FORM FOUR CLUSTER KCSE MODEL2

PHYSICS PAPER 3 QUESTIONS

QUESTION ONE (10 Marks)

PART A

1. You are provided with the following apparatus
   - A metre rule
   - A mass labelled M
   - Two pieces of wood
   - A wire P
   - A complete set of retort stand
   - A stop watch
   - A micrometer screw gauge
   - A 100ml measuring cylinder
   - A piece of thread

   PART A

   Proceed as follows

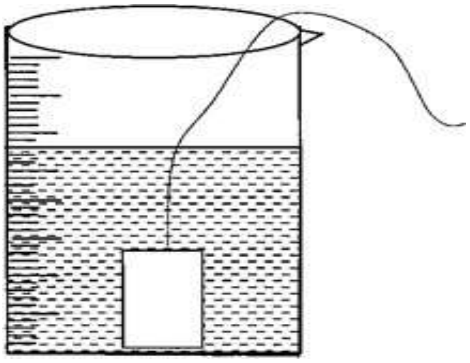
   a) Using a weighing balance, measure and record the mass of the mass

   M= ..... kg(ld.p)

   b) i) Pour water in a 100ml measuring cylinder to half way and record the volume as V1

   V1. .....= cm^3

   ii) Using the thread, lower the mass M into the measuring cylinder provided until it's fully submerged as shown. Record the final volume V2 V2..... cm3



   iii) Determine the volume V of the solid M in m^3

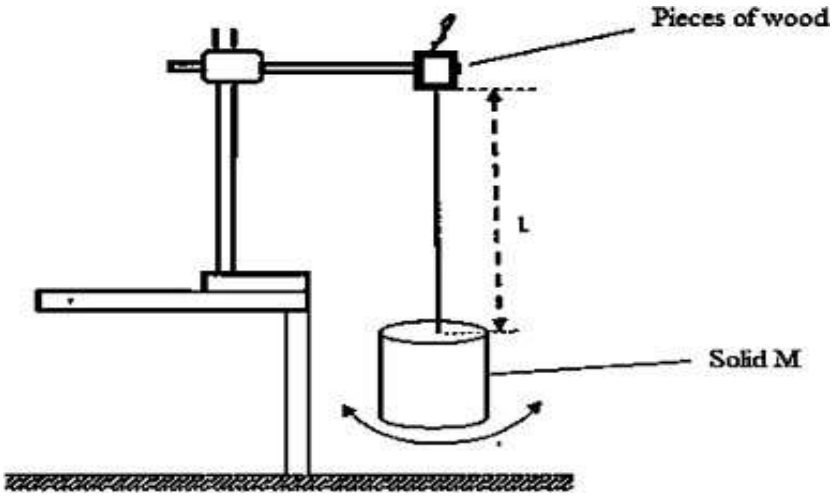
   V.....
   Determine the value of R given that

$$V = \frac{M}{R}$$

   giving the unit

   PART B

c) Set up the apparatus as shown below. Ensure that the wire is free of kinks and the end tied to the hook is very firm and the hook does not move about.



d) Adjust the length L of the wire so that L = 70cm.

Give the solid M a slight twist in a horizontal plane of 180° so that when released if it oscillates about as shown.

Measure the time t for ten oscillations and record in the table below.

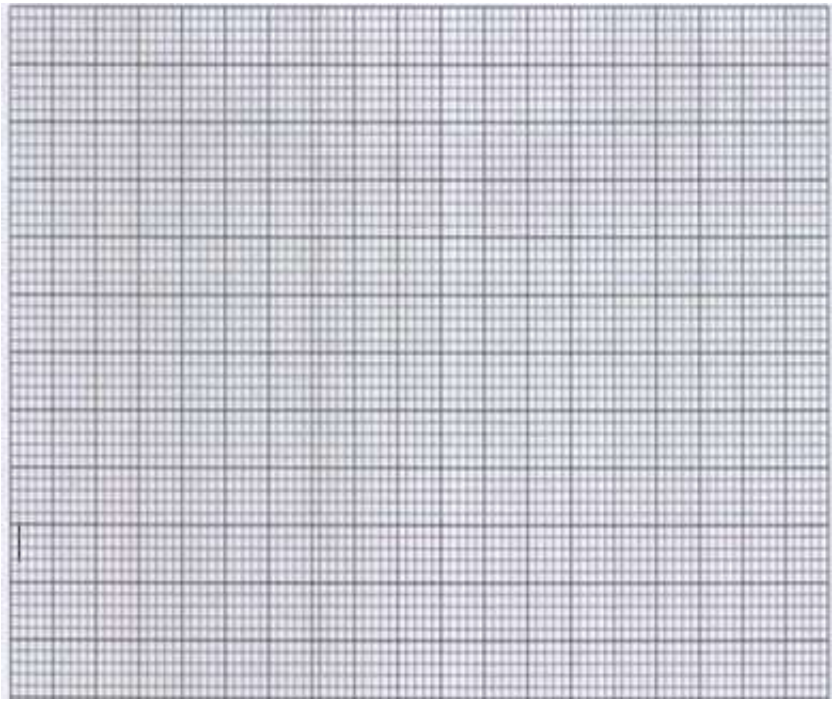
e) Repeat the procedure above for other values of L as shown and complete the table.

