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1966

OXFORD LOCAL EXAMINATIONS



GENERAL CERTIFICATE OF EDUCATION

1966

REGULATIONS

Internationales Schulbuchinstitut

Braunschweig

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NOTES

1. In view of the possibility of increased expenditure, the Delegates reserve the right to increase any of the fees in connexion with their examinations.
2. All payments to the Delegates must be made by cheque, money order, or postal order, payable to The Secretary of Local Examinations, Oxford, and crossed. Stamps, coins, and notes cannot be accepted.
3. Attention is called to the calendar on p. 4. The dates given there are fixed as late as possible consistent with making the necessary arrangements. Failure to observe these dates would cause considerable dislocation of work, and fees for late entries cannot be excused.
4. Any inquiries about exemption from the examinations of universities and other public bodies must be addressed to the proper official of the body concerned and not to the Secretary to the Delegates.
5. Prescribed books should be ordered early, and the order maintained with a bookseller until they are supplied. Cases of difficulty should be brought **promptly** to the notice of the Secretary to the Delegates, who is in constant touch with publishers and can often help.
6. Advertisements for books are included at the back of these Regulations for the convenience of schools and publishers. Mention of a book in these advertisements does not imply recommendation of it by the Delegates.

REVISED AND ADDITIONAL SYLLABUSES

7. There have been changes in a number of syllabuses, including substantial changes in the following: Greek History O* 12, Roman History O* 13, History (British and Foreign) O 34, Religious Knowledge O 41 and O 42, Physics O 54, Chemistry O 55, Ancient History A 12, British Constitution A 36.
8. In Biology O 62 at Ordinary Level one paper only (2½ hours) will be set.
9. An additional option, II G, has been introduced into English Literature at Advanced Level A 3, Paper II.
10. Any changes which are found necessary in these Regulations for 1966 will be recorded in a Supplement which will be printed at Easter 1965 and sent automatically to all schools from which candidates are entered in 1965. Others interested should write early in May 1965 to the Secretary, Delegacy of Local Examinations, Oxford, asking for a copy and enclosing a stamped addressed foolscap envelope.

ATTENTION IS CALLED TO §2 ON PAGE 5 CONCERNING
ADMISSION TO THE EXAMINATION.

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CALENDAR OF IMPORTANT DATES

Dec. 1965	Final applications for the setting of alternative papers or papers on specially-approved syllabuses for the Summer Examination must be made during this month. (See § 6, p. 7.)
	Notification about stage design in Design in Art at Advanced Level (see p. 81) must be made during this month.
1 Feb. 1966	Preliminary entry for oral examinations for all candidates entering for French, German, Spanish, Italian, or Russian in the Summer Examination must be made to Oxford by this date.
1 Feb. 1966	Preliminary entry forms E/Ds for practical tests in Domestic Subjects in the Summer Examination must reach Oxford by this date. (See pp. 50 and 78.)
18 Mar. 1966	Forms E/M/O & E/M/A in connexion with entry for Music at Ordinary and at Advanced Level in the Summer Examination must reach Oxford by this date. (See pp. 51 and 80.)
18 Mar. 1966	Broadsheet entry forms and fees for the Summer Examination must reach Oxford by this date. (See § 8, p. 8.)
19 Apr. 1966	No entries for the Summer Examination can be accepted after this date. (See § 9, p. 8.)
14 May 1966	Specimens of work in connexion with Design in Art at Advanced Level must reach Oxford by this date. (See p. 81.)
1 June 1966	The Summer Examination begins.
June 1966	Final applications for the setting of alternative papers or papers on specially-approved syllabuses for the Autumn Examination must be made during this month. (See § 6, p. 7.)
1 Oct. 1966	Preliminary entry for oral examinations for all candidates entering for French, German, Spanish, Italian, or Russian in the Autumn Examination must be made to Oxford by this date.
1 Oct. 1966	Preliminary entry forms E/DS for practical tests in Domestic Subjects at Ordinary Level in the Autumn Examination must reach Oxford by this date. (See p. 50.)
5 Oct. 1966	Forms E/M/O in connexion with entry for Music at Ordinary Level in the Autumn Examination must reach Oxford by this date. (See p. 51.)
5 Oct. 1966	Broadsheet entry forms and fees for the Autumn Examination must reach Oxford by this date. (See § 8, p. 8.)
26 Oct. 1966	No entries for the Autumn Examination can be accepted after this date. (See § 9, p. 8.)
21 Nov. 1966	The main Autumn Examination begins. (Some practical papers and papers on specially-approved syllabuses may be set in the previous week. See § 6, p. 7.)

GENERAL REGULATIONS

§ 1. GENERAL SCOPE OF EXAMINATION

The examination is conducted by the Oxford Delegacy of Local Examinations. It is approved by the Ministry of Education, and certificates are endorsed by the Ministry. The Delegacy works in close consultation with the Joint Committee of the Four Secondary Teachers' Associations. The examination is intended, normally, to test the work of pupils between the ages of sixteen and nineteen.

By a rule of the Ministry of Education, nobody may become a candidate for either examination in 1966 unless his or her sixteenth birthday falls on or before 2 September 1966, except that the Head of a school may enter a pupil who is below the stated age if he or she certifies:

- (a) that it is educationally desirable that the pupil should take the examination in the subjects offered at the time proposed, and
- (b) that the pupil has pursued a course of study with such a degree of competence as to make a pass very probable in the subjects offered.

These rules about age of entry apply to all candidates, whether in England and Wales or elsewhere.

There is no upper age limit; candidates need not have previously passed any examination.

The full examination is held once a year only, in the Summer. There is also an examination in the Autumn (Nov.-Dec.) at which certain Ordinary Level papers only are set. (See § 5 (f), p. 7.) Provisional time-tables for the examinations are

printed on pp. 82-88. The Delegates do not guarantee that any examination will be held.

§ 2. ADMISSION TO EXAMINATION

Candidates must normally be in attendance at a school which is approved by the Delegates as a centre. They must be entered by the Head of the school who must make arrangements for the conduct of the examination.

Application for approval of a school as a centre for the examination must be made by the Head as soon as it becomes clear that it may be desired to enter candidates from the school. It must not be assumed beforehand that the application will be allowed. Renewal of approval of a centre is necessary when there is a change of Head of the school. The Delegates do not guarantee that an examination will be held at any centre which has been approved, and they accept no responsibility for the failure of a Head of a school to make proper arrangements for the conduct of an examination.

The Head of the school is held generally responsible for the conduct of the examination, including custody of the question papers and the arrangements for invigilation.

Candidates may be charged a small local fee by the Head of the school to cover expenses incurred in conducting the centre. This local fee must be kept as low as possible and its amount must be approved by the Delegates.

The Delegates reserve the right to inspect any centre without notice during the examination and to discontinue the approval of any centre without stating a reason.

Heads of schools may without reference to Oxford admit to their centres any former pupils of the school who need, for the purpose of their careers, to take additional subjects, provided that these former pupils are not in attendance at any educational institution which enters its pupils for the General Certificate of Education examination of another Board. A list of former pupils so admitted is to be submitted with the entry forms. No other external candidates may be admitted without reference to Oxford, and permission will be given only in very exceptional circumstances.

§ 3. REGULATIONS

A certain number of copies of the Regulations, depending on the number of entries for the examination in the year preceding publication, is issued free to schools. Apart from these, copies may be obtained only on prepayment¹ at the rate of 2s. 6d. per copy.

Applications for Regulations, and any inquiries about the interpretation of the Regulations, must be addressed to the Secretary at Oxford.

§ 4. SCHOLARSHIPS

The Delegates do not themselves award any scholarships on the results of their examinations. At the request of awarding bodies they are prepared to make reports to them in connexion with the award of scholarships. No correspondence about the award of such scholarships can be conducted with candidates or with their teachers. Any inquiries must be addressed to the awarding authority. Inquiries about scholarships awarded by Local Education Authorities must be addressed to the Education Officer concerned.

Awarding bodies who desire the Delegates to make reports on candidates for scholarships should make early application to Oxford.

§ 5. SUBJECTS OF EXAMINATION

Papers are set at two Levels, Ordinary and Advanced, on the subjects listed on pp. 12 and 13. In some subjects alternative Ordinary Level syllabuses are provided. The standard of work required for a pass at Ordinary Level is the same for all syllabuses.

At Ordinary Level results are announced to schools in grades 1-9, grade 1 being the highest passing grade, and grade 6 the lowest passing grade. Grades 7-9 are grades of failure. At Advanced Level candidates who pass are put in one of five grades, A, B, C, D, E, grade A being the highest passing grade and grade E the lowest passing grade; candidates who fail are allowed a pass at Ordinary Level if they reach a sufficient standard.

¹ See note 2 on p. 1.

In most Advanced Level subjects, in addition to the normal Advanced Level papers, Special papers are set to enable candidates of high ability to show their merit. These Special papers should be taken only by candidates who are likely to do very well in them.

Candidates may take Special papers in one or in two subjects but not in more than two. In each subject in which Special papers are taken the normal Advanced Level papers must also be taken.

In addition to the grade given on the normal Advanced Level papers in a subject, candidates who reach a sufficient standard on the Special paper are given one of two supplementary grades, Distinction or Merit, provided that they are placed in Grade A, B, or C on the normal Advanced Level papers in that subject in the same year. In general these supplementary grades will be awarded on the Special paper alone but in deciding the supplementary grade in science subjects the practical paper will be taken into consideration in conjunction with the Special paper.

Further particulars are given in the syllabuses for individual subjects and in §§ 10 and 11.

Apart from the exceptions listed in (a) to (f) below, there is no restriction on the subjects or on the number of subjects for which a candidate may enter. No subject is compulsory.

(a) A candidate may not be entered at the same examination for the same subject at different Levels, unless, in exceptional cases, special permission is obtained from Oxford. Where the syllabuses of subjects overlap, the interpretation of this regulation is governed by the following rules:

- (i) English Language at Ordinary Level may be taken with any other subject, e.g. with English Literature at Advanced Level.
- (ii) History at Advanced Level may not be taken with any History subject at Ordinary Level except History (British Social and Economic) and History (British Empire and Commonwealth).
- (iii) Economic History at Advanced Level may be taken with any History subject at Ordinary Level except History (British Social and Economic).
- (iv) Chemistry-with-Physics at Ordinary Level may not be taken with either Chemistry or Physics at Advanced Level.
- (v) Biology at Ordinary Level may not be taken with either Botany or Zoology at Advanced Level. Human Biology and Hygiene may be taken with any subject.
- (vi) General Science at Ordinary Level may not be taken with more than one of Physics, Chemistry, and Biology at Advanced Level. General Science may be taken with Botany and Zoology at Advanced Level provided that neither Physics nor Chemistry is taken at Advanced Level at the same examination.

(b) Special conditions, stated in the syllabuses concerned, attach to entry for some subjects.

(c) Heads of schools wishing to enter candidates for papers set at overlapping times in the time-table must give notice of their intention to do so before commencing the courses. In such cases the Delegates never allow papers to be worked on dates other than those prescribed in the time-tables, but they are prepared to consider a proposal for a change of time-table on a particular day at a centre on the following conditions:

- (i) The change of time-table must apply to all candidates at the centre taking the papers concerned.
- (ii) These candidates must be kept under supervision during any interval between the prescribed time and the actual time of working the papers.
- (iii) No copies of the question papers concerned must leave the examination room until the end of the day.
- (iv) The prescribed duration of the papers must be maintained.
- (v) The consent of the Secretary at Oxford must be obtained.

If such a rearrangement is impossible, it may be necessary for Heads of schools to apply for alternative papers (see § 6, p. 7).

(d) Heads of schools who cannot provide adequate accommodation and equipment must not enter candidates for any subject which includes a practical test requiring the use of a domestic subjects room, or of a workshop, or of a laboratory, or of a piano. The Delegates do not accept any responsibility for the adequacy of the accommodation or of the equipment.

(e) Heads of schools are required to sign a declaration that no candidate entered by them is taking the same or similar subjects in the General Certificate of Education with any other Examining Board in the same term. In this context 'similar' subjects means subjects with a substantial overlap of syllabus.

(f) In the Autumn Examination, papers are not set at Advanced Level, but only on those Ordinary Level syllabuses which are not marked with an asterisk.

§ 6. ALTERNATIVE PAPERS AND SPECIALLY-APPROVED SYLLABUSES

The Delegates are prepared to consider applications from Heads of schools desiring to enter candidates for papers on alternative syllabuses or in subjects other than those listed on pp. 12 and 13. Syllabuses must be submitted for approval before the pupils begin the course. A final application for the setting of the papers, accompanied by a statement of the probable number of candidates for them, and by any special fee¹ required by the Delegates, must be made during the previous December for the Summer Examination, and during the previous July for the Autumn Examination. For each specially-approved Ordinary Level subject a fee of £4, and for each specially-approved Advanced Level subject a fee of £8, is payable by each school entering candidates for it. No part of this fee is returnable, but it is excused in the case of any school entering ten or more candidates for the subject. The normal subject entry fee is also payable at the time of entering. Before agreeing to set papers on a specially-approved syllabus for a few candidates, the Delegates may require evidence that the candidates are likely to reach a reasonable standard. In the Summer Examination papers on specially-approved syllabuses are worked during the period of the main examination; in the Autumn Examination they may be worked either in the period of the main examination or in the week preceding it. The times are notified to schools a few weeks before the examination, and Heads of schools must be prepared to arrange for the papers to be worked on the dates allocated. If no paper on a specially-approved syllabus has been previously arranged for the Autumn Examination, the Delegates do not arrange for one to be set for candidates who failed in this subject in the Summer Examination.

The regulations set out in the preceding paragraph apply also to applications for alternative papers necessitated by overlap in the time-table.

In Chemistry, Woodwork, Metalwork, and Needlework at Ordinary Level and in Physics, Chemistry, Botany, Zoology, and Biology at Advanced Level, alternative practical papers are provided for those schools which find it difficult to accommodate all their candidates on one day. Heads of schools who wish to enter some of their candidates for one or more of these alternative papers (apart from Needlework) must give notice during the December preceding the examination, stating the approximate number of candidates who will be presented for the normal and for the alternative paper in each subject. Application for the alternative practical paper in Needlework must be made on form E/DS. The alternative practical papers are distinguished by the letter X after the number of the paper, the times for their working being printed in the time-table on p. 82. The candidates who are to take these alternative papers must be specified on the broadsheet entry form.

§ 7. FEES

The entry fee for each candidate, excluding any local fee, is 15s. together with 10s. for each subject at Ordinary Level, £1. 5s. for each subject at Advanced Level, and 10s. for the Special paper in an Advanced Level subject.

A cheque for the entry fees must be sent to Oxford by the Head of the school, or by the Local Authority responsible, at the time the broadsheet entry forms are sent to Oxford. Delay in the receipt of fees may result in the payment of late fees.

¹ See note 2 on p. 1.

No fee can be carried to the credit of a candidate at a subsequent examination. If a candidate is unable to take or to complete the examination on account of illness, an application may be made for part of the entry fee to be refunded. The amount of fee refunded for each subject not taken or completed, in cases approved by the Delegates, is £1. 5s. for subjects at Advanced Level, and 10s. for subjects at Ordinary Level. Applications must be sent to Oxford before the close of the examination period and must be supported by a medical certificate. Late fees, fees for Special papers, and fees for papers on specially-approved syllabuses are not refunded, and Heads of schools are not expected to refund any local fees already paid to them.

§ 8. ENTRIES

There are no separate entry forms for individual candidates. The Head of the school must submit entries on broadsheet entry forms, supplied from Oxford. The entries of any external candidates for whom permission to enter at a school has been obtained from Oxford must be included by the Head of the school with the entries of his own pupils.

The broadsheet entry forms and fees must be received at Oxford not later than **18 March** for the Summer Examination and not later than **5 October** for the Autumn Examination.

§ 9. LATE ENTRIES: ALTERATION OF ENTRIES

After the date prescribed in § 8 for the return of entries, no new entry can be accepted and no entry already made can be altered, transferred to another centre, or withdrawn, except as provided for in this section.

(a) *Late entries.* Late entries must be submitted by a Head of a school on a special form obtained from Oxford. They cannot be accepted after 19 April for the Summer examination or after 26 October for the Autumn Examination. They must be accompanied by the entry fee and by a late fee on the following scale:

		<i>Date of receipt of entry and fee at Oxford</i>	<i>Late fee</i>
Summer Examination	. . .	by 1 April	£1
		by 19 April	£2
Autumn Examination	. . .	by 18 October	£1
		by 26 October	£2

(b) *Alteration of entry, and withdrawal.* Any request for an alteration in an entry made after the final closing date for late entries must be accompanied by a fee¹ of 5s. for each candidate concerned (in addition to any extra entry fee required for additional subjects). The alteration is made if time permits. If not, the fee paid for it is refunded. No refund of fee for withdrawal of a complete entry or of part of an entry can be made after the final closing date for late entries, except as provided for in the last paragraph of § 7.

(c) *Transfer of entries.* A candidate who, after entering for the examination, leaves the school attended at the time of entering and wishes to take the examination elsewhere, should write to the Secretary at Oxford giving full particulars.

§ 10. NOTIFICATION OF RESULTS

The Ordinary Level results are issued at the end of August for the Summer Examination and about the middle of January for the Autumn Examination. Advanced Level results are issued in mid-August. Early information about the results of individual candidates cannot be given.

¹ See note 2 on p. 1.

Printed lists of successful candidates are not published. Statements of the results of all candidates are sent to the Head of the school at which they have taken the examination, for communication to them. Every effort is made to secure the accuracy of these statements, but they are not of the nature of certificates. They show the final grade gained by each candidate in each subject taken. For a subject at Ordinary Level the results of candidates who pass are given in grades 1 (top grade)–6, and of those who fail in grades 7–9 (lowest grade). For a subject at Advanced Level the result given is one of the grades A (top grade), B, C, D, E (lowest grade of pass at Advanced Level), O (pass at Ordinary Level), or F (fail). The statement of results also indicates whether the candidate has taken Special papers and the result—Distinction, Merit, or, if neither of these grades is awarded, Unclassified. No further information can be given about a candidate's performance than is contained in these statements.

Any statement concerning the work of a candidate at Advanced Level issued to a University or other body requiring it will contain all the information contained in the statement of results sent to the school, including, if applicable, the result 'fail' on the normal Advanced Level papers and the result 'unclassified' on the Special paper.

