Question 1 marking scheme

| V (V) | 2.9 | 2.8 | 2.7 | 2.6 | 2.5 | 2.4 | 2.2 |
|---|---|---|---|---|---|---|---|
| I A | 0.1 | 0.18 | 0.22 | 0.35 | 0.45 | 0.51 | 0.68 |

Award 5mks for at least 5 correct values of I.

V (V) A (A) 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.5 1.0 1.5 2.0 2.5 3.0
Axes A 1
Scale S 1
Plotting P 2
Straight line L 1

$V = -rI + E$
$E$ = y – intercept = 3.0V√ (Read from the graph)
r gradient of the line √ (slope)

$$\text{slope} = \frac{\Delta V}{\Delta I} = \frac{2.7 - 2.05}{0.26 - 0.81}\surd$$
$$= \frac{0.65}{-0.55}$$
$$= 1.18\Omega\ \surd$$

(b)

| U (cm) | 40 | 45 | 50 |
|---|---|---|---|
| V (cm) | 40 | 36 | 33 |
| $M = {}^{V}/_{U}$ | 1 | 0.8 | 0.66 |

√½ x 3
√½ x 3

$$f_1 = \frac{40}{1 + 1} = 20$$

$$f_2 = \frac{36}{0.8 + 1} = 20$$ √2 for 3 values correct

$$f_3 = \frac{33}{0.66 + 1} = 19.88$$

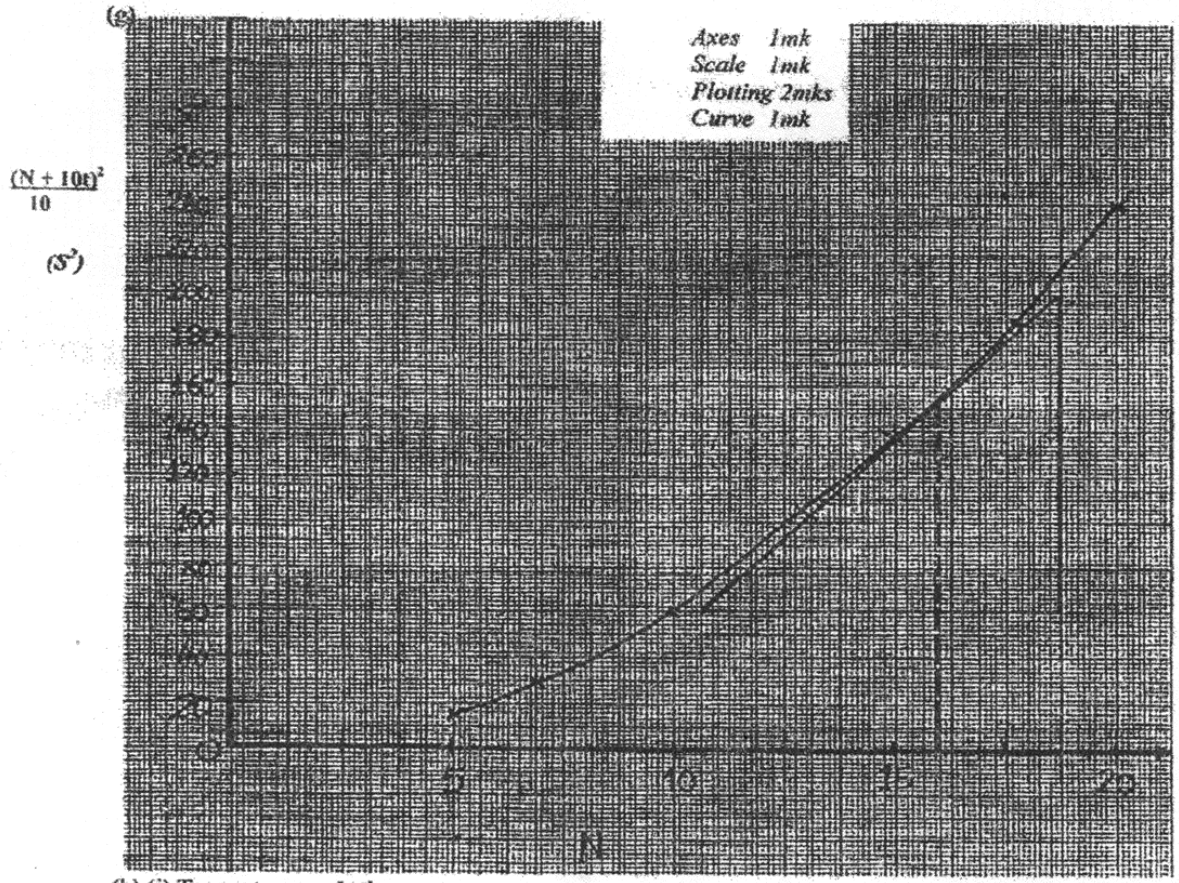
$$\text{Average} = \frac{f_1 + f_2 + f_3}{3} = \frac{20 + 20 + 19.88}{3}$$ √correct average
$$= 19.96\text{cm}$$

