P510/3
PHYSICS
Paper 3
Nov, 2024
2 ½ hours

ST LEOS COLLEGE, KYEGOBE

Uganda Advanced Certificate of Education

END OF YEAR EXAMINATIONS

S5 PHYSICS

Practical

(Principal Subject)

3 hours 15 minutes

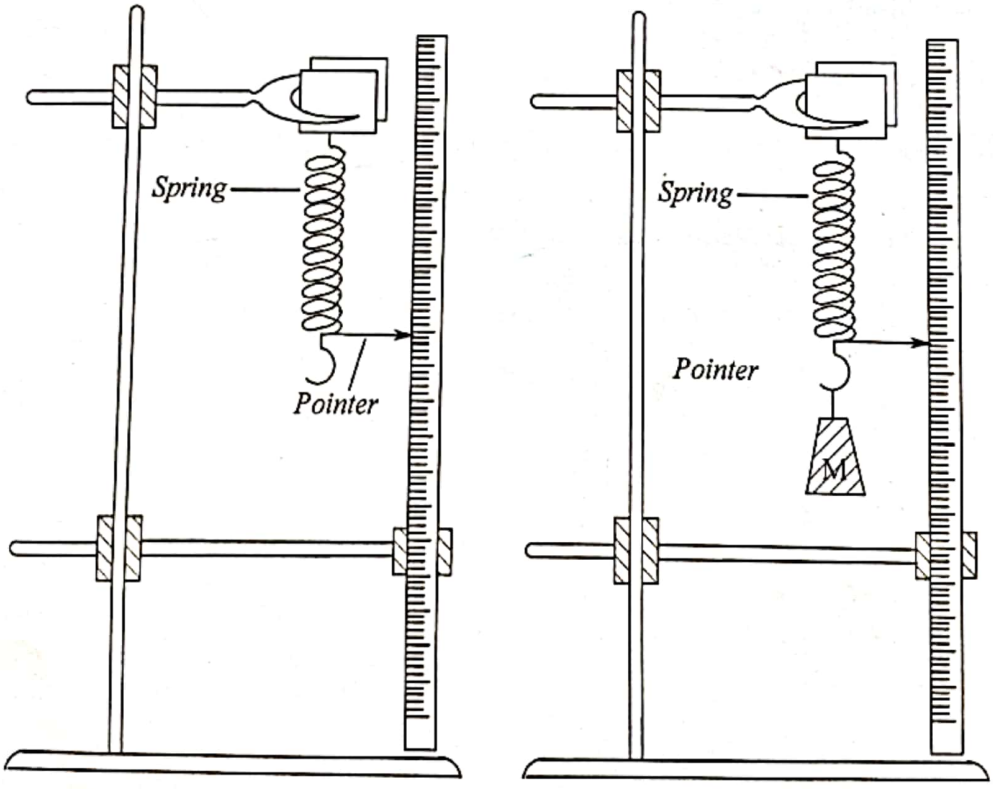
INSTRUCTIONS TO CANDIDATES:

Answer question 1 and any other 1 question.

1.

PART I

In this experiment you will determine the force constant, K for the spring provided.



a) Clamp the upper hook of the spring using the two pieces of wood provided as shown in the figure above.

b) Attach a pointer to the free end of the spring. Read and record the position, X_o (in metres) of the pointer on a vertical metre rule.

c) Suspend a mass, M, of 0.050 kg from the lower end of the spring.

d) Read and record the new end X (in metres) of the pointer.

e) Repeat the procedures (b) to (d) for values of $M = 0.100, 0.150, 0.200, 0.250,$ and $M = 0.100, 0.150, 0.200, 0.250,$ and 0.300kg.

f) Record all your values in a suitable table including values of $(X - X_o)$.

g) Plot a graph of $(X - X_o)$ against M.

h) Find the slope S_1, of the graph.

i) Determine the force constant, k, of the spring from $K = \frac{g}{S_1}$, where g is the acceleration due to gravity.