§ 11. CERTIFICATES

A General Certificate of Education is issued for each examination to every candidate who reaches pass standard in any subject at Ordinary or at Advanced Level. The certificates show the subjects in which the candidate has secured a pass at Ordinary Level, the grade awarded in each subject in which the candidate passes at Advanced Level, and the subjects in which the candidate has been awarded the grade Distinction or Merit on the Special papers. In a subject in which a candidate has taken the Special paper but has not been awarded either of the grades Distinction or Merit, no entry is made for the Special paper on the certificate.

Candidates who enter for a subject at Advanced Level, and who fail to reach the pass standard at Advanced Level, have a pass at Ordinary Level recorded on their certificates if they reach this standard. The subject is recorded under the name by which it is known at Advanced Level.

A fresh certificate is issued to each candidate for each examination in which the pass standard at any level is reached in any subject. Results of one examination cannot be endorsed on a previous certificate or carried forward to a subsequent examination.

The certificates are sent to Heads of schools for distribution not later than the end of November (for the Summer Examination), and not later than the end of February (for the Autumn Examination). Certificates are the final report on the work of the candidates and should be distributed to them without delay. In the event of delay in the distribution at any centre, application must be made to the Head of the school, and not to Oxford. The early dispatch of certificates for distribution at prize-givings, or for other reasons, is not practicable, and requests for this cannot be granted.

Duplicates of certificates can be supplied only in very exceptional circumstances.

§ 12. DUPLICATE STATEMENTS OF RESULTS: CERTIFIED EXTRACTS: CERTIFICATIONS

A duplicate copy of the statement of the results of any candidate may be obtained by the candidate, his parent or guardian, or the Head of his school. Applications must state the name, centre, and index number of the candidate, and the month and year of the examination, and must be accompanied by a fee¹ of 2s. for each candidate for each examination. Applications cannot be dealt with during August and September or during December and January.

A certified extract from the Delegates' Register recording the subjects in which a candidate has passed at Ordinary and at Advanced Level may be obtained by

¹ See note 2 on p. 1.

the candidate, his teacher, or his parent or guardian, on payment¹ of 5s. for each candidate for each examination irrespective of the number of subjects offered, provided that the purpose for which the certified extract is required is approved by the Delegates. Applications must state the name, centre, and index number of the candidate, the month and year of the examination, the relationship of the applicant to the candidate, and the purpose for which the extract is required. Candidates are normally expected to use their certificates, if they have them, and not to apply for extracts from the Register.

The Delegates are prepared to certify direct to certain public bodies (e.g. universities, colleges, and professional associations), if required by them, the results of any candidate in the examination. No charge is made for such certification, but applications must state the name, centre, and index number of the candidate and the month and year of the examination, and must be accompanied by a stamped envelope addressed to the proper officer of the public body concerned.

§ 13. MATERIALS SUPPLIED BY CANDIDATES

Candidates must supply their own pencils, pens, and rubbers. They are warned that writing which is not easily legible may result in disqualification.

For all papers in Mathematics, Physics, Woodwork, Metalwork, Engineering Workshop Theory and Practice, Technical Drawing (Building), and Engineering Drawing, candidates must provide themselves with a pair of compasses, a hard pencil, a protractor, a ruler graduated in centimetres and millimetres and in inches, tenths, and sixteenths of an inch, and a pair of set-squares (45° , 60°).

For the papers in Woodwork, Metalwork, Engineering Workshop Theory and Practice, Technical Drawing (Building), and Engineering Drawing, candidates must, in addition to the items mentioned in the previous paragraph, provide themselves with a drawing-board suitable for half-imperial paper, a tee-square, and a scale ruler reading to $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$ scales.

Mathematical tables must be of a type approved by the Delegates and may be used in any Mathematics or Science Paper, unless directions to the contrary are given at the head of the question paper. The following books of tables are approved:

Four-Figure Mathematical Tables, Castle (Macmillan).

Four-Figure Tables, Godfrey and Siddons (C.U.P.).

Mathematical Tables [Four Figures], Durell (Bell).

Mathematical Tables, Clark (Oliver and Boyd).

Knott's Four-Figure Mathematical Tables, Comrie (Chambers).

Heads of schools who wish to provide candidates with any other book of four-figure tables must apply to Oxford for permission before the examination.

Slide rules may be used in any science paper or in any Advanced Level mathematics paper provided that their use is indicated by the candidate in his script; they may not be used in any Ordinary Level mathematics paper.

Stencils may be used for drawing diagrams of apparatus in any science paper.

Candidates at any Level in Botany, Zoology, and Biology must bring to each paper a lead pencil and a set of coloured pencils, and, to the practical papers, the dissection and other instruments specified in the syllabuses of these subjects.

Materials which may or which must be brought by candidates in Art are specified in the Art syllabuses.

Lists of approximate atomic weights are supplied by the Delegates for use in all Chemistry, Chemistry-with-Physics, and General Science Papers. Candidates must **not** bring to the practical Chemistry examinations any analytical tables, notes, or books.

§ 14. PREVIOUS EXAMINATION PAPERS

The Delegates do not bind their examiners in any subject to adhere year by year to the same pattern in setting papers, provided that the syllabus is followed and the same general standard maintained.

¹ See note 2 on p. 1.

Bound volumes containing all the question papers set on syllabuses in the Regulations with information about the mark allocations adopted are published about six months after each examination. All the Ordinary Level papers for one examination are published in one volume, and all the Advanced Level papers in another volume. These volumes may be obtained, while stocks last, from Parker & Son, Ltd., Broad Street, Oxford, on payment of 6s. per volume (postage 1s. 3d. extra).

Booklets, each containing a series of papers on one subject, are published for certain subjects by The Educational Supply Association Ltd., Pinnacles, Harlow, Essex, by arrangement with the Delegates. Further particulars must be obtained from The Educational Supply Association.

Forms are sent to Heads of schools, in January for the following Summer examination and in September for the following Autumn examination, on which additional loose copies of question papers may be ordered. The additional question papers are sent as soon as possible after the close of the examination. The price of the papers is 2d. each. Advance orders cannot be accepted other than from the Head of a school, but, if copies are available after the examination, they may be bought then at 2d. each. An order form with further instructions may be obtained from the Secretary at Oxford.

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O 83	Technical Drawing (Building)	} (may not both be taken)
O 84	Engineering Drawing	
O 86	Commerce	47-48
O 87	Principles of Accounts	48
O 88	Commerce, Arithmetic, and Accounts	48-49
O 90	Cookery	50
O 91	Needlework	50
O 92	Housecraft	50-51
O 93	Music	51-53
O 94	Art	53-54

INDEX TO SUBJECTS

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SUBJECTS AT ADVANCED LEVEL

(See notes on page 1.)

(Papers on Advanced Level syllabuses are not set for the Autumn Examination.)

	<i>Normal Advanced Level papers</i>	<i>Papers on which Special grades are awarded</i>	<i>Page</i>
A 3 English Literature	I, II	III	55-56
A 10 Greek } A 11 Latin }	I, II, III (Optional: V)	IV	56
A 12 Ancient History	I, II	III	56-57
A 20 French } A 21 German } A 22 Spanish } A 23 Italian } A 24 Russian }	I, II, III, and oral	IV	57 57-58 58 58-59 59 59
A 30 History	I, II	III	59-60
A 31 Economic History	I, II	A 30/III	60-61
A 36 British Constitution	I, II	III	61
A 40 Economics	I, II	III	61-62
A 43 Religious Knowledge	I, II	III	62
A 45 Geography	IA, IB, II	III	63-64
A 50 Pure-and-Applied Mathematics (may not be taken with any other Mathematics subject)	I, II	either A 51/III or A 52/III	64-66
A 51 Pure Mathematics	I, II	III	66-67
A 52 Applied Mathematics	I, II	III	67
A 53 Higher Mathematics	I, II	—	67-68
A 54 Physics	I, II, III	III and IV	68-70
A 55 Chemistry	I, II, III, IV	IV and V	70-72
A 60 Botany } A 61 Zoology } A 62 Biology† } A 64 Geology }	I, II, III	III and IV	73 73-74 74-75 75-76
A 80 Woodwork	I, II, III	—	76-77
A 81 Metalwork	I, II, III	—	76-77
A 84 Engineering Drawing	I, II	—	77-78
A 87 Principles of Accounts	I, II	—	78
A 90 Cookery	I, II, III	—	78-79
A 91 Needlework	I, II, III	—	78-79
A 93 Music	I, II, III, and practical	IV	79-81
A 94 Art	A and three of B, C, D, E	—	81

† May not be taken with Botany or Zoology at any level, unless, in exceptional circumstances, special permission is obtained from Oxford.

ORDINARY LEVEL SYLLABUSES, 1966

ENGLISH LANGUAGE

O 1

Any subject, at either Level, may be taken at the same examination with English Language.

Two papers, I and II, are set, and both must be taken by all candidates offering this subject:

I (1 hour) is an exercise in free composition. There is a choice of subjects, which candidates may treat in any way they choose. They are expected to show not detailed knowledge of any subject but their ability to communicate clearly and pleasingly in writing. They must therefore have reached an acceptable standard in spelling, sentence-construction, and punctuation in order to reach the pass level.

II (1½ hours) will contain:

(i) a passage to be summarized in good continuous prose, for which reported speech may be used but is not required;

(ii) a passage with questions to test comprehension;

(iii) further tests of vocabulary and style, and of the various skills required to use the English language well.

A grammar question will be set, but will not be compulsory.

ENGLISH LITERATURE (SELECTED)

Two schemes are provided, O 2 and O* 3. Candidates may not take more than one of these at the same examination.

O 2

One paper (2¼ hours) is set. Candidates must choose, for detailed study, three of the following works, one in list A, one in list B, and one in list C. The paper is arranged so that candidates have to answer questions on each of the three books chosen, but some choice of questions is provided.

- A. Shakespeare: **Either** (1) *Romeo and Juliet*
or (2) *A Midsummer-Night's Dream*
or (3) *Henry V*
- B. Poetry: **Either** (1) Chaucer, *The Nun's Priest's Tale*
or (2) Browning, *Thirty Poems by Robert Browning*, ed. Mackie (Macmillan)
or (3) Masefield, *Dauber and Reynard the Fox* (Heinemann, in one volume)
or (4) *The Albemarle Book of Modern Verse for Schools*, Volume 2, ed. Finn (Murray), the poems of MacNeice, Muir, Nicholson, Ruth Pitter, Plomer, Reed, Reeves, Rodgers, Ross, Victoria Sackville-West, Sassoon, Scannell, Spender, Dylan Thomas, R. S. Thomas, Warner, Watkins, Yeats, Young.
- C. Prose: **Either** (1) Defoe, *Robinson Crusoe*, Part I
or (2) Austen, *Pride and Prejudice*
or (3) Conrad, *The Rover*
or (4) Orwell, *Animal Farm*.

O* 3

One paper (3 hours) is set on the syllabus for Paper I in English Literature at Advanced Level (see p. 55).

ENGLISH LITERATURE (GENERAL)

O 4

One paper (2½ hours) is set.

The syllabus presupposes wider reading than is normally possible for candidates in one year of study, and opportunity is given in the paper to show evidence of wider reading. The paper consists of two parts.

Part I

A test in comprehension and appreciation of a passage of prose or of verse, a choice being given.

Part II

Candidates must answer one question from Section A (Shakespeare) and one from each of **two** other sections, and may thus confine their reading to two of the topics other than Shakespeare. The questions on the plays of Shakespeare do not involve identification of contexts. The reading suggested for the other topics is intended to be a guide to the minimum required.

- Section A: Shakespeare. †*Henry IV, Part I*
 †*Much Ado about Nothing*
 †*Macbeth*
- Section B: Lyrical Verse. †A wide selection is contained in Palgrave's *Golden Treasury* and in *The Penguin Book of Contemporary Verse*, ed. Allott (Penguin)
- Section C: Ballads. A selection is contained in *Ballads and Ballad-Plays*, ed. Hampden (Nelson), and in *English and Scottish Ballads*, ed. Graves (Heinemann)
- Section D: Novels. †Scott, *Redgauntlet*
 †Boldrewood, *Robbery Under Arms*
 †Masfield, *Sard Harker*
- Section E: Plays. Shaw, *Arms and the Man*
 Wilde, *The Importance of Being Earnest*
 Sygne, *The Playboy of the Western World*
- Section F: Country Life. †Cobbett, *Rural Rides*
 †Mitford, *Our Village*
 †Holme, *The Lonely Plough*
 †Laurie Lee, *Cider with Rosie*.

GREEK**O 10**

Two papers are set, I and II (2 hours each), and both must be taken.

I contains (i) grammatical questions; (ii) an easy unprepared prose passage for translation into English; and (iii) English sentences and, as an alternative, an easy passage of continuous English prose, for translation into Greek.

II contains (i) passages for translation from a prescribed prose book, context and general questions, and, as an alternative, an unprepared prose passage of moderate difficulty; and (ii) passages for translation from a prescribed verse book, context and general questions, and, as an alternative, an unprepared verse passage of moderate difficulty.

The set books are:

Prose: *The Fall of Athens (Selections from Xenophon's Hellenica)*, ed. Horn (Macmillan), Chapters III–XIII inclusive.

Verse: **Either** Homer, *Iliad* XXI, 1–433

or *Scenes from Euripides' Rhesus and Helen*, ed. Kennedy and Davis (Macmillan), the *Rhesus* section, i.e., the Greek text contained on pp. 13–37 inclusive.

LATIN**O 11**

Two papers are set, I and II (2 hours each), and both must be taken. In order to pass a candidate must reach a satisfactory standard in Papers I and II together, and must also reach a satisfactory standard in Paper I considered separately.

I contains (i) grammatical questions; (ii) easy unprepared prose passages for translation into English; and (iii) English sentences and, as an alternative, an easy passage of continuous English prose, for translation into Latin.

II contains (i) passages for translation from a prescribed prose book, context and general questions, and, as an alternative, an unprepared prose passage of moderate difficulty; and (ii) passages for translation from a prescribed verse book, context and general questions.

† These will be set again for 1967.

The set books are:

Prose: **Either** Caesar, *De Bello Gallico* V, 25-52
or *An Easy Selection from Cicero's Correspondence*, ed. Duff, 2nd ed. rev. Lacey (C.U.P.). Letters 1-14 inclusive.

Verse: **Either** *Aeneid* I, 1-440
or *A First Book of Latin Poetry*, ed. Flewett and Pantin (Macmillan), Part I (Poems I-XXII).

GREEK HISTORY AND ROMAN HISTORY

O* 12 and O* 13

In each subject one paper (3 hours) is set: for Greek History on the syllabus for Paper I, for Roman History on the syllabus for Paper II, of Ancient History at Advanced Level (see p. 57).

GREEK LITERATURE IN TRANSLATION

O* 14

One paper (2½ hours) is set. Candidates are expected to show such knowledge of the social, literary, and historical background as is necessary for the appreciation of the texts.

The set books¹ are:

Homer, *The Odyssey*, XIX-XXIV, Rieu (Penguin Classics)

Thucydides, *The Peloponnesian War*, V-VII, Warner (Penguin Classics)

Sophocles, *Electra* and *Philoctetes* in *Sophocles' Electra and Other Plays*, Watling (Penguin Classics).

FRENCH, GERMAN, SPANISH, ITALIAN, RUSSIAN, WELSH

O 20, O 21, O 22, O 23, O 24, O 25

In each language two written papers (1½ hours each) are set, and both must be taken; O 20, I and II, for French; O 21, I and II, for German; O 22, I and II, for Spanish; O 23, I and II, for Italian; O 24, I and II, for Russian; O 25, I and II, for Welsh.

I includes translation of an easy passage or passages of English prose, and free composition in the foreign language.

II includes translation into English of unprepared prose passages, and questions which test comprehension of a passage of prose in the foreign language.

In addition, in each language except Welsh, all candidates must take an oral examination (see below), for which separate entry must be made.

In German, Gothic type is not used, and candidates must not use German script.

The Spanish Academy made changes in 1952 in the rules for using the written accent in Spanish. Both the old system and the new will be accepted.

Oral examinations:

The oral examinations in reading and conversation are conducted by examiners appointed by the Delegates. The dictation tests are given by the teachers of the candidates, the date (early in the term of the examination), being fixed and the materials supplied by Oxford. An oral entry form must be completed and returned by the Head of the school to the Secretary at Oxford by 1 February for the Summer Examination and by 1 October for the Autumn Examination.

HISTORY (BRITISH)

O 30

This subject may not be taken with History at Advanced Level.

Four papers (2½ hours each) are set, and only one may be taken:

- A 1066-1485
- B 1485-1689
- C 1689-1815
- D 1815-1939.

¹ These books will be set again for 1967.

HISTORY (BRITISH SOCIAL AND ECONOMIC)**O 31**

This subject may not be taken with Economic History at Advanced Level.

One paper (2½ hours) is set, on the period 1760–1939. A wide choice of questions is given, and candidates are not necessarily expected to give equal attention to all topics in the syllabus, which is as follows:

The general condition of the people; changes in size and distribution of the population during the period; standard of living and general welfare; with special reference to the following:

Agriculture and the Rural Population

The enclosures; changes in agricultural methods; the effects of the European War 1793–1815; the Corn Laws; high farming and prosperity; village life in the nineteenth century; the effects of increasing overseas competition; agriculture during the First World War and its post-war problems.

Industry and the Urban Population

The changes in methods of production in leading industries; changes in industrial organization, including the factory system; legislation affecting factories, mines, and industrial conditions; the development of Trade Unions and the regulation of wages; town life in the nineteenth century; industry during the First World War and its post-war problems.

Communications and their relation to changes in Agriculture and Industry

Roads; waterways; railways; steam navigation; the internal combustion engine and its application to transport and industry; development of postal, telegraph, and telephone services, and of wireless communication; the Press.

Commercial and Financial Policy

The expansion in British overseas trade; adoption of Free Trade and its results; Tariff-reform and the movement to Empire Free Trade.

The development of financial policy; the organization and functions of the Bank of England and the development of the banking system; the growth of Joint Stock companies.

Social Welfare in the Nineteenth and Twentieth Centuries

The role of the Central and Local Governments and of Voluntary Associations (e.g. Trade Unions, Co-operative and Friendly Societies) in the improvement of the conditions of the people, with special reference to education, housing, water, drainage, gas and electricity supply; the relief of poverty; health, accident, and unemployment insurance, and old age pensions; the political and social emancipation of women.