Question 2 a. marking scheme

1. (b) Lo=60±10mm ( ½ mk)
(c) L1=120±10mm( ½ mk)
(d) L=600
=60mm
=6cm (1mk)
(e) M=100±5g (1mk(
(f)

| Oscillations,N | 5 | 7 | 10 | 13 | 15 | 18 | 20 | |
|---|---|---|---|---|---|---|---|---|
| t(s) | 3.46 | 4.97 | 7.06 | 9.27 | 10.59 | 12.54 | 14.10 | 5mks |
| $\left(\frac{N+10t}{10}\right)^2$ | 3.806 | 5.467 | 7.766 | 10.20 | 11.65 | 13.80 | 15.51 | 1mk |
| $\left(\frac{N+10t}{10}\right)^2 (S)^2$ | 14.48 | 29.90 | 60.31 | 104.0 | 135.7 | 190.3 | 240.6 | 1mk |

(g)




(h) (i) Tangent 1mk
$= \frac{15.5 - 0}{8.2 - 6.5}$ (1mk)
$= 9.12\ S^2$ (1mk)
(ii) $K = \frac{100 \times 9.12\sqrt{}}{13 \times 6} = 11.70\sqrt{}$ (2mks) $Kg\ S^2\ m^{-1}$

# Question 2b marking scheme

(i) $K = \frac{40 - 20}{0.30 - 0.15}$ extraction√ substitution √

$= 133.3$ ans √

(j) $n = \frac{K}{1000}$

$= \frac{133.3}{1000}$ sub √

$= 0.1333kg$ √

A. (b) V = 30cm√

(c)

| U(cm) | V(cm) | $^1/_U(cm^{-1})$ | $^1/_V(cm^{-1})$ | $^1/_U + {}^1/_V = {}^1/_f(cm^{-1})$ |
|---|---|---|---|---|
| 15 | 30 | 0.067 | 0.033 | 0.10 |
| 20 | 20 | 0.05 | 0.05 | 0.10 |
| 25 | 16.7 | 0.04 | 0.059 | 0.099 |
| | | √ | √ | √ |

(d) (i) Mean of $^1/_f = \frac{0.1 + 0.1 + 0.099}{3}$

$= 0.09967$√

(ii) Mean of f = 10.34cm √

B. (b) V = 2.7V√ A = 0.1A√

(c)

| Length (cm) | 80 | 70 | 60 | 50 | 40 | 30 |
|---|---|---|---|---|---|---|
| P.d (V) | 2.7 | 2.65 | 2.6 | 2.55 | 2.55 | 2.5 |
| Current (A) | 0.1 | 0.125 | 0.155 | 0.175 | 0.2 | 0.25 |
| | | √ | √ | √ | | |

0.125
0.1
0.