Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

PHYSICS **9702/33**

Paper 3 Advanced Practical Skills 1 **October/November 2016**

CONFIDENTIAL INSTRUCTIONS

Great care should be taken to ensure that any confidential information given does not reach the candidates either directly or indirectly.

No access to the Question Paper is permitted in advance of the examination.

If you have any problems or queries regarding these Instructions, please contact CIE
by e-mail: info@cie.org.uk,
by phone: +44 1223 553554,
by fax: +44 1223 553558,
stating the Centre number, the nature of the query and the syllabus number quoted above.

This document consists of **7** printed pages and **1** blank page.

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Preparing apparatus

These Instructions detail the apparatus required for the experiments in the Question Paper. It is essential that absolute confidentiality is maintained in advance of the examination: the contents of these Instructions must not be revealed either directly or indirectly to candidates.

No access is permitted to the Question Paper in advance of the examination.

If you have problems or queries regarding these Instructions, please contact CIE:
by e-mail: info@cie.org.uk,
or by telephone: +44 1223 553554,
or by fax: +44 1223 553558,
stating the nature of the query and quoting the syllabus and paper numbers (9702/33).

It is assumed that the ordinary apparatus of a Physics laboratory will be available.

Number of sets of apparatus

The number of sets of apparatus provided for each experiment should be $\frac{1}{2}N$, where N is the number of candidates taking the examination. There should, in addition, be a few spare sets of apparatus available in case problems arise during the examination.

Organisation of the examination

Candidates should be allowed access to the apparatus for each experiment for one hour only. After spending one hour on one experiment, candidates should change over to the other experiment. The order in which a candidate attempts the two experiments is immaterial.

Assistance to Candidates

Candidates should be informed that, if they find themselves in real difficulty, they may ask the Supervisor for practical assistance, but that the extent of this assistance will be reported to the Examiner, who may make a deduction of marks.

Assistance should only be given:
when it is asked for by a candidate,
or as directed in the Notes sections of these Instructions,
or where apparatus is seen to have developed a fault.

Assistance should be restricted to enabling candidates to make observations and measurements. Observations and measurements must not be made for candidates, and no help should be given with data analysis or evaluation.

All assistance given to candidates must be reported on the Supervisor's Report Form.

Faulty apparatus

In cases of faulty apparatus (not arising from a candidate's mishandling) that prevent the required measurements being taken, the Supervisor may allow extra time to give the candidate a fair opportunity to perform the experiment as if the fault had not been present. The candidate should use a spare copy of the Question Paper when the fault has been rectified or when working with a second set of apparatus.

Supervisor's Report

The Supervisor should complete the Supervisor's Report Form on pages 7 and 8 and enclose it in the envelope containing the answers of the candidates. If more than one envelope is used, a copy of the report must be enclosed in each envelope.

Question 1

Apparatus requirements (per set of apparatus unless otherwise specified)

Low voltage power supply fixed at 1.5 V or 2 V d.c., or 1.5 V dry cell with terminals.

Card giving the value of the e.m.f. *E* of the power supply to the nearest 0.01 V as shown in Fig. 1.1.

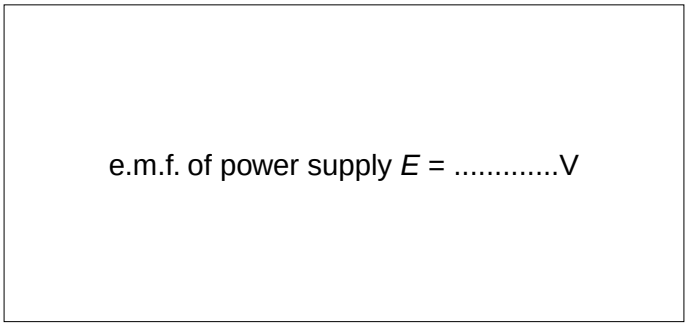

Fig. 1.1

Digital ammeter set to the range 0–200 mA reading to the nearest 0.1 mA.
If a digital multimeter is used, the range should be fixed and any unused terminals should be covered.

