

4.5.3 Physics Paper 3 (232/3)

QUESTION ONE PART A

(a) (i) $D = 0.38 \text{ mm} \pm 0.02$ (1 mark)

(ii) $d = 0.28 \text{ mm} \pm 0.05$ (1 mark)

(b) $C_1 = \frac{D}{d} = \frac{0.38}{0.28} = 1.357$ (1 mark)

(c) $l_1 = 38.5 \text{ cm}$ (1 mark)

$l_2 = 61.5 \text{ cm}$ (1 mark)

$(l_1 < l_2)$

$$\frac{R_p}{9} = \frac{38.5}{61.5}$$

$\therefore R_p = 5.63 \Omega$

(2 marks)

$$C_2 = \sqrt{\frac{9}{5.63}}$$

$= 1.264$

(2 marks)

(ii) C_1 and C_2 are nearly equal (to the nearest whole number).

(1 mark)

QUESTION ONE PART B

$V = 3.1 \text{ volts} \pm 0.1$

$$I_0 = \frac{V}{R} = \frac{3.1}{4.7 \times 10^3} \text{ A}$$

$= 0.659 \text{ mA}$

(3 marks)

$I_1 = 0.63 \text{ mA}$

For $\frac{I_1}{2}$

$t_1 = 3.9 \text{ s}$

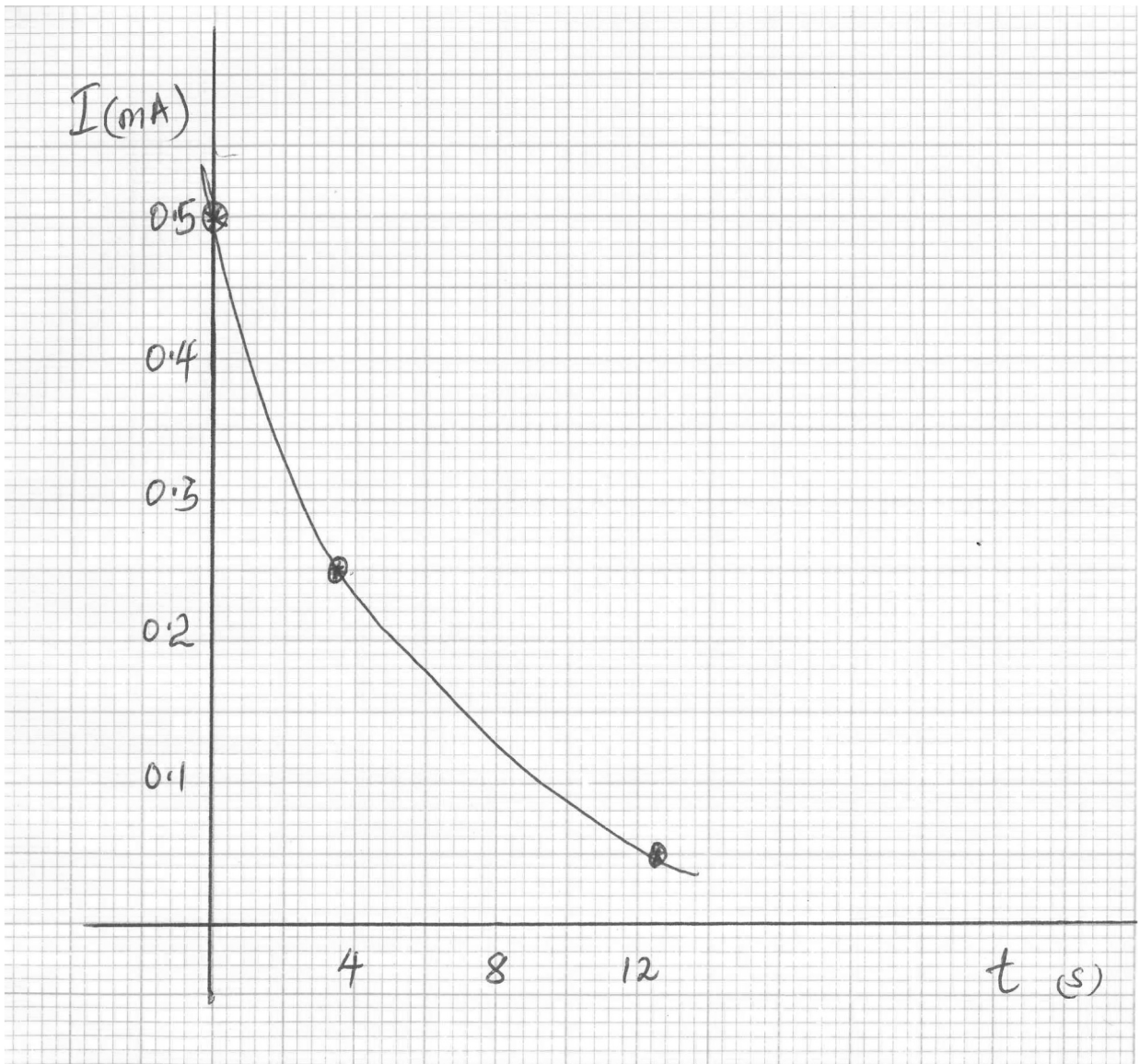
(1 mark)

For $\frac{I_1}{10}$

$t_2 = 13.5 \text{ s}$

(1 mark)

| | | | |
|----------|-----|------|------|
| I | 0.5 | 0.25 | 0.05 |
| t | 0 | 3.6 | 12.5 |