HISTORY (BRITISH EMPIRE AND COMMONWEALTH)**O 32**

One paper (2½ hours) is set, divided into two parts, 1492–1783 and 1783–the present day. Candidates must answer five questions, chosen from one part only or from both. The second part is so arranged that candidates may confine their five questions to the period from the South African War to the present day.

HISTORY (FOREIGN)**O 33**

This subject may not be taken with History at Advanced Level.

European History, 1848–1939. One paper (2½ hours) is set. It includes some factual questions (e.g. dates and the identification of places marked on a map) and essay questions. It may include questions on the activities of European Powers outside Europe which affect their relationships among themselves, and on the intervention of the U.S.A. in the affairs of the European powers.

HISTORY (BRITISH AND FOREIGN)**O 34**

This subject may not be taken with History at Advanced Level.

One paper (2½ hours) is set, on the period 1871-1939. It is divided into three sections, A, B, and C, and candidates must answer questions from at least two sections. The syllabus is as follows:

A. 1871-1914

British. Policies and achievements of the Liberal and Conservative Governments. Rise of the Trade Union movement, and the origins of the Labour Party. The problems of Ireland and South Africa. Changing character of the British Empire and of British foreign policy.

Foreign. European alliances. (Candidates are expected to know the internal history of the main European Powers only in so far as it exerted a major effect on their foreign policies.) The struggle for power in the Balkans, the Near and Middle East, Africa, and the Far East. Origins and causes of the First World War.

B. 1914-1939

British. British contribution to allied victory; social and economic consequences of the war on British life. Industrial distress and discontent. Political crisis of 1931. Steps taken to restore national prosperity. Further evolution of the Commonwealth. Ireland. India. British attitudes towards the League of Nations and the Dictators.

Foreign. Reasons for the defeat of the Central Powers. The Peace Settlement, and the League of Nations; subsequent efforts for collective security. The establishment of the U.S.S.R.; internal and foreign policies of Lenin and Stalin. Effects of the World Slump. Rise and internal policies of Mussolini and Hitler. Origins and causes of the Second World War.

C. General. 1871-1939

British. Parliamentary reform. Expansion of Local Government. Development of the national education system. Changes and shifts in population. Main changes in agrarian and industrial life and in transport, and their social consequences. Status of women.

British and Foreign. Rise to importance in world affairs of Japan and the United States of America. Rise of international socialism. International co-operation e.g., Red Cross, Universal Postal Union, The Hague and Geneva Conventions, I.L.O., disarmament conferences. Developments in medicine, communications, fuel and power, and their social significance.

HISTORY**O* 35**

This subject may not be taken with History at Advanced Level.

One paper (3 hours) is set. Candidates are expected to answer five questions, taken from not less than two of the following sections.

- | | |
|-----------------------|-----------------------|
| A. British, 872-1272 | F. Foreign, 918-1272 |
| B. British, 1272-1485 | G. Foreign, 1272-1494 |
| C. British, 1485-1688 | H. Foreign, 1494-1689 |
| D. British, 1688-1815 | I. Foreign, 1689-1815 |
| E. British, 1815-1931 | J. Foreign, 1815-1933 |

BRITISH CONSTITUTION**O* 36**

One paper (2½ hours) is set. Candidates are expected to have studied, descriptively rather than analytically, the present-day functioning of the British Constitution, with some reference to its historical development. The chief subjects to be covered are as follows.

The fundamental characteristics of the constitution and the outlines of central and local government; the Crown and its prerogatives; Parliament; the electoral system; the conventions of the constitution; the Cabinet, Prime Minister, and Privy Council.

ECONOMICS

O* 40

One paper (2½ hours) is set. The paper is divided into two sections, and candidates must answer questions from both sections.

Section A. The National Income and the Balance of Payments

The meaning of the terms 'national income', 'consumption', 'saving', 'investment', the influence of the relationship between savings and investment on employment, production, and the price level; the distinction between 'money income' and 'real income'. The structure of the balance of payments. The relationship of the balance of payments to employment and to price level.

Section B. Economic development in the United Kingdom since 1929

Candidates are expected to have a general knowledge of the changes since 1929 in production, population, employment, prices, and the balance of payments, and to be able to discuss causes and consequences of these changes.

RELIGIOUS KNOWLEDGE

Four schemes, O 41, O 42, O* 43, and O* 44, are available. Candidates may not take more than one paper at the same examination. The text on which O 41 and O* 43 are based is the Revised Version. That for O 42 and O* 44, which are intended for Roman Catholics, is the Douay Version. Papers in O* 44 are not set unless application is made by Heads of schools during December 1965.

O 41 (R.V.)

Six papers, A, B, C, D, E, F (2½ hours each), are provided, of which candidates must choose one. Candidates are expected to have studied the religious, social, and political conditions of the period offered, with special reference to the passages specified in the syllabus. Detailed knowledge of the text is not expected, and context questions are not set.

A. OLD TESTAMENT—THE BIRTH OF THE HEBREW NATION

Early Traditions and Folk-lore. Stories illustrating some basic religious beliefs and practices of the Hebrews, the emergence of spiritual and moral ideals, and the beginnings of social order.

Genesis 1-3, 6-8, 12¹⁻⁹, 15¹⁻¹⁸, 22¹⁻¹⁹, 27¹⁻⁴⁵, 28¹⁰⁻²², 35¹⁻¹⁵, 37, 42-46⁷

The Beginnings of National, Religious, and Social Consciousness. Brief outline of the part played by Moses in the Exodus, with special reference to the Passover, and to other institutions, beliefs, and customs which formed an essential part of later Hebrew religious and social life.

Exodus 1¹⁻¹⁴, 2, 3, 5-6¹³, 12-24, 32-34

The Struggle for Religious and Political Independence. Opposition by Edom, Moab, and others before the entrance into Canaan; some exploits under Joshua; conditions prevailing after the settlement. The emphasis on Covenant relationship and on the spiritual and moral obligations attached to it should be noted.

Numbers 20-21²⁶, 22-24, 27¹⁵⁻²³

Deuteronomy 34

Joshua 1-4, 5¹³⁻⁸

Judges 1, 2, 5, 13-16

The Growth of Religious and Political Unity. Special attention should be paid to the parts played by Samuel, Saul, David, and Solomon, and to religious beliefs, practices, and leadership. The role of the prophets and the theory of divine kingship are also of special importance.

I *Samuel* 1-6¹⁶, 8-12, 15, 16-18⁸, 20-22, 24, 26-28, 31

II *Samuel* 1, 2¹⁻¹¹, 3^{6-6¹⁵}, 7, 15¹⁻¹², 18-19⁸

I *Kings* 1-3¹⁵, 5-6¹³, 8¹⁻³⁰, 9¹⁻⁹, 10¹⁻¹³, 11

B. OLD TESTAMENT—THE DECLINE OF THE HEBREW NATION

Internal, Religious, and Political Weaknesses. Disruption of the monarchy on Solomon's death; political rivalry of northern and southern kingdoms and the menace of Syria; traditions illustrating the part played by the prophets in political and social affairs and in preserving the nation's faith.

I *Kings* 11, 12, 13¹⁻¹⁰, 14¹⁻³⁰, 16^{21-22⁴⁰}

II *Kings* 2-3²⁷, 5-6²³, 9, 10¹⁵⁻³¹, 13¹⁴⁻²¹

The Challenge of New Circumstances. Influence of Assyria's bid for world empire on Hebrew religious and political thought; the fall of Samaria, and the threat to Jerusalem; the call by the prophets for faith, religious purity, and social justice, and their vision of the New Israel.

II Kings 15¹⁷⁻¹⁷

Amos 2⁹⁻⁹

Hosea 3, 4, 6, 11-14

II Kings 18-20

Micah 3, 5²⁻⁹, 6¹⁻⁸

Isaiah 1¹⁻²⁰, 2¹⁻⁴, 5¹⁻⁷, 6¹⁻¹³, 7¹⁻¹⁷, 9¹⁻⁷, 10⁵⁻¹¹, 19¹⁻¹⁵, 22¹⁻¹⁴, 23, 28¹⁻²², 30

The Response of Religious Faith. The Deuteronomic reform as an attempt to put into practice the teaching of the prophets, and to preserve the age-long traditions and religious ideals of the past.

II Kings 21-23³⁰

Deuteronomy 5, 6, 12, 14²²⁻¹⁶, 17¹⁴⁻¹⁸⁵, 30

The Failure of Religious Practice. Events leading up to the fall of Jerusalem; strictures of Jeremiah and Ezekiel on religious and social conditions.

II Kings 23³¹⁻²⁵³⁰

Jeremiah 1-2²⁸, 5, 7¹⁻²⁸, 8⁴⁻⁹, 17⁵⁻¹¹, 18¹⁻¹², 19-22¹⁹, 23¹⁻²⁹, 26¹⁻¹⁹, 27-29¹⁹, 31, 36, 38-39¹⁴, 40¹⁻⁶, 42-44²³

Ezekiel 1¹⁻¹⁴, 2-3¹⁵, 8, 11¹⁴⁻²⁵, 13¹⁻¹⁶, 18¹⁻³², 34

(Many of the passages are chosen for their literary form and their value as contemporary documents, as well as for their spiritual and moral appeal.)

C. OLD AND NEW TESTAMENTS AND APOCRYPHA—THE REMNANT OF THE HEBREW NATION

The Revival of Hope, and the Re-establishment of Religious and Political Life in Jerusalem.

The passages chosen illustrate, as far as possible in historical sequence: the growth of optimism; triumph over the fall of Babylon; the Return; the delay in rebuilding the Temple; types of opposition; encouragement by contemporary prophets; weaknesses of contemporary society; the work of Nehemiah and Ezra.

Ezekiel 34, 36-37¹⁴, 38¹⁴⁻³⁹

Isaiah 14³⁻²³

Jeremiah 50²⁻²⁰

Isaiah 40-41, 42¹⁻¹⁷, 43¹⁻¹³, 44-45¹³, 47¹⁻¹⁵, 49-53, 55, 61

Ezra 1¹⁻⁸, 4¹⁻⁷, 4¹¹⁻²⁴, 5-6

Haggai 1, 2

Zechariah 1⁷⁻², 4¹⁻¹⁰, 8¹⁻¹⁷

Malachi 1⁶⁻²⁹

Nehemiah 1, 2, 4-7⁴

Ezra 7, 8¹⁵⁻³⁶, 9

Nehemiah 8, 10²⁸⁻³⁹, 13

The Revival of Nationalism. The expectation of the Golden Age; the narrow legalism of the period in Tobit; the Maccabean struggle up to the recapture and rededication of the Temple; enigmatical portrayal of the period in Daniel.

Isaiah 60, 65¹⁷⁻²⁵

Malachi 3¹⁻⁶, 4¹⁻⁶

Joel 2¹⁸⁻³²

Tobit 1-12

I Maccabees 1-4⁶¹

Daniel 1-3, 5-7, 11, 12

The Song of the Three Holy Children

The Suppression of the Nation. Period of Roman occupation and the rise of the Herods.

(For this section reliance must be placed on handbooks.)

Movement towards Spiritual Freedom. The missionary spirit of Jonah; the refusal of Job to accept religious conventionalism; the spirit of universalism in the 'wisdom movement' resulting from Greek influence; Christian ideals and their demands on the individual.

Jonah 3, 4

Job 1-14²², 19²¹⁻²⁷, 38, 39-42⁶

Ecclesiastes 1¹⁻¹¹, 3¹⁶⁻²², 8¹⁰⁻¹⁵, 11⁹⁻¹²

Ecclesiasticus 1¹⁻²⁰, 4, 6⁵⁻¹⁷, 8, 13, 24-26¹⁸, 29-32¹³, 33¹⁹⁻³¹, 44¹⁻¹⁵

Proverbs 3¹¹⁻³⁵, 6⁶⁻¹⁹, 8¹¹⁻³⁶, 31¹⁰⁻³¹

Wisdom 3¹⁻⁹, 7-8¹

Matthew 5-7¹⁴

John 1¹⁻¹⁸

Romans 12, 13

I Corinthians 12⁴⁻¹³, 15

Galatians 5¹⁶⁻²⁵

Ephesians 6¹⁰⁻²⁰

(Many of the passages are chosen for their literary form and their value as contemporary documents, as well as for their spiritual and moral appeal.)

D. NEW TESTAMENT—THE LIFE AND TEACHING OF JESUS

Mark's Gospel provides the basic evidence for the life, teaching, and significance of Jesus. From Matthew and Luke are added the Q passages (sayings) and special material peculiar to these Gospels. The passages from John supplement the Synoptic narrative.

Mark 1-16

Luke 1-3²², 4¹⁻³⁰, 5¹⁻¹¹, 7, 9⁵¹⁻¹⁸¹⁴, 19¹⁻²⁸, 22²⁴⁻⁷¹, 23¹⁻⁴⁸, 24¹⁻⁵³

Matthew 2¹⁻²³, 5-7, 13²⁴⁻⁵², 16¹³⁻²⁰, 18, 20¹⁻¹⁶, 21²⁸⁻³², 22¹⁻¹⁴, 23, 25, 27⁶²⁻²⁸

John 1-2¹¹, 3¹⁻²¹, 4¹⁻⁴², 5¹⁻¹⁸, 6, 10¹⁻¹⁸, 12²⁰⁻³⁶, 13-21

Acts 1-14

Candidates are not expected to have a knowledge of Greek, but opportunity is given to them, if they wish, to show knowledge of the Greek text of Mark's Gospel.

E. NEW TESTAMENT—THE GROWTH OF THE EARLY CHURCH

Acts provides the main historical framework. The Epistles give supplementary details about Paul's life and movements, and illustrate the type of problem with which he had to deal in the cities he visited, and the main Christian doctrines and ideals he put forward. (The more difficult of his theological arguments are avoided as far as possible.)

Acts 1-28

Galatians 1, 2, 5

Romans 5-8, 11-14

I Corinthians 1-4, 8, 9, 10¹⁴⁻³³, 11¹⁷⁻³⁴, 12-16

II Corinthians 9, 11

Ephesians 2-6

Philippians 2, 3

Candidates are not expected to have a knowledge of Greek, but opportunity is given to them, if they wish, to show knowledge of the Greek text of Acts 1-15.

F. THE CHURCH IN THE ROMAN EMPIRE

Ventures of Faith. The impetus which carried the Gospel into the Empire; the growth of the Church within it; some reactions to the demands of Christianity.

Matthew 28

Acts 8-28

Romans 11, 12

II Corinthians 11

Hebrews 11-12¹³

I Peter 4, 5

Revelation 1-3

Trials of Faith. The persecutions by the Emperors from Nero to the Edict of Milan; the settlement under Constantine; other legislation up to the Edict of Valentinian.

Revelation 12-22, and passages quoted in Bettenson's *Documents of the Christian Church* (O.U.P.), pp. 1-33.

Reference should be made to handbooks on Church history.

Expressions of Faith. The growth of the doctrine of the Trinity, and that relating to the nature of Christ's Person, with associated heresies; the doctrine of the Atonement; the Church, the Ministry, and the Sacraments; embodiment of these doctrines in Creeds and in the findings of the Councils.

Trinity and Person of Christ

Matthew 16¹³⁻²⁸

Romans 8¹⁻¹¹

Philippians 2⁵⁻⁹

Colossians 1

Hebrews 1⁵⁻⁵, 4¹⁴⁻⁵¹⁰, 7-10

I Peter 1³⁻¹²

John 1¹⁻¹⁸, 5¹⁹⁻⁴⁷, 8¹²⁻²⁰, 10²²⁻²⁹, 14, 15

Acts 2¹⁻⁴

Bettenson, *op. cit.*, pp. 42-73

The Work of Christ

Matthew 26¹⁷⁻³⁰, 27²⁷⁻⁵⁶

Romans 5, 6

II Corinthians 4⁷⁻⁵¹⁰

Ephesians 1-3

Hebrews 10¹⁻²⁵

I Peter 2¹⁻²⁵, 3¹⁸⁻²²

Bettenson, *op. cit.*, pp. 42-84

The Church

Romans 12

I Corinthians 12⁴⁻³¹, 14

Ephesians 5²²⁻³⁰

Colossians 1⁹⁻²⁹

The Ministry

Mark 3¹³⁻¹⁹, 6⁷⁻¹³

Matthew 16¹³⁻²⁰

Acts 1⁵⁻²⁶, 15¹⁻²⁹

Galatians 1¹⁸⁻²

I Corinthians 9

II Corinthians 11¹⁻¹⁵

Ephesians 4¹¹⁻³²

I Timothy 3

The Sacraments

Mark 14¹⁷⁻²⁵

I Corinthians 10¹⁴⁻²², 11¹⁷⁻³⁴

John 6²²⁻⁵⁹

Creeds and Councils

Bettenson, *op. cit.*, pp. 33-37 and 73

O 42 (D.V.)

The syllabus for O 42 (D.V.) is the same as that for O 41 (R.V.), but the papers are appropriate for Roman Catholics who use the Douay Version.

O* 43 (R.V.)

Two papers, I and II (3 hours each), are set, on the syllabuses for papers I and II for Religious Knowledge at Advanced Level (see p. 62). Candidates may take either paper, but not both.

O* 44 (D.V.)

The syllabus for O* 44 (D.V.) is the same as that for O* 43 (R.V.), but the papers are appropriate for Roman Catholics who use the Douay Version. Papers are not set unless application is made by Heads of schools during December 1965.

GEOGRAPHY

Two schemes are provided, O 45 and O* 46. A candidate may not take papers in both of these at the same examination.

O 45

Two papers, I (1½ hours) and II (1½ hours), are set, and both must be taken.

I. THE PRINCIPLES OF GEOGRAPHY

Candidates are expected to have studied the principles of geography set out below, as applied to and illustrated by a general survey of the world. They may be required to insert in an outline map of the world some of the more important geographical facts. If an outline map of the world is supplied, it is drawn on the Mollweide projection.¹

The earth in space

The earth in space, its form and movements. The seasons. Latitude and longitude. Time, time zones, and the Date Line. Phases of the moon.

Maps and their uses

Scales. Representation of relief. Sections. Reading and interpretation of Ordnance Survey maps on scales of 2½" and 1" to the mile.

The elements of Physical Geography

Distribution of land and water. The common types of land forms (including coasts), their origins and modification by the agents of erosion. Simple river systems and their development. Tides and currents.

The principal factors determining climate. The major wind systems. Distribution of temperature and rainfall. Major climatic types and their distribution over the earth's surface.

The geography of vegetation and its control by climate, soil, and relief. The distribution and characteristics of the principal types of natural vegetation, with associated animal life.