PART II

In this experiment you will determine the effective mass m_o, of the spring.

a) Suspend a mass M, of 0.050kg from the spring as in part I above.

b) Pull the mass vertically downwards through a small displacement and release it.

c) Measure the time, t, for 20 oscillations of the mass.

d) Repeat procedures (a) to (c) for $M = 0.100, 0.150, 0.200, 0.250,$ and 0.300kg.

e) Record all you're your values in a suitable table, including values of, $\frac{1}{f^2}$ where $f = \frac{20}{t}$.

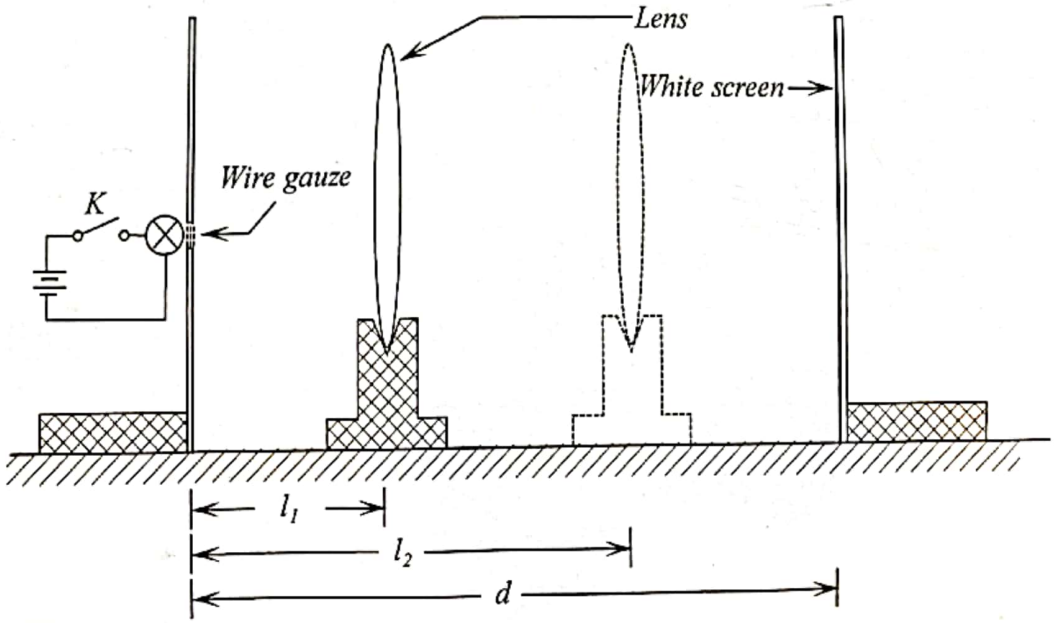
f) Plot a graph of $\frac{1}{f^2}$ against M.

g) Determine the slope, S_2 of the graph.

h) Determine from the graph the intercept, C, of the $\frac{1}{f^2}$- axis.

i) Calculate the effective mass m_o, of the spring from $m_o = \frac{C}{S_2}$.

2. **In this experiment you will determine the focal length, f of the lens provided.**



a) Arrange the bulb, wire gauze, lens and screen as shown in the figure below.

b) Adjust the screen so that distance $d = 70\,\text{cm}$.

c) Place the lens between the screen and the wire gauze and move it near the gauze to obtain a magnified image on the screen.

d) Measure and record distance l_1.

e) Keeping the gauze and the screen fixed move the lens towards the screen to obtain a sharp diminished image on the screen. Measure and record distance l_2.

f) Repeat procedures (b) to (e) for values of $d = 65,60,55,50$ and 45cm.

g) Record the results in a suitable table including values of d^2, $x = (l_2 - l_1)$, x^2 and $y = (d^2 - x^2)$.

h) Plot a graph y against d.

