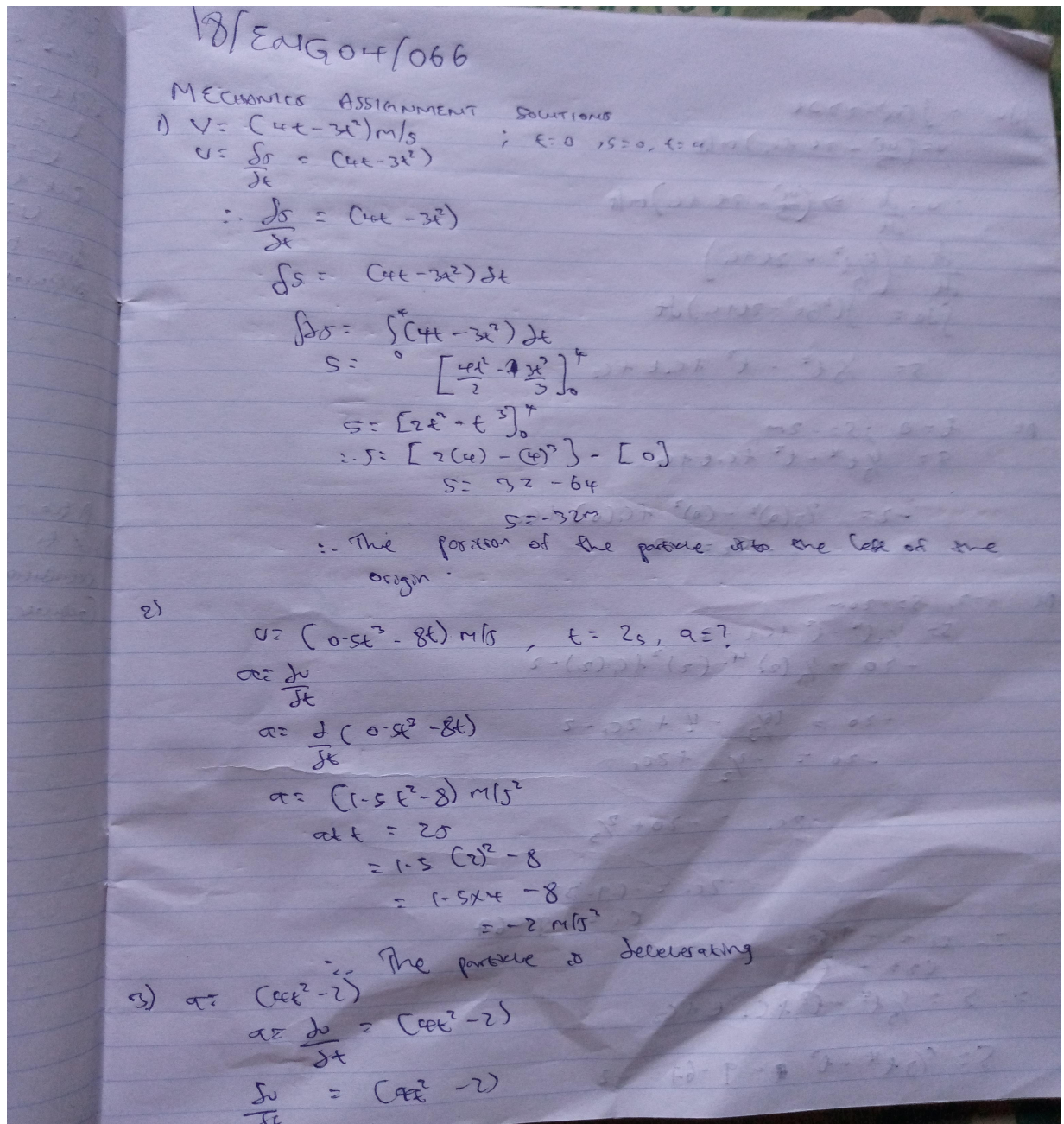


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 18/ENG04/066
 ELECT/ELECT



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

$$u = \left(\frac{4t^3}{3} - 2t + c_1\right) \text{ m/s}$$

$$\therefore u = \frac{ds}{dt} \Rightarrow \left(\frac{4t^3}{3} - 2t + c_1\right) \text{ m/s}$$

$$\frac{ds}{dt} = \left(\frac{4t^3}{3} - 2t + c_1\right)$$

$$\int ds = \int \left(\frac{4t^3}{3} - 2t + c_1\right) dt$$

$$s = \frac{1}{3}t^4 - t^2 + c_1t + c_2$$

At $t=0$, $s=-2\text{m}$

$$s = \frac{1}{3}t^4 - t^2 + c_1t + c_2$$

$$-2 = \frac{1}{3}(0)^4 - (0)^2 + c_1(0) + c_2$$

$$-2 = -c_2 \Rightarrow c_2 = -2$$

At $t=2$, $s=-20\text{m}$

$$s = \frac{1}{3}t^4 - t^2 + c_1t - 2$$

$$-20 = \frac{1}{3}(2)^4 - (2)^2 + c_1(2) - 2$$

$$-20 = \frac{16}{3} - 4 + 2c_1 - 2$$

$$-20 = -\frac{4}{3} + 2c_1$$

$$2c_1 = -20 + \frac{4}{3}$$

$$2c_1 = -(9-33)$$

$$c_1 = -9 - 67$$

$$\therefore c_1 = -9 - 67$$

$$c_2 = -2$$

$$\therefore s = \frac{1}{3}t^4 - t^2 + c_1t + c_2$$

$$s = \frac{1}{3}t^4 - t^2 - 9 - 67 - 2$$

$$\text{At } t = 4\text{s}, S = ?$$

$$S = \frac{1}{3}(4)^3 - (4)^2 - 9.67(4) - 2$$

$$S = \frac{256}{3} - 16 - 38.668 - 2$$

$$S = \frac{256}{3} - 56.668$$

$$S = 28.67\text{m}$$

\therefore Position of the particle is given as 28.67m

$$4) \quad u = (20 - 0.05t^2)$$

$$a = \frac{du}{dt}$$

$$a = \frac{du}{ds} \times \frac{ds}{dt}$$

$$= \frac{du}{ds} \times v$$

$$\therefore a = v \frac{du}{ds}$$

$$\text{and } \frac{du}{ds} = -0.15$$

$$\therefore a = (20 - 0.05t^2)(-0.15)$$

$$\text{At } S = 15\text{m}$$

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

$$a = [20 - 11.25] [-1.5]$$

$$a = (8.75)(-1.5)$$

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