The elements of Human Geography

Distribution of population and variation of human occupation and activities in relation to the above physical conditions. The study of primitive economies (e.g. pastoral nomads, agricultural communities, &c.). Agricultural geography. Geographical factors affecting the localization of manufactures with special reference to the great industrial regions of the world. Geographical conditions (resources, power, labour, markets, lines of communication, and means of transport) affecting commerce and industry.

II. REGIONAL GEOGRAPHY

Candidates should have a detailed acquaintance with the British Isles in their various geographical aspects, and a general knowledge of the regional geography of

either Europe (excluding Russia and the Balkan States)
or North America (Canada, U.S.A., and the West Indian islands)
or U.S.S.R. and Monsoon Asia

¹ Specimen maps may be obtained by schools from the Secretary at Oxford, price, including postage, 1s. 6d. per dozen (minimum order). See note 2 on p. 1.

O* 46

One paper (3 hours) is set. The paper contains a question on map reading, a section on physical geography, and two sections on regional geography. Candidates have to answer the map reading question and some questions from each of the other three sections.

Maps

Candidates are expected to show evidence of their ability to read and interpret topographical maps. Attention should be paid to the maps ($2\frac{1}{2}''$ and $1''$) issued by the Ordnance Survey; conventional signs; scales, profile drawing; measurement of distances and areas; methods of representing relief and other geographical data. Candidates should become familiar with maps, on the scale of one inch to the mile, of three or four representative areas (e.g. a mountainous district, an area of low relief, typical coastal regions), including, where suitable, the map of their own locality, for purposes of illustration of the principles of physical and human geography.

Physical Geography

The characteristics and distribution of typical land forms; the chief processes in the development of the present surface features as illustrated by the major features of the continents and oceans. Emphasis should be laid upon the effect of the surface features upon human life and activities.

Weather and climate; pressure, temperature, sunshine, air movements, precipitation, and humidity; the relations of these elements and the factors affecting their distribution. The principal types of climate throughout the world.

The influence of climate, relief, and soil upon vegetation, natural and cultivated.

The vegetation regions of the world, and the animals and plants of economic importance associated with them.

Regional Geography

Canada with **either** Africa south of the Sahara **or** Australia and New Zealand.

MATHEMATICS

Two schemes are provided, O 50 and O 51. A candidate may not take papers in both at the same examination.

O 50

Three papers are set: I Arithmetic ($1\frac{1}{2}$ hours), II Geometry ($2\frac{1}{2}$ hours), and III Algebra (2 hours), and candidates must take all three. Questions involving the Trigonometry section of the syllabus may be included in any of these three papers. The standard 'pass' is awarded on the aggregate obtained on the three papers.

ARITHMETIC AND MENSURATION

The ordinary processes of arithmetic. The commoner systems of weights, measures, and money, including metric units. Fractions, decimals, ratio, percentage. The use of common logarithm, square, square root, and reciprocal tables. Significant figures.

Questions may be set on the applications of these processes to problems of everyday life in the home and community, but not questions involving complicated operations or the knowledge of uncommon technical terms.

The mensuration of the rectangle, triangle, and figures derived from them, including easy extensions to three dimensions, and of the circle (including the length of an arc in terms of the radius and of the measure, in degrees, of the angle at the centre), cylinder, cone, and sphere.

GEOMETRY

The paper contains questions on practical and on theoretical geometry, as defined in the following schedules.

The questions on practical geometry are set on the constructions contained in the schedule below, together with easy extensions of them.

No answer to a practical question is accepted without a brief statement of the method of construction. Set squares may be used for drawing perpendiculars and parallels incidental to a construction, but such use must be mentioned by the candidates.

The questions on theoretical geometry consist of theorems contained in the following schedule, together with questions upon these theorems, easy deductions from them, and arithmetical illustrations. The order in which the theorems are stated in these schedules is not imposed as a sequence of their treatment, and any proof of a proposition is accepted which appears to the examiners to form part of a systematic treatment of the subject. In the proof of theorems and deductions from them the use of hypothetical constructions is permitted. Proofs which are only applicable to commensurable magnitudes are accepted.

Constructions

Bisection of angles and of straight lines.

Construction of perpendiculars to straight lines.

Construction of an angle equal to a given angle.

Construction of angles of 60° , 45° , and 30° .

Construction of parallels to a given straight line.

Simple cases of the construction from sufficient data of triangles and quadrilaterals.

Division of straight lines into a given number of equal parts or into parts in any given proportions.

Construction of a triangle equal in area to a given polygon.

Construction of tangents to a circle and of common tangents to two circles.

Construction of circumscribed, inscribed, and escribed circles of a triangle.

Simple cases of the construction of circles from sufficient data.

Construction of a square equal in area to a given polygon.

Construction of a fourth proportional to three given straight lines and mean proportional to two given straight lines.

Construction of regular figures of 3, 4, 6, or 8 sides in or about a given circle.

Theorems

¹*Angles at a Point.* If a straight line stands on another straight line, the sum of the two angles so formed is equal to two right angles; and the converse.

If two straight lines intersect, the vertically opposite angles are equal.

Parallel Straight Lines. When a straight line cuts two other straight lines, if

¹(i) a pair of alternate angles are equal,

¹(ii) a pair of corresponding angles are equal,

¹(iii) a pair of interior angles on the same side of the cutting line are together equal to two right angles,

then the two straight lines are parallel; and the converse.¹

Straight lines which are parallel to the same straight line are parallel to one another.

Triangles and Rectilinear Figures. The sum of the angles of a triangle is equal to two right angles.

In a polygon of n sides, the sum of the interior angles is equal to $2n - 4$ right angles.

If the sides of a convex polygon are produced in order, the sum of the angles so formed is equal to four right angles.

¹If two triangles have two sides of the one equal to two sides of the other, each to each, and also the angles contained by those sides equal, the triangles are congruent.

¹If two triangles have two angles of the one equal to two angles of the other, each to each, and also one side of the one equal to the corresponding side of the other, the triangles are congruent.

If two sides of a triangle are equal, the angles opposite to these sides are equal; and the converse.

¹If two triangles have the three sides of the one equal to the three sides of the other, each to each, the triangles are congruent.

If two right-angled triangles have their hypotenuses equal, and one side of the one equal to one side of the other, the triangles are congruent.

If two sides of a triangle are unequal, the greater side has the greater angle opposite to it; and the converse.

Of all the straight lines that can be drawn to a given straight line from a given point outside it, the perpendicular is the shortest.

¹The opposite sides and angles of a parallelogram are equal, each diagonal bisects the parallelogram, and the diagonals bisect one another.

If a quadrilateral has two sides equal and parallel, it is a parallelogram.

The straight line drawn through the middle point of one side of a triangle parallel to another side bisects the third side.

The straight line joining the middle points of two sides of a triangle is parallel to the third side, and equal to one-half of it.

If there are three or more parallel straight lines, and the intercepts made by them on any straight line that cuts them are equal, then the corresponding intercepts on any other straight line that cuts them are also equal.

Areas. Parallelograms on the same base and of the same altitude are equal in area.

The area of a parallelogram is equal to the area of a rectangle on the same base and of the same altitude.

Parallelograms on equal bases and of the same altitude are equal in area.

Triangles on the same or equal bases and of the same altitude are equal in area.

Equal triangles on the same or equal bases are of the same altitude.

The square on the hypotenuse of a right-angled triangle is equal to the sum of the squares on the other two sides; and the converse.

¹ Proofs of these theorems are not required.

Loci. The locus of a point which is equidistant from two fixed points is the perpendicular bisector of the straight line joining the two fixed points.

The locus of a point which is equidistant from two intersecting straight lines consists of the pair of straight lines which bisect the angles between the two given lines.

The Circle. A straight line, drawn from the centre of a circle to bisect a chord which is not a diameter, is at right angles to the chord; conversely, the perpendicular to a chord from the centre bisects the chord.

There is one circle, and one only, which passes through three given points not in a straight line.

Equal chords of a circle are equidistant from the centre; and the converse.

The tangent at any point of a circle and the radius through the point are perpendicular to one another.

The two tangents that can be drawn to a circle from an external point are equal.

If two circles touch, the point of contact lies on the straight line through the centres.

The angle which an arc of a circle subtends at the centre is double that which it subtends at any point on the remaining part of the circumference.

Angles in the same segment of a circle are equal; and, if the line joining two points subtends equal angles at two other points on the same side of it, the four points lie on a circle.

The angle in a semicircle is a right angle; the angle in a segment greater than a semicircle is less than a right angle; and the angle in a segment less than a semicircle is greater than a right angle.

The circle described on the hypotenuse of a right-angled triangle as diameter passes through the opposite vertex.

The opposite angles of any quadrilateral inscribed in a circle are supplementary; and the converse.

Areas. Illustrations and explanations of the geometrical theorems corresponding to the following algebraical identities:

$$k(a+b+c+\dots) = ka+kb+kc+\dots; \quad (a+b)^2 = a^2+2ab+b^2;$$

$$(a-b)^2 = a^2-2ab+b^2; \quad a^2-b^2 = (a+b)(a-b).$$

The square on a side of a triangle is greater or less than the sum of the squares on the other two sides, according as the angle contained by those sides is obtuse or acute. The difference is twice the rectangle contained by one of the two sides and the projection on it of the other.

In any triangle, the sum of the squares on any two sides is equal to twice the square on half the third side together with twice the square on the median which bisects the third side.

The Circle. ¹In equal circles (or in the same circle) (i) if two arcs subtend equal angles at the centres, they are equal; (ii) conversely, if two arcs are equal, they subtend equal angles at the centres.

¹In equal circles (or in the same circle) (i) if two chords are equal, they cut off equal arcs; (ii) conversely, if two arcs are equal, the chords of the arcs are equal.

If a straight line touches a circle, and from the point of contact a chord is drawn, the angles which this chord makes with the tangent are equal to the angles in the alternate segments.

If two chords of a circle intersect either inside or outside the circle, the rectangle contained by the parts of the one is equal to the rectangle contained by the parts of the other.

Proportion; Similar Triangles. If a straight line is drawn parallel to one side of a triangle, the other two sides are divided proportionally; and the converse.

If two triangles are equiangular, their corresponding sides are proportional; and the converse.

If two triangles have one angle of the one equal to one angle of the other and the sides about these equal angles proportional, the triangles are similar.

If a perpendicular is drawn from the right angle of a right-angled triangle to the hypotenuse, the triangles on each side of the perpendicular are similar to the whole triangle and to one another.

The internal bisector of an angle of a triangle divides the opposite side internally in the ratio of the sides containing the angle, and likewise the external bisector externally.

The ratio of the areas of similar triangles is equal to the ratio of the squares on corresponding sides.

ALGEBRA

Elementary algebraical processes; fractions; simple cases of factorization. Simple equations, quadratic equations containing one unknown quantity; two simultaneous equations, both linear or one linear and one quadratic; problems leading to such equations; construction and use of formulae; logarithms to base 10, the use of four-figure tables. Questions (not involving theoretical proofs) on the use of fractional and negative indices, and on graphical methods, may be set.

¹ Proofs of these theorems are not required.

TRIGONOMETRY

Definition and use of sine, cosine, and tangent for angles not greater than 180° . Solution of right-angled triangles. Proof and use of the formulae

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}; \quad a^2 = b^2 + c^2 - 2bc \cos A;$$

and of the formula $\frac{1}{2}bc \sin A$ for the area of a triangle, and use of the formula $\sqrt{s(s-a)(s-b)(s-c)}$ for the area of a triangle.

O 51

Three papers, I, II, and III (2 hours each), are set. The standard 'pass' is awarded on the aggregate obtained on the three papers.

Each paper may contain questions on any part of the syllabus, and the solution of any question may require knowledge of more than one section of the syllabus.

Each paper is divided into two sections. The first section consists of a number of short questions, elementary in type, to be attempted by all candidates. The second section contains five questions, of which candidates are allowed to attempt no more than three.

Unless the terms of the questions impose specific limitation, a candidate may use any appropriate method.

Arithmetic and Mensuration. The ordinary processes of arithmetic. The commoner systems of weights, measures, and money, including metric units. Fractions, decimals, ratio, percentage. The use of common logarithm, square, square root, and reciprocal tables. Significant figures.

Questions may be set on the applications of these processes to problems of everyday life in the home and community, but not questions involving complicated operations or the knowledge of uncommon technical terms.

The mensuration of the rectangle, triangle, and figures derived from them, including easy extensions to three dimensions, and of the circle (including the length of an arc in terms of the radius and of the measure, in degrees, of the angle at the centre), cylinder, cone, and sphere.

Algebra. Construction of a formula by symbolical expression of a functional relation (e.g. V is proportional to x^2), or by generalization of an arithmetical result. Interpretation, evaluation, and easy manipulation of a formula.

The use of indices. Only simple examples involving the manipulation of indices and surds are set: candidates will be expected to understand the use of indices to express such numbers as 3.74×10^8 or 1.35×10^{-6} .

Common factors, factors of $a^2 - b^2$, $a^3 \pm b^3$, easy trinomial factors, and simple extensions of these forms. The remainder theorem.

Simple fractions. Linear equations; quadratic equations; and simultaneous equations in two variables, of which at least one is linear.

Graphs from statistical data. The idea of a function of a variable. The illustration of relations such as 'y is inversely proportional to x', 'V varies as x', by sketch-graphs. Graphical treatment of simple rational algebraic functions of the form

$$y = Ax^3 + Bx^2 + Cx + D + \frac{E}{x} + \frac{F}{x^2},$$

where the constants are numerical and at least three of them are zero.

The gradients of these graphs, by drawing, and the estimation of areas under them, by counting squares. Applications to rates of increase; easy linear kinematics, including distance-time and speed-time curves; and maxima and minima. Candidates are not required to know the notation or any formulae of the calculus, but their use will be allowed.

Geometry and Trigonometry. A sound understanding of the properties set out below, and ability to apply them, is expected. It should not be assumed that any of the propositions included below will be set for proof.

Properties of angles at a point and angles made with parallel lines. The exterior angle property and angle-sum of a triangle. Angle-sum properties of polygons.

Congruence and similarity of triangles. Symmetry about a point or line.

The isosceles triangle, parallelogram, rectangle, and square.

The sine, cosine, and tangent of an angle, acute or obtuse, including graphs of these functions and the use of tables of them and of their logarithms.

Area properties of the rectangle, the parallelogram, the triangle, and a quadrilateral with one pair of parallel sides, including the formulae

$$\frac{1}{2}bc \sin A \quad \text{and} \quad \sqrt{s(s-a)(s-b)(s-c)}.$$

The straight line joining the mid-points of two sides of a triangle is parallel to the third side and equal to half the length of the third side.

Connexions between algebra and geometry, e.g. $(a+b)^2$, use of coordinates (including negative coordinates).

The sine-rule for a triangle (examples are not set on the ambiguous case).

The theorem of Pythagoras; $\sin^2 A + \cos^2 A = 1$.

$$a^2 = b^2 + c^2 - 2bc \cos A.$$

The symmetrical properties of chords of a circle.

The angle properties of a circle.

The perpendicularity of tangent and radius. The 'alternate segment' theorem. The equality of tangents from an external point. The distance between the centres of circles in contact.

The 'intersecting chord' theorem ($OP \cdot OQ = OR \cdot OS = OT^2$).

The relationship between the areas of similar triangles. Corresponding results for similar figures and for volumes of similar solids.

The internal and external bisectors of any angle of a triangle divide the opposite side in the ratio of the sides containing the angle.

Knowledge of simple loci, with easy extensions to three dimensions. The use of intersecting loci to determine points satisfying two conditions.

The following 'ruler and compasses' constructions (set squares are allowed for the construction of parallel lines):

Bisection of angles and of straight lines.

Construction of angles of 30° , 45° , 60° , and 90° , and of an angle equal to a given angle.

Construction of triangles, quadrilaterals, and circles from simple data, including the inscribed and circumscribed circles of a triangle.

Division of a straight line into a given number of parts or in a given ratio.

Construction of a triangle equal in area to a given quadrilateral or pentagon.

Construction of a square equal in area to a given rectangle.

Construction of tangents from an external point.

Construction of a segment containing a given angle.

Practical Applications. Questions involving drawing, calculation, or geometrical reasoning may be set on the following topics:

(a) Simple map problems, scales, contour lines, slopes.

(b) Heights and distances (including the determination of position by two bearings; the nautical mile and knot).

(c) Simple plan and elevation problems.

(d) Latitude and longitude. Great and small circles on a sphere.

(e) Three-dimensional problems which can be solved by analysis into plane figures (a knowledge of the forms of cube, rectangular block, pyramid, tetrahedron, prism, right circular cylinder, right circular cone, and sphere is assumed).

ADDITIONAL MATHEMATICS

O 53

This subject may be taken at the same examination with O 50 or O 51. It may be taken with Applied Mathematics at Advanced Level, provided that special notice is given before 1 March in the year of the examination, and that no Applied Mathematics questions in the Additional Mathematics papers are attempted. It may not be taken with any other Mathematics paper.

Two papers, I and II (2 hours each), are set. Each paper contains twelve questions, two on each of the sections of the syllabus which follows. Candidates are required to answer six questions in each paper. The papers are set on syllabus O 51 with the addition of the following:

Algebra

Theory of quadratic functions; partial fractions (excluding repeated factors in the denominator); ratio and proportion; simple progressions; the use of the binomial theorem for rational index.

Trigonometry

Circular measure; the trigonometrical functions for all angles between $\pm 360^\circ$; the formulae for $\sin(A \pm B)$, $\cos(A \pm B)$, $\tan(A \pm B)$, and associated formulae; easy equations and identities; the solution of triangles.

Pure Geometry

The theorems of Menelaus and Ceva; angles between planes, between lines and planes, and between non-intersecting lines; shortest distance between two non-intersecting lines.

Analytical Geometry

The point and straight line referred to rectangular cartesian axes; the parabola referred to its axis and the tangent at its vertex.

Calculus

The formulae for the differentiation of powers of x , $\sin x$, $\cos x$, and of sums, products, quotients, and a function of a function; the integration of functions requiring only a knowledge of the differential coefficients specified and of simple changes of variable; maxima and minima of functions of one variable; tangents and normals to curves whose equations are given explicitly in the form $y = f(x)$; the determination of plane areas and of volumes of solids of revolution.

Statics and Dynamics

The composition and resolution of forces in one plane; moments, couples; elementary graphical methods; the determination of the centre of mass in simple cases; simple examples on the equilibrium of one rigid body; friction.