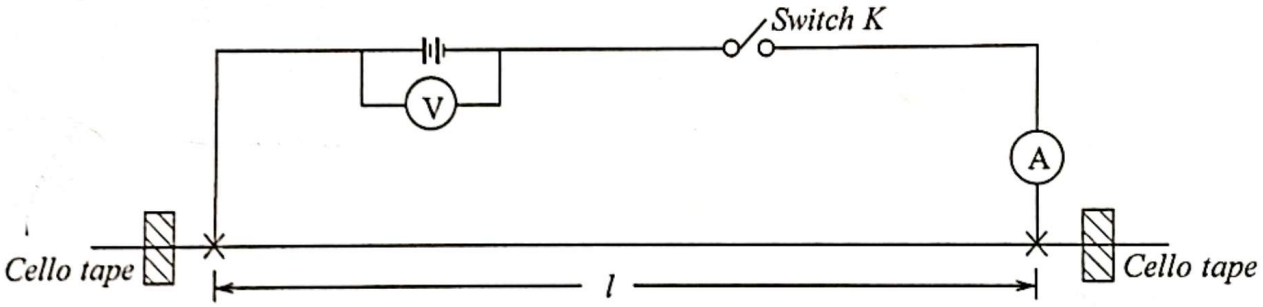
i) Find the slope S.

j) Find f from $4f = S$.

3. **PART I**

In this experiment you will determine the resistivity of the wire labeled P.

a) Connect the circuit as shown below starting with length $l = 0.100$m.



b) Record the value of V_o.

c) Close switch K.

d) Read and record the ammeter reading I.

e) Open Switch K.

f) Repeat the procedures (c) to (e) for values of $l = 0.200,0.300,0.400,0.500,0.600,0.700,0.800$ and 0.900m.

g) Tabulate your results in a suitable table including values of $\frac{l}{I}$.

h) Plot a graph of $\frac{l}{I}$ against l.

i) Determine the slope S_1 of your graph.

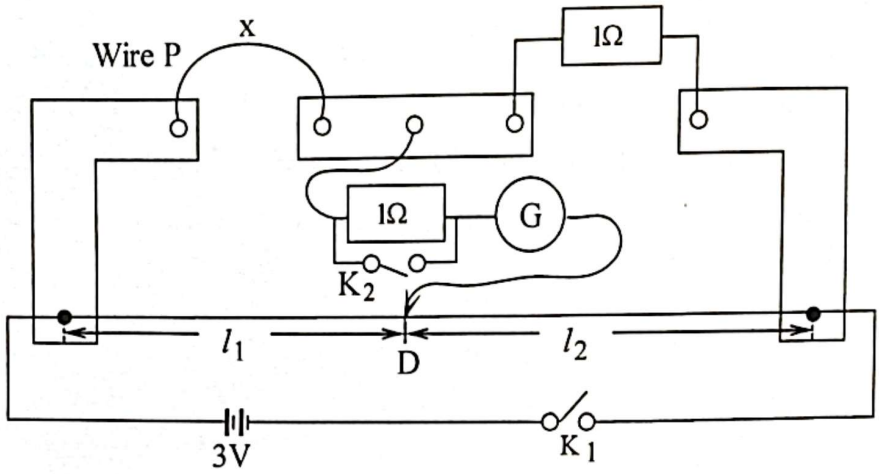
j) Determine the mean diameter, d, of the wire P, in metres.

k) Find the value of $\rho_1 = \frac{\pi S_1 d^2 V_o}{4}$.

PART II

In this experiment you will determine the resistivity of the wire labelled, P by another method.

a) Connect the circuit as below.



b) Starting with $x = 0.100\text{m}$, close switch K_1.

c) Move the sliding contact along the meter bridge wire to the point D where the galvanometer G shows shows no deflection. Close switch K_2 and find the balance point D accurately.

d) Measure and record the balance length l_1 and l_2.

e) Open switches K_1 and K_2.

l) Repeat procedures (b) to (e) for values of $x = 0.200, 0.300, 0.400, 0.500, 0.600, 0.700$ and 0.800m.

m) Tabulate your results including values of $R = 2\frac{l_1}{l_2}$.

n) Plot a graph of R against x and find the slope S_2 of the graph.

o) Find the value of ρ_2 from $\rho_2 = \frac{\pi S_2 d^2}{4}$

Where d is the diameter of the wire determined from part one.

END