UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE
General Certificate of Education Ordinary Level

PHYSICS 5054/3

PAPER 3 Practical Test

MAY/JUNE SESSION 2000 2 hours

Candidates answer on the enclosed answer booklet.
Additional materials:
As listed in Instructions to Supervisors
Electronic calculator and/or Mathematical tables
Graph paper

TIME 2 hours

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces provided on the answer booklet.

Answer **all** questions.

Write your answers in the spaces provided in the answer booklet.

For each of the questions in Section A, you will be allowed to work with the apparatus for a maximum of 20 minutes. For the question in Section B, you will be allowed to work with the apparatus for a maximum of 1 hour.

You are expected to record all your observations as soon as these observations are made. All of your answers should be written in the answer booklet; scrap paper should **not** be used.

An account of the method of carrying out the experiments is **not** required.

At the end of the examination, hand in only the answer booklet.

INFORMATION FOR CANDIDATES

Graph paper is provided in the enclosed answer booklet. Additional sheets of graph paper should be used only if it is necessary to do so.

Any additional sheets should be attached firmly to the answer booklet.

This question paper consists of 5 printed pages, 3 blank pages and an inserted answer booklet.

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Section A

Answer **all** questions in this section.

1 *In this experiment, you will determine the density of the material from which a bung is made.*

You have been given a bung and a mm scale. A top-pan balance is available.

(a) Take and record measurements to determine mean values for

(i) the largest diameter of the bung,

(ii) the smallest diameter of the bung,

(iii) the height h of the bung.

(b) Explain any special precautions which you took when determining the diameters.

(c) Calculate

(i) the mean diameter d of the bung,

(ii) the volume V of the bung given

$$V = \frac{\pi d^2 h}{4} .$$

(d) Using the top-pan balance, measure the mass m of the bung.

(e) Calculate the density of the bung, given

$$density = \frac{m}{V} .$$

2 *In this experiment, you will plot the magnetic field of a bar magnet.*

You have been provided with a bar magnet and a plotting compass.

(a) Place the middle of the bar magnet over the point X on page 4 of your Answer Booklet. The long edges of the magnet must be parallel to the side of your page and the north pole of the magnet pointing towards the top. Draw around the magnet to mark its position.

(b) Place your plotting compass close to, and to the left side of, the north pole of the magnet.

(i) Use it to trace the path of a field line from the north pole to the south pole. If your field line goes off the page, start at a point which is further down the left side of your magnet.

(ii) Mark the direction of the magnetic field line on your diagram.

(c) Explain how you plotted the field line in **(b)**.

(d) Repeat the procedure described in **(b)**,

(i) for a point which is on the right side of the north pole,

(ii) for two further points on the left side of the north pole,

(iii) for two further points on the right side of the north pole.

3 *In this experiment, you will determine the resistance of the filament of a lamp for a particular current.*

You have been provided with a power supply, a switch, a variable resistor, a lamp in a holder, a milliammeter, a voltmeter and connecting leads.

(a) Set up the circuit shown in Fig. 3.1.

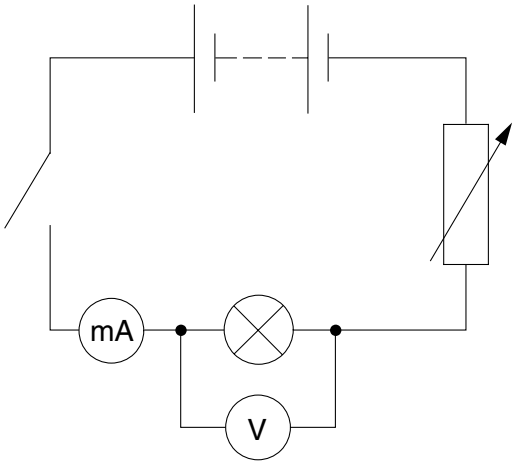

Fig. 3.1

(b) Adjust the variable resistor until the current I through the lamp is about 40 mA. Record this current and the voltage V across the lamp.

(c) Find the resistance R of the filament for this current using

$$R = \frac{V}{I} \ .$$

Section B

4 *In this experiment, you will investigate the motion of a sphere down a ramp.*

You have been provided with a ramp consisting of two metre rules a small distance apart. This is supported by a block of wood. You have also been provided with a glass sphere and a stopwatch.

(a) Place the glass sphere on the ramp with the centre of the sphere at the 40.0 cm mark.

(i) Release the sphere. Take and record measurements to determine the mean time t taken for the sphere to roll down the ramp and to hit the stop at the bottom.

(ii) Measure and record the distance d of the centre of the sphere from the bottom of the ramp when the sphere is in contact with the stop.

(iii) Hence determine the distance y travelled by the sphere as it rolls down the ramp.

(b) **(i)** Repeat the steps set out in **(a)** for a wide range of values of y greater than 40.0 cm.

(ii) Tabulate all your measurements, including your values of y and t.

(c) Plot a graph of y / cm (y-axis) against t / s (x-axis).

(d) Draw a smooth curve to fit the points on your graph.

(e) Determine the gradient of your graph at $y = 60.0$ cm.

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