Velocity and acceleration; Newton's laws of motion; force, mass, weight; work, energy, and power; elementary applications of the principles of conservation of energy and of linear momentum; the motion of a particle in a straight line with constant acceleration.

PHYSICS**O 54**

One paper (2½ hours) is set. The paper is divided into two sections, (A) easy questions of a short-answer type, (B) questions of greater length and difficulty.

Section A consists of ten questions, all of which must be answered, covering the whole syllabus.

Section B is divided into two parts, each consisting of five questions. Part I is set on **Matter and Energy** and **Electric Current and Electromagnetism**. Part II is set on **Electric Charge and the Structure of Matter** and **The Transmission of Energy by Waves**. Candidates must answer five questions from Section B, including at least two from each part.

There is no practical examination, but candidates are expected to have had suitable laboratory experience in addition to experimental demonstrations.

Matter and Energy

Mass, length, time, and their units (c.g.s. and M.K.S.).

Use of vernier and screw gauge. Volume measurement.

Density of solids, liquids, and gases.

Scalar and vector quantities. Composition and resolution of vectors (limited to the right-angled case). Notion of relative velocity.

Spring and direct-reading balances.

Moment of a force; couples; centre of mass; equilibrium.

Work and energy. The principles of simple machines, e.g. lever, inclined plane, simple pulley systems, screw.

Kinetic energy; potential energy (illustrations to include stretched springs, compressed air, water reservoir).

Uniform velocity; uniform acceleration; simple problems on uniformly accelerated motion in a straight line.

Momentum; impulse.

Newtonian mechanics

Newton's laws of motion. Force proportional to rate of change of momentum.

Absolute units of force; dyne and newton. Mass and weight. Conservation of momentum. Qualitative treatment of motion in a circle and gravitational attraction.

Power; absolute units of energy and power; erg, joule, kilowatt-hour, watt, kilowatt; horsepower as 0.746 kilowatt; simple experiments on power.

Properties of fluids and solids

Molecular motion; diffusion; Brownian motion.

Molecular attraction. Qualitative treatment of surface tension phenomena.

Upper limit of molecular size by surface film method. Pressure exerted by molecular bombardment. Transmission of pressure through fluids.

Manometers. Archimedes' principle; flotation and simple applications.

Atmospheric pressure. Principles of mercury and aneroid barometers.

Elastic behaviour of solids; Hooke's law.

Boyle's law.

The idea of temperature, introduced via two fixed points and an air thermometer. Celsius scale. The ideal gas equation. Idea of absolute temperature and absolute zero.

Expansion of solids and liquids; measurement of coefficient of linear expansion of a solid; liquid-in-glass thermometers.

Calorimetry

Heat as a form of energy; the joule and the calorie as units of heat, and determination of their numerical relation by a simple mechanical method.

Elementary calorimetry, with emphasis on methods based on constant rate of supply of heat. Specific heat.

Change of state; the expansion of water on freezing; latent heat of fusion of ice and latent heat of vaporization of water. Saturated vapour pressure; evaporation, boiling, variation of boiling-point with pressure.

Heat transfer by conduction and convection. Simple ideas of their mechanisms.

Electric Current and Electromagnetism

The idea of electric current, using d.c. sources. Magnetic, thermal, chemical, mechanical effects. Direction convention.

Simple properties of magnets and magnetic fields. Field plotting with small compass.

Force between current-carrying conductors. Principle of the current-balance. The ampere, defined in terms of force between conductors. The coulomb.

Faraday's laws of electrolysis. The Faraday. Determination of electrochemical equivalent of copper.

The volt, defined as watt-per-ampere or joule-per-coulomb. Energy conversions, treated quantitatively.

V/I characteristic of metallic conductor. Resistance and resistivity.

Units. Determination of resistance by simple two-meter experiments and by the substitution method. Effect of temperature on resistance (e.g., metal filament lamp, manganin, thermistor).

V/I characteristic of thermionic diode.

E.M.F., internal resistance, p.d.; comparison of p.d.'s by potentiometer; simple circuit problems.

Conversion of galvanometer to ammeter and voltmeter.

Magnetic flux patterns of current-carrying straight wire, plane coil, and solenoid. Electromagnets (effect of iron core treated qualitatively). Force on a straight wire carrying a current at right angles to a uniform magnetic field; induced e.m.f. in a straight wire moving at right angles to a uniform magnetic field; applications to simple d.c. motor, moving-coil galvanometer, simple alternator, and d.c. generator.

Rectification by diode and other methods.

Simple experiments on electromagnetic induction. The transformer.

Power loss in transmission lines.

Electric Charge and the Structure of Matter

Separation of charge by friction. The leaf electroscope.

The pulse (e.g. Wulf) electroscope. Simple experiments identifying current with flow of charge.

Simple ideas of electric field; potential differences in the field, explaining separation of charge by induction. Order of magnitudes of voltages and charges in such experiments.

Capacitance.

Thermionic emission of electrons. Properties of cathode rays; deflexion in electric and magnetic fields.

Ionization (demonstration using pulse electroscope).

Radioactivity. Ionizing radiations and their nature: α - and β -particles, range and magnetic deflection; γ -rays, range and absorption.

Radioactive decay. Half-life.

The Transmission of Energy by Waves

Examples of vibration. The pendulum. Interchange of kinetic and potential energy. Frequency and amplitude. Coupled pendulums; transmission of energy from driver to driven.

Mechanical wave models. Transmission of energy with velocity depending on medium. Longitudinal and transverse waves. Stationary waves. Reflection and refraction of plane and spherical wave-fronts incident on plane and spherical surfaces, illustrated by ripple tank.

Sound

Displacement and compression waves. Pitch. Measurement of frequency of fork. Measurement of speed of sound.

Electromagnetic sound generators. Vibrations of strings; relation between fundamental frequency and length.

Reflection of sound; echoes.

Light

Rectilinear propagation. Rays and ray-tracing.

Reflection and refraction of light. Snell's law. Formation of virtual image by reflection and refraction at plane surface.

Refraction by prism. Total internal reflection; use of 45° prism.

Simple converging lenses; determination of focal length by plane-mirror method. The camera; the eye as an optical instrument (questions on defects will not be set); the simple magnifying glass. Concave mirrors.

Determination of radius of curvature and focal length by optical methods.

Determination of the nature, size, and position of the image of a small line object on the axis and perpendicular to it, restricted to converging lenses and concave mirrors (graphical methods will be accepted).

Interference

Interference between two coherent wave-trains, and diffraction, as shown in a ripple tank. Interference effects with sound waves; stationary waves in tubes. Interference effects with light waves. Diffraction grating (treated as interference system); approximate wavelength determination.

The Electromagnetic Spectrum

Common properties (e.g. inverse square law) of the whole of the electro-magnetic spectrum, and characteristic differences.

Radio waves.

Infra-red radiation; approximate wavelength range, sources, detection by heating effect; blackened and polished surfaces as emitters and absorbers of infra-red radiation.

The visible spectrum. Types of spectra.

Ultra-violet radiation; approximate wavelength range, sources, ionization, photoemission, fluorescence.

X-rays and γ -rays (basic physical properties only).

CHEMISTRY

O 55

Two theoretical papers, I (2 hours) and II ($1\frac{1}{2}$ hours), and one practical paper, III ($2\frac{1}{2}$ hours), are set. All candidates must take I and **either II or III**.

In Paper I, candidates must answer Question 1, which consists of independent short-answer questions, and any three other questions, chosen from six. The questions in Paper II, which is alternative to the practical paper, are designed to test the candidates' familiarity with simple chemical laboratory operations of a preparative or analytical nature; candidates must answer three questions, chosen from five.

Heads of schools who cannot provide adequate accommodation and equipment must not enter candidates for the practical paper. The materials and apparatus required are those normally to be found in a school chemistry laboratory. Confidential information about any special materials required is sent to Heads of schools about six weeks before the examination. This information cannot be supplied earlier. Candidates are not allowed to bring into the laboratory for the practical examination any textbooks or analytical tables. Lists of approximate atomic weights are supplied.

I and II (Theoretical)

Questions will be set within the scope of the following syllabus. It is intended that the principles and theories indicated in part (a) shall be illustrated in the study of the substances scheduled in part (b).

Knowledge of the technical detail of large-scale plant is not required, except in so far as it is necessary for an understanding of the chemistry involved, but candidates may use diagrams where these help to clarify the answer.

Part (a)

Questions may be set (1) to test candidates' familiarity with simple practical operations in chemistry normally employed in the laboratory preparation of substances selected from the schedule of part (b), and (2) to invite interpretation of chemical evidence from data given or from observations made or described. Candidates are also expected to be able to perform or describe the commoner analytical tests for ions mentioned in the syllabus for Paper III (no particular technique or analytical scheme is specified or advised), and to be

able to recognize oxidizing and reducing agents. The use and function of common reagents such as barium chloride, potassium permanganate, &c., will be expected although these substances may not appear in the schedule.

Classification of matter

Solids, liquids, and gases, and the recognition of mixed states, e.g. suspension, solution, emulsion, mist, fog. Distillation and crystallization as methods of purification; use of physical properties for identification. Elements, compounds, and mixtures; use of symbols and formulae.

Properties of gases

Physical behaviour pattern exemplified by the laws of Boyle and Charles and by the phenomenon of diffusion; the Avogadro rule. Gay-Lussac law of combining volumes. Densities, and vapour densities relative to hydrogen. G.M.V. as the volume at S.T.P. occupied by the gram formula weight.

Qualitative picture of molecular kinetics.

Chemical change

Types of chemical change: synthesis, decomposition, displacement, oxidation, reduction. Chemical change considered as a redistribution of matter and energy. Exothermic and endothermic reactions; calorific value of fuels (details of practical measurements not required). Factors affecting the initiation and rate of chemical change: temperature and pressure or concentration (qualitative treatment only), state of division, light, catalysis; reversible reactions with recognition of the sign \rightleftharpoons ; simple idea of chemical equilibrium.

Electrochemistry

Use of electrical energy to effect chemical change.

Classification of substances as electrolytes or non-electrolytes (importance of solvent where appropriate). Qualitative comparison of conductances of solutions of strong and weak electrolytes.

Quantity of electricity required to liberate one gram atom of an element considered as a small whole number of Faradays. Electrons as the 'atoms' of electricity; electric current as a flow of electrons. Ions as charged particles formed from atoms (or group of atoms) by loss or gain of electrons; number of electrons gained or lost = valency; loss of electrons considered as oxidation. The electrochemical series as applied to the reactions of metals with water, dilute acids, and solutions of salts of other metals.

Electrolysis of (1) dilute acid using platinum electrodes, (2) copper sulphate solution using platinum electrodes, (3) copper sulphate solution using copper electrodes.

Chemical union

A simple model of an atom as consisting of a nucleus whose positive charge is balanced by extra-nuclear electrons in unspecified distribution (limited to the relationships: atomic weight = no. of protons + no. of neutrons; atomic number = no. of protons = no. of electrons). Isotopes. Electron transfer with formation of ions (electrovalency) and electron sharing with formation of molecules (covalency). Sodium chloride, methane, or carbon tetrachloride as 'ideal' examples. Ionic and molecular crystals and the effect of solvents. Precipitation as the rapid formation of an insoluble substance resulting from union of ions in solution. Neutralization as the formation of water from the appropriate ions. Use of molecular and ionic equations.

Metals

General properties (including formation of positive ions) contrasted with the properties of non-metals. Methods of isolation from compounds. Their reactions towards air, water (or steam), and acids. Simple treatment of corrosion and its prevention. Alloys, as specified in part (b). Relation between atomic weight and specific heat.

Acids, bases, and salts

General characteristics. Formation of salts by neutralization, by saturation of acid by oxide, carbonate, or metal, by precipitation, and by synthesis (a knowledge of the essential experimental details of the preparation of typical simple salts will be expected). Crystals and water of hydration; efflorescence and deliquescence.

Quantitative chemistry

Daltonian atomic theory illustrated by (1) law of conservation of mass from investigation of precipitation reactions, (2) law of constant composition from analysis of (say) copper oxide made in several ways, (3) law of multiple proportions from consideration of percentage composition of simple (binary) compounds leading to ratio of number of atoms present. Relative masses of atoms and atomic weight scale accepted from physical methods. Gram atom, gram formula, and their use in known (or given) equations. Empirical formula of carbon dioxide. Percentage loss of water from a salt hydrate leading to empirical formula for the crystals. Determination of the volume of gas produced in a reaction, and of the mass of solid solute obtained by evaporation of a solution. The idea

of chemical equivalence and of equivalent weights as illustrated by the experiments on copper oxide and carbon dioxide previously referred to, and by the results of Morley's experiments on the composition of water. Use of standard solutions of acids and alkalis in titrations (either equivalents and normalities, or gram formula weights may be used in the calculations set).

Chemical industry

Raw materials and their sources: air, sea, mineral ores, coal, petroleum, and hence the more important forms in which the elements listed below occur. An elementary study of the following: large-scale production of hydrogen, oxygen, chlorine, sodium, aluminium, calcium carbide, sodium hydroxide (electrolytic details not required), iron and steel; the electrolytic purification of copper; the production of common gaseous and liquid fuels; Haber process, the manufacture of nitric acid, contact process; carbon dioxide, quicklime, and slaked lime, as derived from calcium carbonate; sodium carbonate and bicarbonate. Candidates will be expected to know the uses of these substances.

Part (b)

Although detailed or comprehensive knowledge of the periodic classification is not expected, questions may be set which relate to the position in the Table occupied by sodium (group 1), calcium (group 2), aluminium (group 3), carbon (group 4), nitrogen (group 5), sulphur (group 6), the halogens (group 7), iron and copper (transition elements).

Hydrogen, oxygen, and argon. The properties of hydrogen and oxygen. Air and its composition. Argon as an example of an element with no chemical properties. Combustion and respiration. Water. Oxidation and reduction. The reactions of hydrogen peroxide solution.

Nitrogen. The properties of ammonia; ammonia solution and ammonium salts. The properties of nitric acid and its salts. Biochemical aspects of nitrogen and its compounds.

Carbon. Allotropic forms. The properties of carbon dioxide; carbonates and bicarbonates. Carbon monoxide from carbon dioxide; its combustion and reducing powers. Production of ethanol by fermentation of sugar (detail of enzyme action not expected). Properties of ethanol as representing a typical organic compound. Properties of ethylene and acetic acid. Relationship of organic acids with esters, fats, and soap. Methane, ethane, propane, and butane as fuels. Benzene from distillation of coal tar. Simple notion of molecular architecture based on the unique carbon-carbon link. Allotropy as alternative arrangements of similar atoms, isomerism as alternative arrangements of the same number of different atoms, and polymerization as an aggregation of a molecular species. Photosynthesis, and the carbon cycle.

Sulphur. Allotropic forms; its behaviour towards iron and copper compared with that of oxygen; sulphides. The properties of hydrogen sulphide. The properties of sulphur dioxide; sodium sulphite. Sulphur trioxide as an intermediate (not isolated) in the formation of sulphuric acid from sulphur dioxide. The properties of sulphuric acid; sulphates, sodium bisulphate, sodium thiosulphate.

Chlorine. Common salt, its extraction, properties, and reactions. The properties of hydrogen chloride and of hydrochloric acid; chlorides. Properties of chlorine; sodium hypochlorite solution. Bromine and iodine as analogues of chlorine, as shown by the properties of the elements and of chlorides, bromides, and iodides.

Sodium. Properties of the metal. Hydroxide, carbonate, bicarbonate, chloride, sulphate, bisulphate, sulphite, thiosulphate, nitrate.

Potassium as an analogue of sodium. Bromide, iodide, chlorate, potash alum.

Calcium. Properties of the metal. Oxide, hydroxide, carbonate, bicarbonate, sulphate (anhydrite, gypsum, plaster of Paris), chloride. Hard water.

Magnesium as an analogue of calcium. Oxide, hydroxide, carbonate, sulphate, chloride.

Aluminium. Properties of the metal. Oxide, hydroxide, chloride, potash alum.

Iron. Properties of the metal. Cast iron, steel. Ferric oxide and ferrosferric oxide; ferrous and ferric hydroxides; ferrous and ferric chlorides; ferrous sulphate; ferrous ammonium sulphate and potassium ferric alum; ferrous sulphide; the ferrocyanide and ferricyanide ions.

Zinc. Properties of the metal. Oxide, hydroxide, carbonate, chloride, sulphate, sulphide. Galvanized iron; brass.

Copper. Properties of the metal. Cuprous oxide; cupric oxide; carbonate, nitrate, chloride, sulphate, and solutions containing the cuprammonium ion.

Silver. Nitrate, chloride, bromide, iodide. Photochemical effect.

Lead. Properties of the metal. Solder. Lead monoxide, triplumbic tetroxide, lead dioxide; hydroxide, carbonate, chloride, nitrate, sulphate, sulphide.

III (Practical)

Candidates who elect to take Paper III instead of Paper II must offer section (a) below and either section (b) or section (c). The Head of their school must specify on the broadsheet entry form whether they are offering section (b) or section (c).

(a) Simple exercises of a preparative, manipulative, or analytic nature designed to test candidates' powers of observation and description. The formal identification of substances outside the syllabus will not be required.

(b) Qualitative analysis, restricted to identification of the following ions: sodium, potassium, ammonium, calcium, magnesium, aluminium, ferrous, ferric, zinc, copper, lead, chloride, bromide, iodide, nitrate, carbonate, bicarbonate, sulphide, sulphite, sulphate, thiosulphate. The substances set for analysis will be single substances and not mixtures, but they may include a double salt such as potash alum.

(c) A test which may be either a simple volumetric exercise involving the use of standard solutions of acids and alkalis or a simple gravimetric exercise involving the use of a balance, such as the determination of the loss of weight of a solid on heating. (Balances weighing to 0.01 gm. will be adequate.)

BOTANY**O 60**

Two papers are set, I and II (1½ hours each), both of which must be taken, and the second of which contains practical questions. For Paper II candidates must bring to the examination room a sharp penknife or scalpel, two needles mounted in handles, a hand lens and, for the Summer Examination only, one copy of a British Flora (Clapham, Tutin, and Warburg's *Excursion Flora of the British Isles* or *Flora of the British Isles*, without the illustrations by S. J. Roles, C.U.P. Candidates wishing to use any other Flora must apply for the approval of the Delegates before commencing their course of study). The use of mathematical instruments is permitted.

