UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

BIOLOGY 9700/03

Paper 3 Practical Test AS

May/June 2005

CONFIDENTIAL INSTRUCTIONS

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

Instructions for preparing apparatus

These instructions give details of the apparatus required by each candidate for each experiment in this paper. A summary of the questions that will be presented to the candidates is included, where appropriate, to allow the Biology teacher to test the apparatus appropriately. **No access to the question paper is permitted in advance of the examination session**.

If a candidate breaks any of the apparatus, or loses any of the material supplied, the matter should be rectified and a note made in the Supervisor's Report.

Candidates must be provided with a microscope with:

- Low-power objective lens, e.g. × 10 (equal to 16 mm or $\frac{2}{3}$″)
- High-power objective lens, e.g. × 40 (equal to 4 mm or $\frac{1}{6}$″)
- Eyepiece graticule fitted within the eyepiece and visible in focus at the same time as the specimen.

Each candidate must have sole, uninterrupted, use of the microscope for at least 35 minutes.

Supervisors are advised to remind candidates that **all** substances in the examination should be treated with caution. Pipette fillers and safety goggles should be used where necessary.

In accordance with the COSHH (Control of Substances Hazardous to Health) Regulations, operative in the UK, a hazard appraisal of the examination has been carried out.

The following codes are used where relevant.

C = corrosive substance

F = highly flammable substance

H = harmful or irritating substance

O = oxidising substance

T = toxic substance

If you have any problems or queries regarding these Instructions, please contact CIE
by e-mail: International@ucles.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 **3** printed pages, **3** blank pages and a report.

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Centres are reminded that under no circumstances can the papers be opened before the start of the Practical Test.

Each candidate must be provided with the following apparatus and materials.

To be supplied by the Centre

Question 1

Each candidate will require:

(i) one large test-tube (sometimes termed a boiling tube) containing a 2 cm depth of distilled water, labelled **S1**.

[H] (ii) Three large test-tubes each labelled **S2** and each containing a 2 cm depth of a solution of bacterial protease or trypsin or any other suitable protease enzyme with an optimum pH approximately between 7 and 8.5 (pepsin would **not** be suitable). The pH of this enzyme solution should be measured and should be not less than pH7. The solution should be made up according to the manufacturers instructions with distilled/deionised water. If there are no instructions provided, 1 g of enzyme powder should be dissolved in 80 cm^3 of water and made up to 100 cm^3. It should be possible to keep this enzyme solution in a refrigerator overnight.

(iii) Four 40 mm lengths of glass capillary tube, each filled with boiled egg white (albumin). Capillary tube (with an internal diameter between 0.3 and 1.2 mm) may be available in various lengths that can readily be cut up into pieces short enough to fit into a large vessel of boiling water, or melting point tubes may be used.

The fresh, unboiled egg white is drawn up into the capillary tube, for example using a pipette filler, until the capillary tube is entirely full, and free of bubbles. These full capillary tubes should then be placed in boiling water until the transparent egg white can be seen to have gone white. The capillary tubes can then be removed from the water and allowed to cool. They should be scored, for example with a sharp file or glass cutter, at 40 mm intervals and then snapped into separate 40 mm lengths.

The stock of enzyme powder should be kept cool, but not frozen, and tested well in advance of the examination, so that it can be replaced if necessary.

To test the enzyme, gently boil an egg, and cut a small cube of hardened egg white, 3 mm $\times$ 3 mm $\times$ 3 mm. Place this into a solution of the enzyme, made up as above, and shake every minute. The cube of egg white should break down and dissolve within 10 minutes.

If the end point is not reached within 10 minutes, then the concentration of the enzyme being tested could be doubled, or increased by five times, and this higher concentration used in the examination. If the end point is still not reached within 10 minutes fresh protease must be obtained.

Centres are advised to test the enzyme well before the examination. Any changes in concentrations that are made should be fully recorded on the Report Form on the back of the first script in each packet.

(iv) Access to two waterbaths, one at 35 °C, the other at 45 °C. These could be thermostatically controlled waterbaths, or troughs, bowls or large beakers of water, containing a means to support the large test-tubes used in the experiment. The water may need to be heated in cool environments (e.g. by using hot tap water, a burner or kettle), or cooled in warm environments (e.g. by using a refrigerator or providing ice). These waterbaths could be shared between two or more candidates if necessary, but every effort should be made to minimise sharing and to plan the careful supervision of candidates sharing waterbaths.

(v) 1 mol dm^{-3} HC*l* with dropping pipette labelled **dilute acid**.

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(vi) Universal indicator paper and pH reference chart.

(vii) Thermometer to measure between 0–60 °C.

(viii) A square of black or dark coloured card, 30 mm × 30 mm.

(ix) A stopclock or stopwatch or sight of a clock with a second hand.

(x) Distilled water with dropping pipette, labelled as **distilled water**.

(xi) Paper towel.

(xii) Ruler, measuring in mm.

(xiii) Wax pencil or other means of marking glassware.

Question 2

In addition, each candidate will require:

(i) Slide **K1**, supplied by Cambridge.

(ii) A microscope with:

- Low-power objective lens, e.g. × 10 (equal to 16 mm or $\frac{2}{3}''$)
- High-power objective lens, e.g. × 40 (equal to 4 mm or $\frac{1}{6}''$)
- Eyepiece graticule fitted within the eyepiece and visible in focus at the same time as the specimen.

MATERIALS TO BE SUPPLIED BY CAMBRIDGE

(i) Question papers.

(ii) Slide **K1** (question 2 and shared between two candidates).

RETURN OF EXAMINATION MATERIALS TO CAMBRIDGE

Immediately after the examination, microscope slides **must** be returned to CIE in the containers in which they were received, using the self-adhesive label for the parcel. They must **not** be included in the parcel of scripts. It may be possible to buy the slides, in which case an order form will be enclosed with the slides, and should be returned to CIE using the self-adhesive label for the letter. Slides and containers not returned in good condition will be charged at a rate of £3 per item to which may be added administrative costs.

REPORT FORM

The teacher responsible for the examination is asked to fill in the Report Form attached to these instructions. For Centres where more than one script envelope is used, there must be a copy of the complete Report Form in each script packet.

These report forms are vital in order to allow the examiners to assess all candidates as fairly as possible. The Report Form should always be completed by every Centre. Please include information relevant to all candidates, and also to individual candidates.

A copy of the seating plan for the examination room must also be enclosed in each script envelope.

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

REPORT ON PRACTICAL BIOLOGY

A Level

May/June Session 2005

The Supervisor or Teacher responsible for the subject should provide the following information.

1. Was any difficulty experienced in providing the necessary materials? If so, give brief details.

2. Give details of any difficulties experienced by particular candidates, giving names and candidate numbers. Reference should be made to:

(a) difficulties arising from faulty specimens or microscopes;

(b) accidents to apparatus or materials;

(c) assistance provided in case of colour-blindness;

(d) any other information that is likely to assist the Examiner, especially if this cannot be discovered from the scripts.

All other cases of individual hardship, e.g. illness or disability, should be reported direct to CIE on the normal 'Special Consideration Form' as detailed in Part 6 of the Handbook for Centres.

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3. Enclose a plan of work benches with the scripts, giving details of the candidate numbers of the places occupied by the candidates for each session. The space below can be used for this, or it may be on separate paper.

Declaration (to be signed by the Principal)

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

Signed .....

Name (in block capitals) .....

Centre number .....

Centre name .....

If scripts are required by CIE to be despatched in more than one envelope, it is essential that a copy of the relevant Supervisor's report and the appropriate seating plan(s) are sent inside **each envelope**.

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