232/3
PHYSICS
PAPER 3

1. (I) (i) U= 21.0 cm (1 mk)

(ii) U = 79.0 cm (1 mk)

(iii) d^2=79.0 – 21.0 = 58.0 cm (1 mk)

(iv) $f = \dfrac{(100)^2 - (58)^2}{4 \times 100}$ (1 mk)

= 16.36 cm (1 mk)

(II)

Table of results

Hole	A	B	C	D	E
Distance L(m)	0.04	0.06	0.08	0.10	0.12
Time for 10 oscillations	14.45	12.45	11.58	11.15	10.27
Period time T	1.45	1.25	1.16	1.12	1.03
T^2S^2	2.10	1.56	1.35	1.25	1.06
T^2L	0.084	0.0936	0.108	0.125	0.127
$L^2 \times 10^{-4}$	16.01	36	64	100	144

GRAPH

(a) Slope (3 mks)

$$\text{Slopes} = \frac{152 - 5.0}{110 - 10} = \frac{8.2}{100} \times 10^4 = 8.2 \times 10^4 \times 10^{-2}$$

$$= 8.2 \times 10^2$$

(b) The equation of the line is represented by

$$T^2 = \frac{4\pi^2 L^2}{R} + \frac{4\pi^2 k^2}{R}$$

(i) Find the value of the constant R given that $\pi = 3.14$

$\left[\dfrac{4\pi^2}{R}\right] = slope$ $\dfrac{4x\pi^2}{R} = 8.2 \times 10^2$ ✓1mk

R = 4.82×10^{-2} ✓1mk

(ii) Find the value of the intercept *c* of your graph and hence find the value of κ (3 mks)

C = any reading of intercept correctly read ✓1mk

$$\frac{4x3.142^2 k^2}{4.82 \times 10^{-2}} = 7.5 \times 10^{-2}$$ ✓1mk

$$K = \frac{7.5 \times 10^{-2} \times 10^2 4.82}{4 \times 3.142^2} = 0.911$$ ✓1mk

2. (a)

(i) D= 0.36×10^{-3}m ✓1mk

(ii) $A = \dfrac{\pi D^2}{4} = \dfrac{\pi \times 0.36^2 \times 10^{-6}}{4} = 1.017 \times 10^{-6}$ Sub 1 mk

(b) Table of resuots

e cm	10.0	20.0	30.0	40.0	50.0	70.0	80.0
L cm	91.0	81.0	73.0	65.5	60.0	55.0	46.5
$\frac{1}{l}\ cm^{-1}$	1.10	1.23	1.37	1.53	1.67	1.96	2.15

(c) **Graph**

(d) Slope S

S……(3 mks)

$\frac{\Delta i)}{\Delta x} = \frac{85-20}{2.2-1.23} = 65 \big/ 0.97\times10^{-2} = 1.586$ ✓1mk

(e) From the graph state the value of $\frac{1}{l}(cm^{-1})$ when e=0 (1 mk)

X – Intercept = $0.94\times10^{-2}cm^{-1}$

Correct reading of X-intercept

(f) Given that $e = \frac{100R}{\pi} = \frac{R}{J}$. *Find the value of* J *when* $R = 10\Omega$ (2 mks)

R

Y intercept = C= J = 0.65✓1mk But R = 10

$\frac{10}{J} = 65$

$\frac{10}{65} = 0.153$ ✓1mk