Candidates are expected to have studied organisms with the aid of a hand lens and, where necessary, a compound microscope or a microprojector.

1. General structure of the plant body so far as it can be observed with the naked eye or with the aid of a hand lens. Stem, leaf, root and their principal modifications. Herbaceous and arborescent plants. Perennation; vegetative propagation.
2. Angiosperm inflorescence. Structure of the flower and its parts and the more important modifications (e.g. perigyny, epigyny, gamopetal); functions of the floral organs; adaptations for pollination. Pollination and fertilization. Development and dispersal of seeds and fruits; germination.
3. Soil and its constituents in relation to plant life, including the more important soil bacteria. Absorption of raw materials. Diffusion and osmosis. Transpiration; photosynthesis; translocation and storage of foods; carbohydrates, fats, and proteins. Respiration and energy relationships. Growth. Responses to stimuli.
4. Structure of living cells. Structure and function of root-hair, mesophyll cell of foliage leaf, stoma. Sexual and asexual reproduction. An elementary treatment of genetics.
5. Structure, nutrition and life-histories of *Spirogyra*, *Mucor*, and *Phytophthora infestans*. Life-history of a fern.
6. Study of plants in a natural habitat or of weeds in cultivated ground. Candidates may be required to describe and identify common British Plants with the aid of a Flora.

ZOOLOGY**O* 61**

Two papers, I and II (2 hours each), are set and both must be taken. Paper II is a practical paper. Heads of schools who cannot provide the necessary accommodation and equipment must not enter candidates for this subject. The apparatus required is that normally provided in a school biological laboratory and should include microscopes having low (1 in. or ½ in.) and high (¼ in.) power objectives. Confidential information about any special materials required is sent to Heads of schools about six weeks before the examination; this information cannot be supplied earlier. For the practical examination candidates must bring to the examination room their own dissection instruments and a hand lens.

1. Differences between animals and plants. A mammal; general anatomy with reference to rabbit or rat; skull with reference to dog; physiology mainly with reference to man.

Anatomy.—External features; skin; skeleton; coelom; alimentary, blood-vascular, respiratory, nervous, sensory, excretory, reproductive, and endocrine systems.

Physiology.—Functions of the skeleton. Nutrition, ingestion, digestion, absorption, assimilation; vitamins, illustrated especially by vitamin C; transportation and storage of food. Secretion. Enzymes. Respiration. Waste substances and excretion. Hormones, illustrated especially by that of the thyroid gland. Brain, spinal cord, and co-ordination. Senses of touch, taste, smell, sight, and hearing. Reactions to stimuli; reflex action; movements; behaviour. Reproduction.

2. External features of *Rana* during its development from fertilization to metamorphosis, studied on the living organism.

3. Cellular structure of animals. Microanatomy of the following mammalian organs: skin, tooth, stomach, liver, pancreas, kidney, thyroid, ovary, testis. General characteristics and histology of the following tissues: epithelial, glandular, nervous, connective, skeletal, muscular, blood.

4. The cell, protoplasm, nucleus, chromosomes. Mitosis, meiosis, fertilization.

5. Structure, life-history, and mode of life of: *Amoeba*, *Hydra*, *Fasciola*, *Lumbricus*, *Apis* (excluding internal organs), *Scylliorhinus*, *Oryctolagus* or *Rattus*.

6. Evidence for organic evolution; the Lamarckian and Darwinian theories of the mode of evolution. An elementary treatment of genetics.

7. Natural history of animals. Adaptations of animals to their environment, as illustrated by the field study of **either** freshwater animals, **or** animals of the sea-shore, **or** insects.

BIOLOGY

O 62

This subject may not be taken with either Botany or Zoology at Advanced Level.

One paper (2½ hours) is set. The knowledge of candidates must be based on their observation in the laboratory and out of doors, but there is no practical examination. Candidates are expected to have studied organisms with the aid of a hand lens and, where necessary, a compound microscope or a microprojector.

General

1. The general physiology of organisms, as illustrated by a flowering plant and a mammal.

2. Nutrition, with special reference to the differences and interrelations between plants and animals. The study of air, water, and soil in relation to life. The carbon and nitrogen cycles. Raw materials of food. Diffusion, osmosis, absorption. Photosynthesis. Carbohydrates, fats, proteins. The transportation and storage of foods; enzymes, digestion. Waste substances and excretion. Transpiration. Respiration and energy relationships. Growth and movement. Responses to stimuli; geotropism and phototropism in plants; sense organs and nervous system in animals; hormones.

3. The cellular structure of organisms; protoplasm and nucleus. Sexual and asexual reproduction. An elementary treatment of genetics, omitting cytological details. Vegetative propagation.

4. The natural history of organisms with special reference to relationship with natural environment, as illustrated by **one** of the following: (a) plants (or weeds in cultivated ground); (b) freshwater animals; (c) insects; (d) organisms of the sea-shore.

Botany

5. The main structural features of a herbaceous flowering plant so far as they can be observed with the naked eye or with the aid of a hand lens. Structure of a living cell from the mesophyll of a foliage leaf; structure and function of stomata. The differences between herbaceous and arborescent plants (excluding histological detail).

6. Floral morphology as illustrated by the buttercup, a zygomorphic flower (e.g. the pea), and a composite. Pollination. Fertilization (omitting microscopical detail); the formation and structure of fruits and seeds. Mechanisms of fruit and seed dispersal. Germination of seeds of broad bean, maize, sunflower, and castor oil.

7. The structure, nutrition, and life-histories of *Euglena*, *Spirogyra*, and *Mucor*.

Zoology

8. The general structure and biology of a mammal as exemplified by the rabbit or other small mammal. The skeleton, omitting the skull. Organs and organ systems, their functions and co-ordination, with some reference to human physiology.

9. The external features of development of the frog from fertilization to metamorphosis so far as they can be observed with the aid of a hand lens.

10. A general comparison of the reproductive processes and modes of development in amphibians, birds and mammals (omitting embryological details).

11. The external structure, life-history, and habits of the honey-bee, of a butterfly or moth, and of one of the following fish: dogfish, eel, herring, salmon, stickleback, trout.

12. The structure, nutrition, and life-histories of *Amoeba* and *Hydra*.

HUMAN BIOLOGY AND HYGIENE

O 63

This subject may be taken with any other science subject offered at any level.

One paper (2½ hours) is set, containing ten questions, of which candidates must answer six. Candidates are expected to have previously pursued a course of elementary science, including biology, and to have a sufficient knowledge of physics and chemistry to be able to understand the physiology and hygiene included in the syllabus; and the questions, set on the syllabus which follows, are framed in such a way as to test this knowledge. Wherever possible throughout the course, the work must be based on observation and simple experiment.

The attributes of living organisms. The living cell. Distinction between cells, tissues, and organs. The interaction between living organisms and their environment. Comparison of plants and animals. The interdependence of plants and animals. The sun as the origin of the energy of living organisms. Plants as the main source of man's food. The relationship between form and function.

Man as a mammal. General structure of a mammal. Position of the principal organs and cavities of the body in relation to one another. (It is suggested that the rat, the rabbit, or the guinea-pig be used for demonstration dissections by the teacher to illustrate general anatomy.)

The skeleton and its functions. Types of joints: gliding joints, pivot, ball and socket, hinge, immovable joints. Muscles; their origin and insertion in relation to movement; movement as brought about by the co-ordinated contraction and relaxation of opposing sets of muscles. The principle of levers applied to movement of joints. The characteristics of good posture. The importance of exercise. Work, fatigue, rest.

Circulatory system. Position of the heart in the thoracic cavity. Structure and action of the heart. Structure and functions of the blood; circulation of the blood. (Candidates will be expected to know the main course of blood circulation but the names of blood-vessels will not be required other than aorta, superior and inferior venae cavae, pulmonary artery and vein, portal vein, renal artery, renal vein, carotid artery, jugular vein.) Lymph and lymphatics.

The respiratory system. Lungs: trachea, bronchi, alveoli. The mechanism of breathing. Tissue respiration leading to the provision of energy for the activities of life. The difference between fresh air and expired air. Importance of nose breathing; function of the mucous membrane. Simple investigation of the relation between breathing, the heart beat, and muscular activity. Variation in the composition of air; the value of ventilation (to be considered also under regulation of temperature).

Food and its uses. Basic food requirements; proteins, carbohydrates, and fats; mineral salts, vitamins, and water. The importance of a balanced diet and of regular meals. Food requirements during infancy, childhood, and adult life. Relative requirements of manual and sedentary workers.

The alimentary canal. The structure and function of teeth. Digestion of food in the mouth, stomach, and small intestine. Food absorption and transport. Functions of the large intestine. Enzymes; simple experiments with enzymes (e.g. pepsin and diastase for ptyalin in saliva), to illustrate their properties. Liver and pancreas.

The structure and functions of the skin; regulation of body temperature. The importance of suitable clothing. The dangers resulting from dirty skin and hair.

The excretory system: kidneys. Structure and functions of the kidneys and bladder.

The nervous system; the brain and spinal cord. Reflex action; conditioned reflexes; autonomic nervous reactions. Voluntary actions; habit formation. Sleep. The sense organs and their work; the skin as a sense organ; organs of taste and smell. The general structure and action of the eye and ear. Long sight and short sight and the elements of their correction by spectacles.

Ductless glands and hormones. Simple treatment of endocrine secretions in general, with special reference to the thyroid and pituitary.

Reproduction and heredity. Male and female organs. The formation of sex cells. Fertilization. Development of fertilized ovum, excluding details of cell division; an outline of the growth of the foetus. Special needs of the pregnant woman. Mammary glands. Lactation. An outline of Mendelian inheritance applied to not more than two pairs of independent hereditary factors.

Diseases and how they are spread. Simple study of micro-organisms in relation to disease. Simple experiments to show the presence of micro-organisms in air, water, milk, and on the hands. Insects as carriers of disease. The life-history of the housefly. The role of the housefly in spreading disease, e.g. summer diarrhoea, dysentery, typhoid. Immunity; vaccination; immunization. The common cold, influenza, whooping-cough, mumps, diphtheria, small pox, measles, scarlet fever, poliomyelitis, tuberculosis; the transmission of these diseases and the role of immunity in each case. Commonly occurring parasites, e.g. worms in children.

Food storage and preservation. Sources of food contamination. Inspection of food.

Housing. The importance of sunlight to health; principles involved in the lighting, ventilation, and heating of buildings. Relation between overcrowding and health. The importance of open spaces, e.g. parks and playgrounds. The town water-supply. Sources of water-supply, e.g. rain water, springs, wells, rivers. Impurities in water and their source; methods of purification. Water-borne diseases, e.g. typhoid. Disposal of waste matter, including kitchen waste and sewage. Healthy habits and the part they play in preventing disease.

Public Health and National Health Services. Laws to safeguard the health of factory workers.

GEOLOGY

O* 64

Two papers, I and II (2 hours each), are set on the following syllabus. Both are theoretical papers, and there is no practical examination, but questions are set to test whether the candidates have engaged in field studies, and developed powers of observation. It is assumed that candidates possess a knowledge of elementary physics and chemistry, and questions in geology may be set which involve such knowledge.

The outlines of geology, i.e. the principal igneous, aqueous, and metamorphic rocks; denudation; deposition of stratified rocks; dip, strike, joints, cleavages, faults, dykes; unconformable stratification; the principles on which the relative ages of rocks are determined and the use of fossils; the outlines of stratigraphical geology; relationship of surface to geological structures.

CHEMISTRY-WITH-PHYSICS

O 70

This subject may not be taken with either Chemistry or Physics at Advanced Level.

Two theoretical papers, I and II (1½ hours each), are set, and both must be taken. There is no practical paper. Paper I contains questions on the Physics section of the syllabus only, and Paper II contains questions on the Chemistry section only. In both papers there is considerable choice of questions. Simple numerical questions are set where necessary to test the proper understanding of principles.

I. PHYSICS*Mechanics and Hydrostatics*

Velocity, acceleration. Force, mass, weight. Momentum; conservation of momentum. Composition and resolution of forces, including parallel forces.

Moments and centre of gravity.

Density; its determination by direct measurement of mass and volume. Specific gravity; its determination for a solid by the principle of Archimedes, and for a liquid by specific gravity bottle. Principle of flotation. Common hydrometer and its uses.

Fluid pressure. Boyle's Law. Simple experiments. The mercury barometer.

Surface tension.

Energy, kinetic and potential. Transformation and conservation of energy. Work. Power and horse-power.

Simple machines; mechanical advantage, velocity ratio, and efficiency.

Heat

Heat and temperature. Thermometers, including maximum and minimum and clinical thermometers. Centigrade and Fahrenheit scales with conversion from one to the other.

Thermal expansion of solids, its applications and consequences; a simple method for its measurement. Demonstration of the difference between the real and apparent expansion of liquid. Anomalous behaviour of water. Determination of coefficient of volume expansion of gas and liquid. Charles's Law. Absolute zero; absolute temperature.

Calorie. Thermal capacity. Determination of specific heat of solid and liquid by method of mixtures. Latent heats of fusion and of evaporation and their determination for ice and water.

Vapour pressure, evaporation, boiling. Atmospheric humidity, dew, mist.

Transference of heat; conduction, convection, radiation; simple applications.

Light and Sound

Rectilinear propagation of light. Shadows and eclipses. Laws of reflection and refraction and their verification. Formation of images by reflection at plane and spherical surfaces and by thin lenses. Simple graphical constructions to show formation of images. Total internal reflection, critical angle.

Simple optical instruments; periscope, projection lantern, camera, telescope, microscope.

The spectrum; its production.

Sound as an illustration of wave motion with special regard to frequency, wave-length, and velocity. Reflection of sound.

Magnetism and Electricity

Magnets and their properties. Plotting magnetic fields. The magnetic compass. The earth's magnetic field.

Magnetic effect of an electric current. The electric bell.

Heating effect of an electric current.

Chemical effect of a current. Faraday's Laws. Electrolysis. Simple cell. Polarization and local action. Daniell and Leclanché cells.

Ohm's law. Practical units of current, of potential difference and of resistance. The watt and kilowatt-hour.

Comparison of resistances by Wheatstone bridge. Resistances in series and in parallel. Shunts.

Magnetic behaviour of a closed circuit carrying a current. Simple galvanometers, ammeters, and voltmeters.

The E.M.F. and P.D. of a cell. Internal resistance; cells in series and in parallel.

Principle of electromagnetic induction illustrated by simple experiments.

II. CHEMISTRY

Elements, compounds, and mixtures.

Densities of gases (vapour density).

The Avogadro rule. Relation between vapour density and molecular weight.

Characteristics of chemical combination. Laws of Definite and Multiple Proportions.

Equivalent weights of elements, acids, and bases.

Relation between atomic and equivalent weights. Valency. Atomic weights of metals from their equivalent weights and specific heats.

Use of symbols for atoms of elements and of formulae for molecules of compounds. Chemical equations and their quantitative significance, including volumes of gases involved.

Characteristic properties of metals. Comparison of their oxides with those of non-metals. General methods of preparing metallic oxides. Common alloys and their uses.

Catalysis.

Characteristics of acids, bases, and salts. General methods of preparing salts (*a*) by neutralization of acid with alkali, (*b*) by saturation of acid with oxide, carbonate, or metal. Simpler aspects of ionic theory as illustrated by formation of precipitates, by conduction,

by salt solutions, and by electrolysis. Electrolysis of copper sulphate solution, and of a solution of sodium chloride in a divided cell. Electro-plating.

Gravimetric composition of water. Determination of equivalent weight of a metal by the evolution of hydrogen from an acid. Use, in volumetric analysis, of standard solutions of acid and alkali.

Hydrogen. Oxygen. Outlines of their laboratory and large-scale production and uses. Water. Water of crystallization. Oxidation and reduction, limited to addition and subtraction of oxygen and hydrogen only.

Nitrogen. Ammonia, ammonium salts. Nitric acid and nitrates. Nitrogen cycle.

Air. Its composition. Function of nitrogen, oxygen, and carbon dioxide in the atmosphere. Combustion.

Carbon. Allotropic forms. Carbon dioxide. Coal. Carbon and its compounds as fuels. Carbon monoxide. Fuel gases—coal-gas, water-gas, producer-gas. Carbonates and bicarbonates.

Sulphur. Rhombic, monoclinic, and plastic sulphur. Dioxide and trioxide. Sulphuric acid, its manufacture (contact process) and uses. Hydrogen sulphide.

Chlorine. Common salt. Hydrochloric acid. Isolation, properties, and uses of chlorine. Bleaching powder, Sodium hypochlorite.

Sodium nitrate, sodium hydroxide, sodium carbonate, sodium bicarbonate. Potassium nitrate, potassium chlorate.

Calcium. Oxide, hydroxide, carbonate, sulphate, chloride, and their uses. Calcium bicarbonate. Hard water.

Iron. Occurrence as oxides. Blast furnace. Production of cast iron. Steel. Ferrous and ferric chlorides and sulphates.

Zinc. Production of the metal from its oxide. Uses of the metal. Sulphate.

Copper. Electrolytic purification of the metal. Its uses. Cupric oxide. Cupric sulphate and nitrate.

Lead. Properties and uses of the metal. Chloride and nitrate.

GENERAL SCIENCE

O 71

This subject may not be taken with more than one of Physics, Chemistry, and Biology at Advanced Level. It may be taken with Botany and Zoology at Advanced Level, provided that neither Physics nor Chemistry is taken at Advanced Level at the same examination.

Two papers, I (1 hour) and II (2 hours), are set, on the portions of the following syllabus not printed in italics, and both must be taken. There is no practical examination.

In the following syllabus the subject is presented under the three headings of Physics, Chemistry, and Biology, but this is not to be taken as indicating that these subjects are to be presented as separate sciences. Paper I consists of a large number of short questions, each of which is to be answered in a few words, and candidates are instructed to answer as many of the questions as they can in the time available. Paper II consists of a number of longer questions and offers a reasonably wide choice, but it is divided into three sections and candidates are required to answer questions from each section.

Physics.

Motion; velocity and acceleration; *composition and resolution of velocities.*

Force; the spring balance and its use in measuring forces; parallel forces; the principle of moments; *composition and resolution of forces.*

Centre of gravity in simple cases; *its relation to stability.*

Effects produced by a force; laws of motion; mass and weight; *momentum.*

Density; its determination by direct measurement of mass and volume. Relative density (specific gravity); its determination for a solid by the principle of Archimedes, and for a liquid by specific gravity bottle and by hydrometer. Flotation in liquids and in air.