Length L(cm)	70	60	50	40	30	20
Length L(m)						
$\frac{1}{l}$ (m^{-1})						
Time for 10 oscillations t(s)						
Period T (s)						
Frequency , f (Hz)						
f^2 (Hz^2)						

f) On the grid provided plot a graph of f^2 against $\frac{1}{l}$

g) Determine the slope of the graph.
h) Using the micrometer screw gauge measure the diameter of the wire, d

d =.....m



i) Given that $f^2 = \frac{39\pi^2}{GdL}$, determine the value of the constant G.

QUESTION TWO (20 Marks)

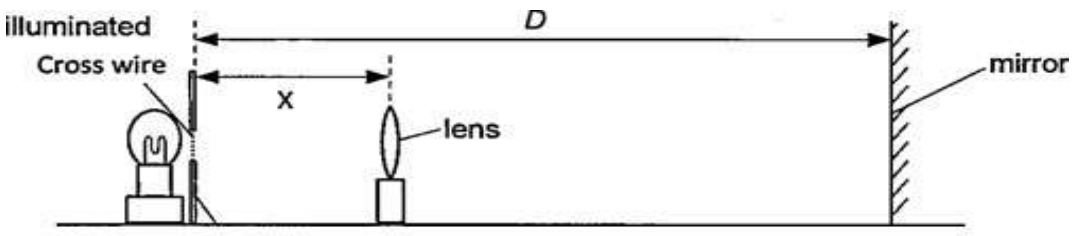
PART B

2. QUESTION 2

PART A

You are provided with the following:

- A lens and a lens holder
- A screen with cross-wires
- A candle
- A metre rule
- (a) Arrange the illuminated cross wire, lens and mirror as shown in the figure.



Screen with cross wire

Screen with cross wire

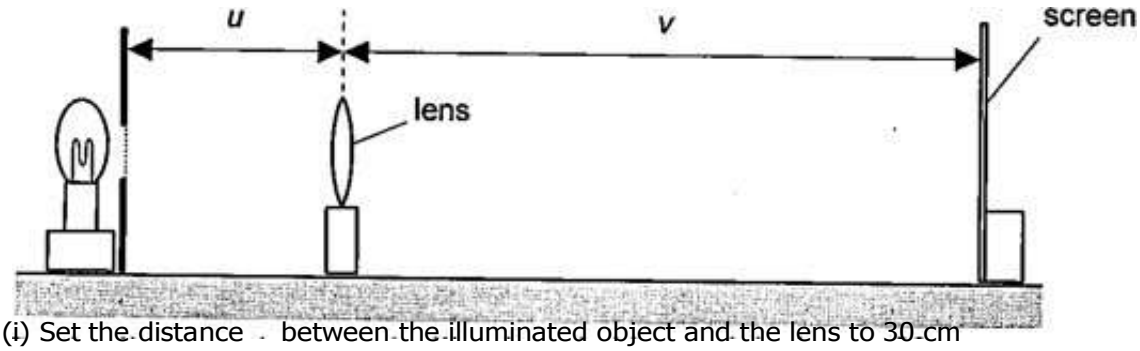
(i) Set the distance D between the mirror and screen to be 25 cm apart

(ii) Move the lens until a sharp image appears on the screen by the side of the illuminated cross wire. Measure the distance X and record in the table.

(iii)Repeat steps (i) to (iii) for a distance D=40 cm.

D(cm)	X(cm)
25	
40	

(iv) Determine the value T, the average value of X
(b) Set up the lens, illuminated across wire and screen as shown in the figure.