10 Ω resistor in a component holder labelled X. See Note 1.

Another component holder labelled R.

Resistors with values 10 Ω, 12 Ω, 15 Ω, 18 Ω, 22 Ω, 27 Ω and 33 Ω with their values clearly labelled. See Note 2.

Small container for the resistors.

Metre rule with a millimetre scale. See Note 3.

110 cm length of 36 swg constantan wire. See Note 3 and Note 4.

Two crocodile clips.

Seven connecting leads.

Switch.

Notes

1 The resistor should have a minimum power rating of 0.25 W and a maximum tolerance of 5% (e.g. RS Components product code 385-932). Tape should be used to hide the value of its resistance.

2 All resistors should have the same power rating and tolerance as the 10 Ω resistor in Note 1.

3 The wire should be attached to the metre rule as shown in Fig. 1.2.
The wire should be firmly taped and as free from kinks as possible.

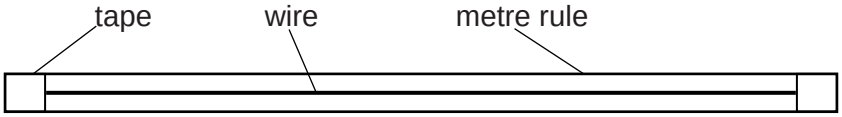

Fig. 1.2

4 If 36 swg constantan wire is not available, use one of the following:

34 swg constantan wire
38 swg constantan wire
30 swg nichrome wire
32 swg nichrome wire
34 swg nichrome wire.

5 The apparatus should be laid out on the bench. If the apparatus is to be used by another candidate, then it should be dismantled and restored to its original state.

Information required by Examiners

Sample set of numerical results, clearly labelled “Supervisor’s Results” and obtained out of sight of the candidates by the Supervisor, who should be a teacher of Physics or other competent physicist.

Question 2

Apparatus requirements (per set of apparatus unless otherwise specified)

Stand.

G-clamp suitable for securing the base of the stand to the bench.

Two bosses.

Expendable spring with approximate outside diameter 15 mm, approximate coiled length 20 mm and approximate spring constant 25 N m^{-1} (e.g. Philip Harris product code B8G87194).

Wooden rod with approximate diameter 1.2 cm and approximate length 30 cm. See Note 1.

100 g mass hanger.

Three 100 g slotted masses.

Metre rule with a millimetre scale.

String of approximate length 2 m.

Scissors.

Stopwatch reading to 0.1 s or better.

Notes

1 It must be possible for a loop of the spring to fit on the wooden rod.

2 The apparatus should be laid out on the bench. If the apparatus is to be used by another candidate, then the string should be removed and a new length of string provided.

Information required by Examiners

Sample set of numerical results, clearly labelled “Supervisor’s Results” and obtained out of sight of the candidates by the Supervisor, who should be a teacher of Physics or other competent physicist.

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This form should be completed and sent to the Examiner with the scripts.

SUPERVISOR'S REPORT FORM

The Supervisor's Report should give full details of:

(a) any help given to a candidate (including the nature of the help given and the name and candidate number of the candidate);

(b) any cases of faulty apparatus (including the nature of the problem, the action taken to rectify it, any additional time allowed, and the name and candidate number of the candidate);

(c) any accidents that occurred during the examination;

(d) any other difficulties experienced by candidates, or any other information that is likely to assist the Examiner, especially if this information cannot be discovered in the scripts.

Cases of individual hardship, such as illness, bereavement or disability, should be reported direct to CIE on the normal Special Consideration form.

Information required by Examiners

For each question, please enclose a sample set of numerical results, obtained out of sight of the candidates and clearly labelled "Supervisor's Results".

Supervisor's Report

Supervisor's Report (continued)

Declaration
(to be signed by the Supervisor)

The preparation of this practical examination has been carried out so as to maintain fully the security of the examination.

Signed .....

Name .....

Centre number .....

Name of Centre .....