Work and its measurement in ft. lb., &c. Kinetic energy and potential energy; their conservation in absence of friction. Power; horse-power.

Simple machines (e.g. inclined plane, lever, pulley). Mechanical advantage, velocity ratio, efficiency.

Isochronism of simple pendulum; observation of relation between length and time of swing.

General differences between solids, liquids, and gases. *Hooke's law; elastic limit.* Pressure and its measurement; simple barometer; aneroid barometer; Boyle's law. Pumps (common, force, and *centrifugal*). The siphon.

Simple explanation of properties of liquids and gases in terms of molecules. Experimental treatment and importance in natural phenomena of surface tension, capillarity, diffusion, and osmosis.

Thermal expansion of solids, liquids, and gases. Applications and consequences. Thermometers (including maximum and minimum and clinical thermometers, but not including details of construction); temperature scales (C. and F.) and their interconversion. Thermostats. Anomalous expansion of water. *Determination by simple methods of linear coefficients of expansion of solids and of volume coefficients of liquids and gases. Charles's law; absolute temperature.*

Units of heat; calorie, B.Th.U., and therm. Definition and measurement of specific heat.

Heat a form of energy. Transformation and conservation of energy. Mechanical equivalent of heat; *its determination by simple methods.* Simple account of the steam-engine and internal combustion engine.

Change of state, ebullition, evaporation, fusion. Latent heats *and their measurement.* Refrigerators. Vapour pressure. Atmospheric humidity, dew, mist. Effects of pressure and of dissolved substances upon boiling-points and freezing-points of liquids.

Transmission of heat; conduction, convection, radiation; heat insulation.

Sound due to vibration and requiring material medium for propagation; sound as an illustration of wave motion with special regard to frequency, wave-length, and velocity. Reflection of sound. *Dependence of frequency of a vibrating string on its length and tension. Vibrating air columns. Resonance.*

Rectilinear propagation of light; shadows and eclipses.

Reflection of light at plane surfaces. Refraction; *Snell's law.* Refraction by a prism.

Total internal reflection; *critical angle.* Periscope.

Convex and concave mirrors, converging and diverging lenses, experimentally studied. Graphical methods for position and size of images. Uses of mirrors and lenses.

The eye; accommodation; cause and correction of long and short sight; the blind spot.

The camera and the projection lantern. *The telescope (two lens forms only) and microscope.*

Dispersion and colour; the spectrum; *ultra-violet and infra-red regions; elementary ideas of spectrum analysis.*

Magnetic substances. Properties of magnets; permanent and temporary magnets.

Plotting magnetic fields by iron filings. The magnetic compass. The earth as a magnet. The simple cell; Leclanché cell; dry cell; polarization. *Use and care of the lead accumulator.*

Magnetic and thermal effects of electric current. Simple practical applications; fuses. The electric bell. *The telephone.*

Potential-difference; current strength; resistance. Practical units of measurement. Statement and application of Ohm's law. Use of simple galvanometers (excluding tangent galvanometers), ammeters, and voltmeters. *Resistances in series and in parallel. The E.M.F. and P.D. of a cell. Internal resistance. Cells in series and in parallel.*

The watt; the kilowatt hour; lamps; *relation between watts and horse-power.*

Principle of electromagnetic induction illustrated by simple experiments. Simple dynamo and D.C. motor. *Induction coil and transformer. Simple experiments in illustration and to show the difference between A.C. and D.C.; A.C. generator; A.C. motor.*

Chemistry.

Classification of substances as elements, compounds, and mixtures; chemical combination; Law of Definite Proportions.

Atoms and molecules; symbols, formulae, and equations, to represent quantitative relations. Energy changes accompanying chemical reactions.

Metals and non-metals, with common examples. Common alloys and their uses.

Laboratory preparation and properties of oxygen. Acidic and basic oxides. Common acids and alkalis; salts and their preparation. The main constituents of air. Determination of the proportion of oxygen. *Preparation of oxygen from air by liquefaction.* Combustion, respiration, rusting.

Laboratory preparation of hydrogen and its uses in relation to its properties. *Production of hydrogen on a large scale.*

Synthesis of water by combustion of hydrogen or by reduction of red-hot copper oxide with hydrogen. *Gravimetric composition of water.* Importance of water as a solvent. Solution, saturated solution, solubility. Influence of temperature on solubility. Evaporation. Crystallization; water of crystallization. *Solubility curves.* Solubility of gases, especially of oxygen and carbon dioxide, and importance of this in relation to aquatic life and to erosion, &c. *Chemical and physical forces at work during rock disintegration.*

Carbon and its allotropic forms. Its presence in organic material. Coal. Carbon dioxide; photosynthesis and the carbon-dioxide cycle. Preparation and uses of carbon monoxide. Oxidation and reduction. Extraction of iron. Flames; the bunsen burner. *Coal-gas, water-gas, producer-gas as fuels.*

Sulphur; occurrence, extraction, and uses; the effect of heat and behaviour on cooling. Sulphur dioxide and trioxide. Importance of sulphuric acid, and its manufacture.

Chlorine. Common salt. Sea-water. Salt deposits. Hydrogen chloride; its solubility in water; hydrochloric acid. Production of chlorine from hydrochloric acid and from sodium chloride. Properties and uses of chlorine and of hydrochloric acid. *Bromine and iodine as analogues of chlorine.*

Nitrogen. Production of nitric acid from nitre *and from atmospheric nitrogen*. Nitrates; their absorption by plants and the formation of plant proteins, serving as food for animals; decay of proteins leading to liberation of ammonia. The laboratory preparation of ammonia *and its industrial synthesis from nitrogen and hydrogen*. Properties of ammonia; ammonium salts. Ammonia in the soil converted into nitric acid and thence nitrate. Nitrogen cycle. *General account of importance of nitrogen compounds. Nitric oxide and its conversion into nitric acid. Preparation of nitrous oxide and distinction between it and oxygen.*

Calcium carbonate, quicklime, slaked lime, and their uses. Lime-water and its behaviour towards carbon dioxide. Temporary and permanent hardness of water. Softening of hard waters. *Use of slaked lime to produce caustic soda from washing soda.*

Electrolytes and non-electrolytes. Ions. The electrolysis of copper sulphate solution (a) with platinum electrodes, (b) with copper electrodes. The electrolysis of water (dilute sulphuric acid). Laws of electrolysis. Electro-plating. *Electrolytic preparation of magnesium and aluminium. Production of caustic soda from brine in divided cell.*

Equivalent weights. *Their determination by direct methods.*

Biology

The work in this section is to be based on the observation of plants and animals in their natural surroundings as well as under controlled conditions, with special regard to their relationship to their environment and to one another.

The contrast between living and non-living things, and between organisms and engines.

The form, life-history, and physiology of a herbaceous plant. The flower structure of the buttercup. Functions of root, stem, and leaf. The soil and its constituents. Absorption. Transpiration. Photosynthesis. Respiration. Effects of stimuli. Pollination. Fertilization. Fruits and seeds, and their dispersal. Storage and digestion of food. Translocation. Germination and growth. Vegetative propagation; tubers, corms, bulbs, *runners, rhizomes*. Cuttings, *grafting and budding*. *Some knowledge of minute structure of plant parts, e.g. vascular system and cambium, pollen tube, and ovule.*

The external structure and life-history of a frog, a butterfly, *and a honey-bee*. *The general structure and biology of a mammal as exemplified by the rabbit or other small mammal.*

Outlines of human anatomy and physiology (with special reference to hygiene). General structure of the body. Limbs and their major movements. Sense organs. *Nervous system and brain. Control of the body. Reflex action. Hormones.* Functions of skin, teeth, respiratory system. The blood; heart, arteries, veins, capillaries. Foods; carbohydrates, fats, proteins, *vitamins*; food values; *food-deficiency diseases*. Alimentary canal; digestion; enzymes; assimilation; excretion; growth and reproduction.

The cell as the unit of living matter. *Cell structure*. Simple study of Amoeba, Hydra, Spirogyra, *Chlamydomonas, Mucor*.

Reproduction, asexual and sexual. *Heredity. Crosses involving only one pair of Mendelian factors. Dominants, recessives; genotypes, phenotypes.*

Comparison of nutrition in green plants and animals. *Main characteristics of parasites and saprophytes.*

Preservation of food. Insects as agents of transmission of disease. Housefly. *Malarial mosquito.*

ADDITIONAL GENERAL SCIENCE

O 72

One paper (2 hours) is set on the whole of the General Science syllabus, including the portions printed in italics. All candidates taking Additional General Science must also take General Science at the same examination. The work of candidates who take the three papers O 71, I and II, and O 72 is considered as a whole for the award of a 'pass' in General Science only or of 'passes' in General Science and Additional General Science.

AGRICULTURAL SCIENCE

O 73

Two papers (1½ hours each) are set. All candidates must take both papers. Paper I deals with the general principles common to all agricultural and horticultural production. Paper II is divided into alternative parts, the one dealing with agriculture and the other with horticulture, and candidates must choose **one** of these.

It is intended that emphasis should be laid on principles involved rather than on detail; the papers are framed in such a way as to test whether the candidate has an adequate knowledge of biology and as far as possible the aim is to show the linkage between science and practice.

While the principles of sound agriculture and horticulture remain constant, detailed practice may vary from place to place. To illustrate principles, teachers may wish to refer to practices likely to be within the local experience of individual candidates. Candidates will, therefore, be encouraged to refer to such practices and should be prepared to state the locality to which they refer.

Paper I

1. Constituents of soils; sand, silt, clay, chalk, organic matter, humus; soil colloids. Simple experiments to demonstrate their properties. Quantitative determination of total pore-space, water, and organic matter. The soil in relation to water; water-holding capacity and the factors which affect it; movement of water in the soil; availability of water to the plant.
2. Effect on the soil of lime or chalk, organic matter. Soil reaction and simple tests for its determination. The meaning of lime requirement. Forms and uses of lime and chalk. Drainage and draining.
3. Outline of the construction and mode of operation of **one** of the following internal combustion engines: two-stroke; four-stroke; Diesel. Cultivating implements and their uses (principles only—details of operation not required).
4. The chief plant-nutritional substances found in the soil. Nitrogen, carbon, and water cycles. Humus as a reservoir for water and mineral nutrients. Relation of soil organisms to fertility. Principles of crop rotation.
5. Principles of manuring. Chief manurial elements. Importance of trace elements. Organic and inorganic manures. Green manuring. Composts. Chief nitrogenous, phosphatic, and potassic fertilizers and their approximate percentage composition (only so far as main ingredients are concerned—details of sources and manufacture of fertilizers **not** required).
6. Plant structure; stem, root, leaf and their major modifications; the flower. Structure of a cereal grain and a broad bean seed. Germination and the conditions necessary for it. Annual, biennial, and perennial plants. The nutrition of a flowering plant.
7. An elementary treatment of genetics. Principles of breeding, illustrated by reference to **either** animals **or** plants.
8. Proteins, carbohydrates, and fats as the basic foods and reserve substances of animals and plants. Minerals in nutrition. The alimentary canal and digestive processes in a mammal. Enzymes and their functions. Vitamins and hormones in animals and plants. Saprophytes; parasites; symbionts. Life history of an insect and of a fungus.

Paper II

A. Agricultural

1. Chief types of farming: arable, grazing, sheep, mixed. Factors that affect farming: e.g. capital, type and proximity of markets, soil, situation and site, climate. Crops. Preparation of seed-bed. Simple classification of crops. Practice of crop rotation. Cultivation and conservation (details of seed-rates, seed-mixtures, and yields not required) of the chief cereal, pulse, root, and fodder crops (wheat, oats, barley, beans, mangolds, swedes, turnips, sugar-beet, potatoes, kale, cabbage, lucerne, sainfoin). Silage. Grassland—pasture, meadow, and ley; principles involved in grassland improvement. Chief implements used in crop production and conservation.
2. Management of stock: cattle, sheep, pigs, and poultry. A knowledge of the points of good conformation in live-stock. Maintenance and production rations (numerical details not required). Characteristics of the more important home-grown and imported foodstuffs (detailed analyses not required).
3. Chief weeds of arable and pasture land. The principles underlying their eradication and control. The use of synthetic weed killers.
4. Damage caused by and principles of methods of control of pests and diseases, with special reference to:
 - (a) potato-blight, take-all, a virus disease;
 - (b) potato-root eelworm, wireworm, an Aphid;
 - (c) tuberculosis, ringworm, foot and mouth disease, coccidiosis, stomach worms, liver-fluke.
5. Beneficial insects and birds.

H. Horticultural

6. Chief types of horticultural enterprise: market-gardening, glasshouse production, plant propagation, seed-production, fruit growing. Factors that affect horticultural enterprise—e.g. capital, markets (type and proximity), soil (situation and site), climate.

7. Vegetables. Choice of soil and site. Planning, preparation of seed bed, planting. Cultivation of the chief kinds of vegetables. Rotation of vegetable crops. Catch-cropping and inter-cropping. Fruit. Site and soil for orchards. Layout and upkeep. Propagation, planting, cultivation, and pruning of the principal fruits (apple, pear, plum, cherry, currants, raspberry, strawberry).

8. Hardy ornamental plants. Hardy and half-hardy annuals. Hardy biennials. The planning, planting and maintenance of the herbaceous border. The uses of shrubs and ornamental trees in gardens.

9. A general knowledge of the principal commercial crops grown in glasshouses—tomato, cucumber, lettuce, chrysanthemum, carnation, pot plants—to illustrate the principles of glasshouse production.

10. Chief weeds of gardens and horticultural land. The principles underlying their eradication and control. The use of synthetic weed killers.

11. Damage caused by and principles of methods of control of pests and diseases, with special reference to:

- (a) potato-blight **or** damping-off, a powdery mildew, apple scab, mint rust **or** antirrhinum rust **or** chrysanthemum rust, a virus disease;
- (b) potato-root eelworm, wireworm **or** turnip flea-beetle, cabbage-white butterfly, an Aphid, a sawfly, onion fly **or** carrot fly **or** cabbage-root fly.

12. Beneficial insects and birds.

ELEMENTARY AERONAUTICS**O* 74**

A candidate cannot pass in this subject unless he passes at the same examination in either Physics, Chemistry-with-Physics, or General Science.

One paper (2 hours) is set. The paper is divided into two sections, each containing four questions; candidates must answer questions from both sections.

Section A—Principles of Flight

This part of the syllabus should be treated in a simple manner such as in the account given in *Aerodynamics* by J. E. Allen (Hutchinson), or in *The Science of Flight* by O. G. Sutton (Pelican) which is now out of print but may be used if available. *Shape and Flow* by A. H. Shapiro (Science Study Series, Heinemann) is also useful for reference.

Air Flow. (The treatment of this section is entirely descriptive. Relevant demonstrations should, wherever possible, be seen by the students.)

Streamline and shock-wave patterns for the flow past bodies of simple geometrical shape (e.g. plates, wedges, cones, cylinders, and spheres) at subsonic and supersonic speeds. Boundary layer flow; causes and consequences of boundary layer separation. Streamlining. Mach number and its significance; properties of shock waves; causes and consequences of shock-wave formation. Flow past wings. Flow through propellers, helicopter rotors, jet engines, and rocket nozzles.

Aerodynamic Forces. (In this section the relevant principles of mechanics and thermodynamics are introduced.)

Bernoulli's equation ($p + \frac{1}{2}\rho V^2 = \text{constant}$) for low speed flow, the energy equation ($\frac{1}{2}Pv^2 + CpT = \text{constant}$) for high speed flow. The gas law $P/\rho T = \text{constant}$. The momentum principle. Application of these principles to account for the pressure and temperature distributions and the forces associated with the flows described in the section on Air Flow. The graphs of lift and drag against angle of incidence for a wing. Form drag, skin friction, and induced drag. Lift and drag coefficients. The graph of drag coefficient against Mach number for a wing at constant incidence. Means of obtaining high lift and low drag.

Flight Mechanics. (In this section the production of the required motion of an aircraft by the aerodynamic forces in accordance with Newton's laws is studied.)

The forces and torques on an aircraft in steady, straight, and level flight and in simple manoeuvres. Use of the drag equation $D = AV^2 + B/V^2$; minimum drag speed. Aerodynamic controls, their operation and effect; automatic pilots. Stability; means of ensuring stable flight.

Section B—Aircraft Operation

Cosmography. The solar system; the annual and diurnal motion of the earth. Measurement of position and direction in relation to the earth. The construction and use of maps; special features of maps used in aviation. Measurement of direction and distance on maps.

Meteorology. (Students should be encouraged to observe the weather.)

The composition and structure of the atmosphere. Measurement of temperature, pressure, and wind velocity. Large-scale horizontal, vertical, and temporal variations of temperature, pressure, and wind. Depressions, anti-cyclones, and fronts; synoptic charts. The origin and appearance of the main types of cloud; the weather associated with these clouds. Fog. Icing; ice prevention.

Navigation. Flight instruments. Dead reckoning; the velocity triangle. Principles of astro-navigation; identification and naming of the major navigational constellations and stars. Principles of radio- and radar-aids to navigation.

WOODWORK AND METALWORK

[The Delegates are prepared to consider proposals for the examination of candidates in other suitable crafts, e.g. pottery, but the extent to which such examinations would be possible would depend on the availability of visiting examiners. Application should be made in accordance with the rules for papers on specially-approved syllabuses set out in § 6, p. 7.]

Heads of schools who cannot provide adequate accommodation and equipment for the practical examination must not enter candidates for these subjects. The tools normally to be found in a school workshop are required. Confidential information about any special material needed may be obtained from Oxford in March for the Summer Examination or in September for the Autumn Examination.

Candidates may take either Woodwork or Metalwork, or both. In each craft two three-hour papers are set. Paper I contains questions on Drawing and on Theory. Candidates are expected to devote about one hour to the Drawing section. The recommendations of the British Standards Institution on *Drawing Office Practice for Architects and Builders*, B.S. No. 1192; and *Engineering Drawing Practice*, B.S. No. 308, should be followed, so far as they apply, in the preparation and dimensioning of drawings. Paper II is a practical test. Candidates are required to satisfy the examiners in each paper.

O 80

Woodwork

I. *Drawing and Theory*

Drawing. Ability to make and read properly dimensioned working drawings to scale, in orthogonal projection, using drawing-board, tee-square, and drawing instruments. Measurements may be in either English or metric units.

Details of construction may be shown by means of freehand sketches, isometric or oblique projection, or other methods of pictorial representation.

Only sections parallel to vertical or horizontal planes are required.