(3 marks)

QUESTION TWO

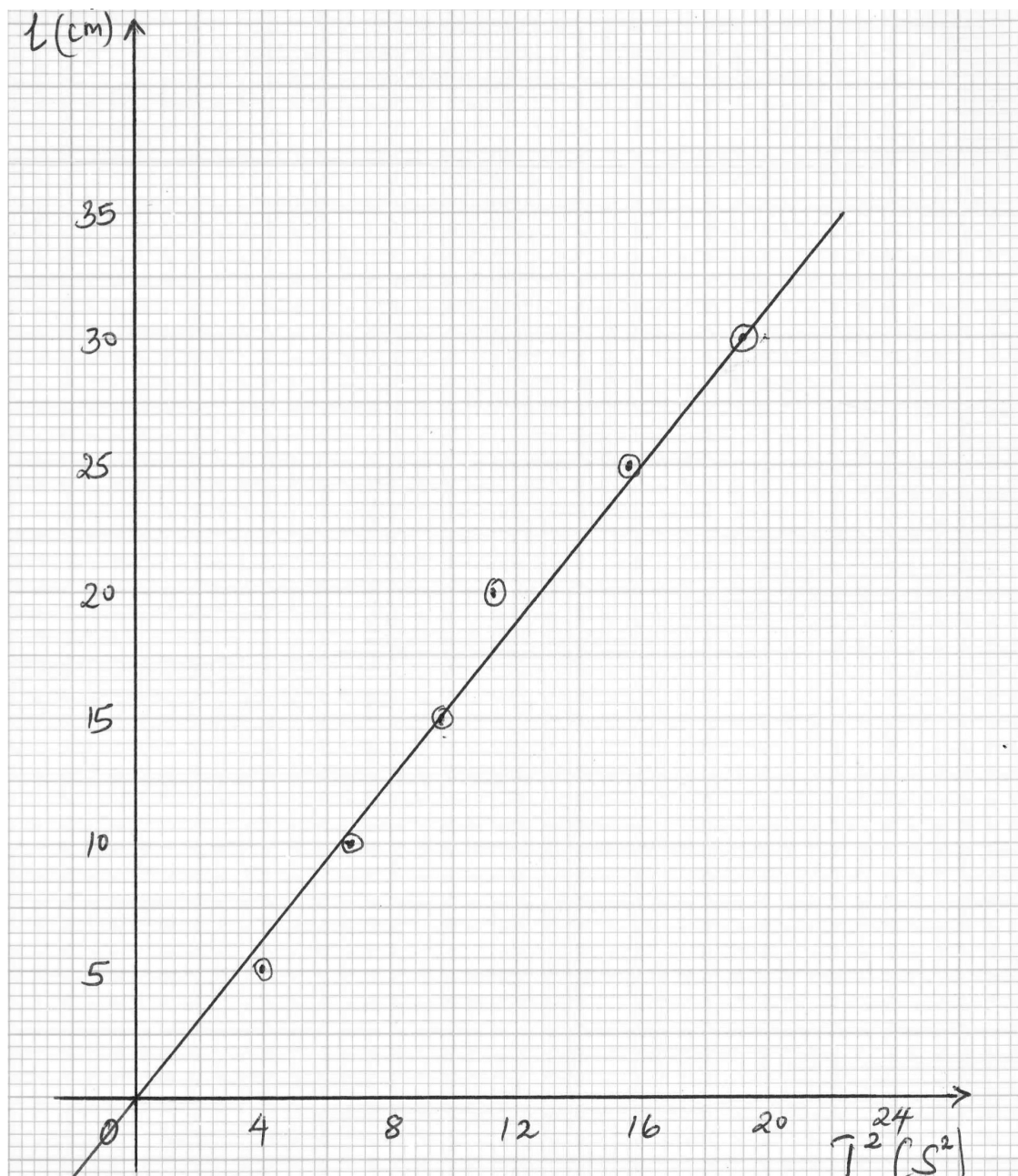
(d)

| | | | | | | |
|-------------------------|------|------|------|-------|-------|-------|
| l (cm) | 5 | 10 | 15 | 20 | 25 | 30 |
| t (s) | 20.1 | 26.3 | 31.2 | 33.0 | 39.6 | 43.4 |
| T (s) | 2.01 | 2.63 | 3.12 | 3.3 | 3.96 | 4.34 |
| T^2 (S ²) | 4.04 | 6.92 | 9.73 | 10.89 | 15.68 | 19.84 |

(6 marks)

(e) Graph.

(5 marks)



$$\begin{aligned}
 \text{(f) Gradient} &= \frac{20}{16} \text{ cm/s}^2 \\
 &= \frac{0.20}{16} \text{ cm/s}^2 \\
 &= 0.015625 \text{ ms}^{-2}
 \end{aligned}$$

(3 marks)

$$\text{(g) } l_N = 20 \text{ cm} = 0.2 \text{ m}$$

$$\text{(i) } t_N = 52.0$$

$$\text{(ii) } T_N = 5.2$$

$$\text{(iii) } T_N^2 = 27.04$$

(1 mark)

$$H = \frac{0.2}{27.04} = 0.007396$$

(1 mark)

$$\text{(iv) } \frac{H}{S} = \frac{0.007396}{0.015625}$$

$$= 0.4737$$

(2 marks)