(i) Set the distance between the illuminated object and the lens to 30 cm

(ii) Move the screen until a sharp image of the illuminated object appears on the screen.
(iii)Measure the distance between the lens and the screen

(iv) Repeat steps (i) and (iii) for the value of =40 cm

(v) Fill the table below

u/cm	v(cm)	$Y=\frac{uv}{u+v}$
30		
40		

(vi) Determine S, the average value of Y.
(c) Using the average values in a (v) and b (vi), calculate the constant value f of the lens.

$$f=\frac{T+S}{2}$$

PART B

- 3 dry cells each of 1.5V

- A cell holder
- A resistance wire on a mm scale
- 10Ω resistor
- Amilliameter (0 - 1 A)
- Five connecting wires
- Micrometer screw gauge

a) Using the micrometer screw gauge given, measure and record the diameter of the resistance wire fixed on the mm scale.

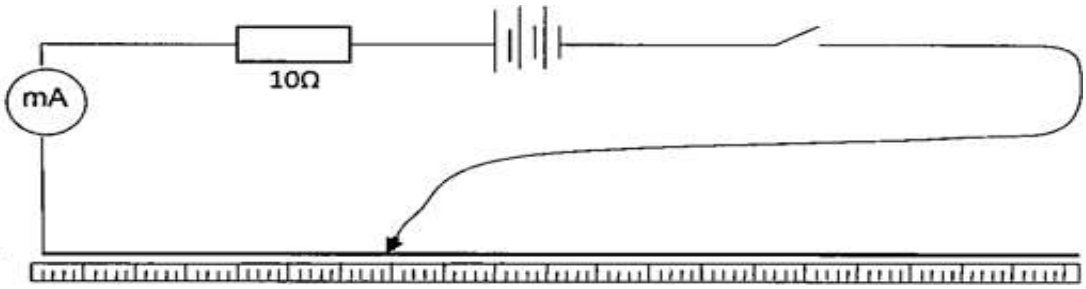
D= ..... m

(b) Hence determine;

i) Radius r =_____m

ii) The cross-sectional area using the equation $A = \pi r^2$

c) Set up the circuit using the apparatus given as shown.



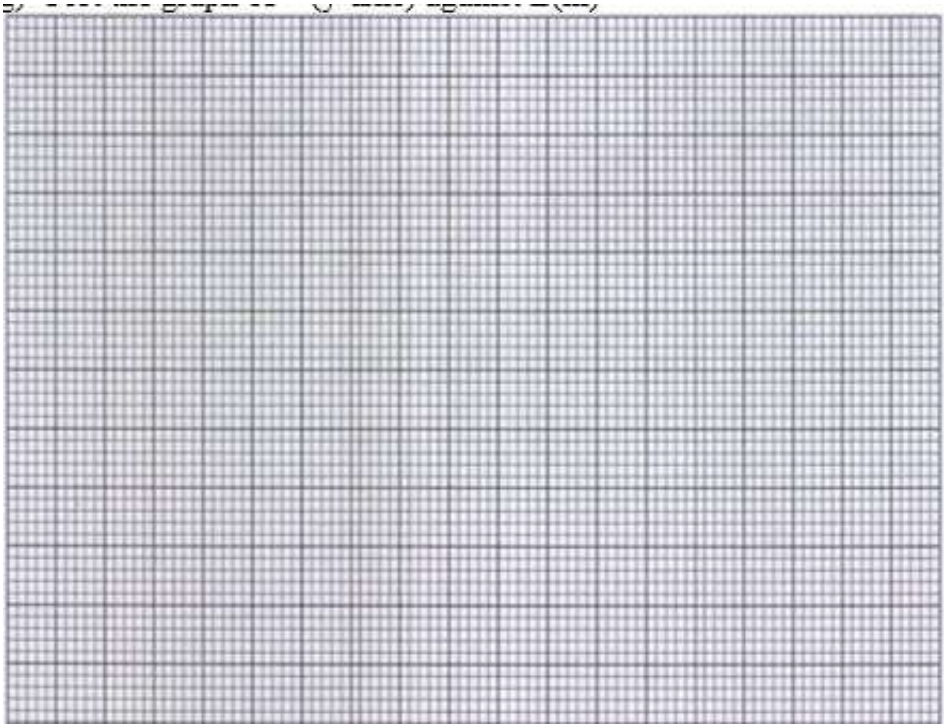
d) Starting with L=0.20M, close the circuit and read the milliameter

e) Repeat the procedure (d) for other values of L shown in the table.

f) Fill the table.

L(cm)	0.10	0.20	0.40	0.60	0.80	0.90
I(A)						
$\frac{1}{I}(A^{-1})$						

g) Plot the graph of $\frac{1}{I}$ (L)



h) Use the graph to determine:

(i) The slope k
(ii) The y-intercept **M**.

i) The graph is related by the equation $\frac{1}{l} = kL + M$ where k and M are constants of the graph.

Calculate the value of resistivity ρ of the resistance wire given that $\frac{k}{M} = \frac{\rho}{AR}$ where R=10