Theory. There are two sections, and candidates are expected to answer at least one question from each section.

TOOLS, MATERIALS, CONSTRUCTION, PROCESSES, AND FINISHES

An elementary knowledge of:

Tools: common kinds and their uses, their construction, sharpening, and upkeep.

Materials: characteristics of soft and hard wood in common use; growth, conversion, seasoning, and defects; plywood, blockboard, veneer and laminated boards; preparation and properties of animal, casein, and synthetic resin glues; glasspaper, screws, nails, stains, and polishes.

Construction, Processes, and Finishes: preparation of a cutting list from dimensioned drawings; common joints and their application; glueing and assembling of small jobs; finishing processes.

HISTORY AND DEVELOPMENT

Development of construction in wood with reference to one of the following crafts: carpentry and joinery, cabinet-making.

A knowledge of design as applied to woodwork construction, illustrated by simple articles suitable for use in the home and garden; fitness for purpose; general proportions; suitable construction; contour and surface decoration; appropriate finish.

II. *Practical*

The use of the common hand tools and methods of construction; types of joints and the correct use of one or more of these in given pieces of constructional work in cabinet-making or carpentry and joinery; correct use of nails, screws, and glues as means of fastening; working from dimensioned sketches and completed scale drawings.

Candidates should be familiar with the following joints and their application to construction: the housing, halving, dovetail halving, bridle, the through and stopped mortise and tenon joints, the long and short shoulder mortise and tenon joint, the common and lapped dovetail joints; basic tool operations including rebating, grooving, shaping, and simple moulding.

O 81

Metalwork

I. *Drawing and Theory*

Drawing. Ability to make and read properly dimensioned working drawings to scale, in orthogonal projection, using drawing-board, tee-square, and drawing instruments. Measurements may be in either English or metric units.

Details of construction may be shown by means of freehand sketches, isometric or oblique projection, or other methods of pictorial representation.

Only sections parallel to vertical or horizontal planes are required.

The making of geometrical development suitable for sheet metalwork.

Theory. There are two sections, and candidates are expected to answer at least one question from each section.

TOOLS, MATERIALS, CONSTRUCTION, PROCESSES, AND FINISHES

An elementary knowledge of:

Tools: common kinds and their uses, their construction, sharpening, and upkeep.

Materials: elementary knowledge of the various metals and alloys in common use in the handicraft room; their production and preparation for various purposes; the nature and use of solders, fluxes, lubricants, &c.

Construction, Processes, and Finishes: methods of fastening used in metalwork; simple decorative treatments and appropriate finishes.

DESIGN

Design and construction in metalwork with reference to various aspects of the craft, e.g. forging, rolling, casting, turning, shaping, sheet metal, beaten metal, welding. Alternative questions are set, so that candidates may confine themselves to the processes involved in **either** section (i) **or** section (ii) of the syllabus for the practical paper, which follows.

II. *Practical*

Provision is made for alternative tests involving **either** (i) hand and machine tools, **or** (ii) the use of hand tools mainly.

Either (i) The use of common metals and alloys; basic constructional processes, e.g. setting out, filing, fitting, and riveting; soft and hard soldering; hardening, tempering, and annealing; use of stocks and dies, and taps; simple forge work (drawing down, upsetting, bending, and twisting); sheet metalwork in heavier material; elementary lathe work (plain turning and boring).

Or (ii) The use of common metals and alloys; basic constructional processes, e.g. setting out, filing, fitting, and riveting; sheet metalwork in light-gauge material; soft and hard soldering; hardening, tempering, and annealing; use of stocks and dies, and taps; piercing, hollowing, raising, and planishing; appropriate decoration (simple modelling from one side only, the application of drawn, hammered, twisted, and plaited wires); suitable finishes (colouring, waxing, and lacquering).

ENGINEERING WORKSHOP THEORY AND PRACTICE

O 82

This subject cannot be taken at the same examination with Metalwork at either Level. Two three-hour papers are set. Paper I consists of a compulsory question on design and questions on the technology of materials, processes, and tools. Paper II is the practical test, consisting of appropriate exercises in machining, fitting, sheet metalwork, and forging both ferrous and non-ferrous metals. Confidential information about any special material needed may be obtained from Oxford in March for the Summer Examination or in September for the Autumn Examination.

Candidates are expected to appreciate the necessity for safety precautions and to have an elementary knowledge of them. The recommendations of the British Standards Institution on *Engineering Drawing Practice, B.S. No. 308*, should be followed in the preparation and dimensioning of drawings.

I. Design and Technology

Design. The design of simple tools, fastenings, jigs, and fitments. Freehand sketching of hand and machine tools and of simple assemblies. Orthographic projection. The preparation of working drawings from relevant data.

Materials. An elementary knowledge of the properties and uses of cast iron, wrought iron, mild steel, carbon steels, copper, aluminium, brass, and other common alloys.

Processes. Production of simple castings, including cores. Heat treatment of carbon steels: hardening, tempering, annealing, case hardening. Composition and uses of solders and fluxes. Soldering, brazing, and forging. Sheet metalwork including simple wiring and riveting.

Hand tools and benchwork. A knowledge of the more common engineering metalwork tools, including their construction, uses, and maintenance; cutting tools including chisels, files, saws, drills, scrapers, reamers, taps, and dies; tools for soldering, brazing, forging, and sheet metalwork. Standard vee thread forms: B.S.F., B.S.W., B.A., Unified, Acme.

Marking out and measuring. Use of rules, scribes, calipers, dividers, try squares and protractors, gauges, micrometers, verniers, surface plates, vee blocks, surface gauges. Limits, fits, tolerances, and clearances. Use of simple plug and gap gauges. (Candidates should be familiar with *British Standards for Workshop Practice, B.S. Handbook No. 2*, as a reference book.)

Machine tools. Use and maintenance of cutting tools. Lubricants and coolants. The main features and functions of the following:

- (a) Drilling Machine. Pillar and sensitive manually operated types. Methods of holding work and the use of simple jigs. Types of drills and their maintenance. Drilling of flat, inclined, and cylindrical surfaces. Reaming.
- (b) Centre Lathe. Turning between centres; three and four jaw chucks and face plate work; boring; screw cutting (single-start thread only). Tool forms and cutting angles; simple gear trains.
- (c) Milling Machines. Horizontal and vertical milling machines; milling cutters, their use and care. Setting up and securing of the work, use of simple jigs.
- (d) Shaping Machine. Special features of construction—quick return mechanisms. Setting up and securing of the work. Machining of flat surfaces and grooves.

II. Practical.

Candidates should be familiar with the use of ferrous metals and the common non-ferrous metals used in engineering practice. The questions set involve fundamental tool operations and skills in one or more of the following processes. Candidates are not required to use milling and shaping machines in the practical examination.

Basic workshop processes: marking out, filing, chipping, drilling, riveting, hard and soft soldering, brazing, cutting of threads, and reaming by hand methods.

Machine work: centre lathe turning and boring; taper turning between centres (with-out attachment) and using compound slide; screw cutting of single-start vee form threads. Knurling.

Machining to be to limits of not less than $\pm 0.002''$ and to an acceptable finish.

Sheet metalwork and forging in steel, brass, and copper sheet including folding, bending, seaming, and simple wiring. Forging, including hot and cold bending, upsetting, drawing down, and twisting. Hardening and tempering of carbon steel; case hardening of mild steel using hardening powders.

TECHNICAL DRAWING (BUILDING), O 83
ENGINEERING DRAWING, O 84

Candidates may enter for either O 83 or O 84, but not both. Two papers, I (2½ hours) and II (3 hours), are set in each subject and candidates are required to take both papers. Paper I is common to both O 83 and O 84 and consists of questions on plane geometry and on solid geometry. These are of a practical nature such as would be met with in engineering and the constructional trades, but specialized knowledge of any trade is not required.

Each candidate must have available a drawing-board suitable for half-imperial paper, a tee-square, a pair of set squares (45°, 60°), a pair of compasses, a hard pencil, a protractor, a ruler graduated in centimetres and in inches, tenths, and sixteenths of an inch, and a scale ruler reading to ¼, ½, and ¾ scales. In addition, the following may be used: dividers; spring bows; parallel ruler. In paper I, french curves or flexible plastic strip may be used to obtain a fair curve through plotted points. In paper II, the free use of french curves and radius curves is allowed.

Paper I (O 83 and O 84)

Plane Geometry

The construction and use of scales.

The construction of simple geometrical figures from given data.

Determination by graphical methods, also by measurement and calculation, of areas of plane figures. Enlargement and reduction of simple plane figures.

The circle and its properties. Tangency.

Construction of circles to satisfy given conditions involving points, lines, and other circles.

The ellipse, parabola, and hyperbola, and other problems on loci. The involute of a circle, the cycloid and Archimedean Spiral.

Solid Geometry

Orthogonal projection of points, lines, planes, plane figures, and simple solids in assigned positions.

Sections of solids, simple development and intersection of regular solids. Auxiliary projections.

Isometric (without the use of the isometric scale) and oblique projection.

Paper II—Technical Drawing (Building) (O 83)

Candidates are expected to work from dimensioned sketches, from other drawings, or from written descriptions. Questions are set requiring (a) freehand sketches, (b) drawing in orthogonal, isometric, and oblique projection. The following list indicates the kind of constructional details which may be studied with advantage:

Common tools used in the wood workshop, such as try-squares, mallets, planes, braces. Components such as ironmongery and furniture for cabinets, doors, and windows. Water taps, stop-cocks, and valves. Bolts, nuts, and other types of fastening. Constructional details as used in sheds, roofs, windows, gates, benches, tables, cabinets.

Questions may be set on the elementary perspective of cubical and cylindrical solids above and below the horizon line, using one point and two point perspective by either the direct or measuring point methods.

A knowledge is required of mouldings as elements of design, and of the intersection of mouldings including simple examples of raking moulds. Drawings are normally required in first angle projection, but an elementary knowledge of third angle projection is expected. [Not more than one question on third angle projection will be set in any paper.]

Emphasis should be given to the importance of drawing layout and to clear and systematic dimensioning and printing. The recommendations of the British Standards Institution on *Drawing Office Practice for Architects and Builders*, B.S. No. 1192; and *Engineering Drawing Practice*, B.S. No. 308, should be followed, so far as they apply, in the preparation and dimensioning of drawings.

Paper II—Engineering Drawing (O 84)

Candidates are expected to work from dimensioned sketches, from other drawings, or from written descriptions; to make specific views and scale drawings with simple sections, and to produce assembly drawings from details or details from arrangements. The following list indicates the kind of engineering details which may be studied with advantage:

Simple bearings, brackets, pipe joints, pulleys, couplings, details of the steam and internal combustion engine, valves, workshop tools, machine tools, riveted joints, girders, keys and keyways, bolts and screw threads (B.S.W. and B.S.F.). Simple electrical details.

Candidates are also expected to make free-hand sketches of tools and components from given drawings. Drawings are normally required in first angle projection, but an elementary knowledge of third angle projection is expected. [Not more than one question on third angle projection will be set in any paper.]

Emphasis should be given to the importance of drawing layout and to clear and systematic dimensioning and printing. The recommendations of the British Standards Institution on *Engineering Drawing Practice*, B.S. No. 308, should be followed in the preparation and dimensioning of drawings.

COMMERCE

O 86

One paper (2½ hours) is set, on the following syllabus:

Candidates are required to show a knowledge of the structure of the business world and of the purpose and aim of business activities. Some knowledge of the procedures and forms used in the daily conduct of business is expected, but greater emphasis is laid upon the purpose of business activities and the growth, structure, and purpose of financial and commercial institutions. It is realized that the candidates' own experience is limited, but candidates are expected to have had the kind of experience involved in the carrying out of carefully selected projects, in organized visits to business houses, and in the use of standard works of reference, government publications, trade reports, &c. Candidates are expected to have acquired the habit of verification and guarded statement and to understand the extent to which business structure depends on the good faith of all concerned.

Introduction

The complexity of the process by which human wants are satisfied. The interdependence of individuals as a result of division of labour, specialization, and mass production.

Home Trade

Channels of Distribution

Functions of the retailer; unit shops; multiple shops; departmental stores; chain stores; mail order business; retail co-operative societies.

Wholesale trade; services of wholesale merchants; purpose and organization of wholesale warehouses; Co-operative Wholesale Societies; functions of agents such as brokers and factors.

Special aspects of marketing, such as direct selling, advertising, packaging, proprietary articles, price maintenance, self-service, after-sales service, organized markets and methods of dealing.

Commercial Transactions

Quotations; discounts; credit sales; purposes of main documents used in buying and selling. Hire-purchase agreements. Purchase tax.

Foreign Trade

Elementary knowledge of the special machinery of foreign trade, including the purposes of the main documents involved. (Questions involving the working of foreign exchanges are not set.) Work of H.M. Customs. Warehousing. Sales of imported goods on organized markets. Import duties and licences.

Business Units

Organization, ownership, and control of one-man businesses, partnerships, private and public companies, co-operative societies, public undertakings. Sources of capital and disposal of profits. An elementary knowledge of combination and monopoly.

Finance

Means of payment: Post Office facilities. The services of banks; current and deposit accounts; purpose and use of cheques, crossing and endorsements on cheques: negotiability of cheques. Work of the Bank of England and of the Bankers' Clearing House.

Obtaining finance: Issue of shares and debentures by companies; loans and overdrafts; discounting Bills of Exchange; hire purchase; functions of the Stock Exchange; Building Societies.

Capital: Various ways of increasing the total capital employed; fixed capital and circulating capital; working capital. Gross and net profits; fixed and variable expenses; relation of gross and net profit to turnover, and rate of stock turn; relation of net profit to capital invested.

Insurance

A means of spreading risk; the procedure followed in taking out a policy and in making a claim; risks commonly covered; the requirement of 'the utmost of good faith' in contracts of insurance; the significance of 'insurable interest'; the principle of indemnity.

Transport and Communications

Various methods of transport and the purposes for which they are suitable. Dock and harbour facilities and the work of port authorities.

Transmission of information; facilities of post office and cable companies.

Government Agencies

An elementary knowledge of the work of Government departments in controlling and facilitating commercial activities.

The Office

A general view of its work and organization. The purposes and general principles of machines. The machines in common use. Filing and indexing.

PRINCIPLES OF ACCOUNTS**O 87**

One paper (3 hours) is set, on the following syllabus:

Candidates are expected to be able to prepare, analyse, and interpret the financial records of sole traders, partnerships, and clubs and other non-trading associations.

The necessity for accurate records. The main documents upon which records are based. Subsidiary books and other methods of original entry based upon the documents. The use of columnar records.

Cash Books; Petty Cash Books. Use of analysis columns; treatment of bank current and deposit accounts, bank overdraft, and bank loan. Bank Reconciliation Statement. Receipts and Payments Account.

The principle of double-entry book-keeping.

The ledger; posting to the ledger; folios; balancing; the statement of account; interpretation of ledger accounts. The trial balance, its uses and limitations.

Distinction between capital and revenue.

Trading and Profit and Loss Account; cost of goods sold; the nature and ascertainment of profit (or loss); profit (or loss) as the increase (or decrease) in the *net* value of assets. Gross and net profits and their statistical relationship to turnover; rate of turnover of stock; fixed expenses; variable expenses; capital invested and capital used. Consideration of payments in advance and of amounts due but unpaid; provision for depreciation, for bad and doubtful debts, and for other contingencies.

Current and capital accounts of partners; sharing of profits; interest on capital.

Simple manufacturing or production account for the ascertainment of cost. Prime cost, overhead cost, cost of goods manufactured.

Comparison of various costs and of results of trading periods.

Structure and interpretation of Balance Sheets, inter-relationship of items. Valuation of assets; current, fixed and wasting assets; short term and long term liabilities, working capital, proprietors' capital, and capital from other sources.

Elementary treatment of records of sale or purchase of the business of a sole trader or partnership, admission of a new partner, treatment of goodwill.

Easy problems on the preparation of accounts from incomplete records.

COMMERCE, ARITHMETIC, AND ACCOUNTS**O 88**

Three papers, I Commerce, II Arithmetic, and III Accounts, are set, and all must be taken. No report on individual papers can be made to schools or candidates. The grade reported is for the subject as a whole.

I. Commerce (2 hours).

The purpose of the examination is to test a general knowledge of the structure and function of commerce associated with the home trade. It is realized that the candidates' own experience is limited, but candidates are expected to have had the kind of experience involved in the carrying out of carefully selected projects, in organized visits to business houses, and in the use of standard works of reference, government publications, trade reports, &c. Candidates are expected to have acquired the habit of verification and guarded statement and to understand the extent to which business structure depends on the good faith of all concerned.

The paper is set on the following syllabus. Where questions which involve calculation are set, the arithmetical work is subordinate to the commercial principles involved.

Introduction. The complexity of the process by which human wants are satisfied. The interdependence of individuals as a result of division of labour, specialization, and mass production. The 'national dividend' as the sum of all that is produced and from which all income is drawn.

Commerce: that particular human activity which is concerned with distribution so that goods and services reach the persons who want them with a minimum of inconvenience.

The development of modern methods of distribution. Barter; its limitations. The introduction of media of exchange. Direct selling by producers to consumers. The services of 'middlemen'.

Retailing; its effectiveness as a method of distribution. The nature of chain-stores, department-stores, and local markets. The nature of 'self-service' and the reasons for its development. The control by rationing of the distribution of goods in short supply. The purpose of a Purchase Tax.

The services of the wholesale markets and produce markets.

Hire purchase and credit sales: fundamental conditions as shown in the normal documents concerned, e.g. the passing of the property, the seller's right to retake possession, the buyer's right to sell; advantages and dangers.

Terms of payment. Cash; cheque; postal and money order. Discounts (cash and trade).

The various forms of the 'Business Unit'. Owner management; partnerships; companies; co-operative societies. The reasons for the effectiveness of each. The obtaining of capital and the disposal of profits. The meaning of the terms 'turnover', 'gross profit', 'net profit', 'dividend'.

The Office. A general view of its work. The allocation of duties. Services performed by juniors. The machines in common use. The purpose of filing and indexing letters and documents.

Tracing the path of a simple transaction, e.g. letter asking for price-list or quotation, reply, letter enclosing particulars of order, acknowledgement of order, letter advising dispatch of goods, letter enclosing cheque, acknowledgement with receipt.

A broad picture of the principal ancillary services. Banks: current and deposit accounts; how money is paid in and withdrawn; advances; overdrafts. The cheque system; negotiability; practical safeguards such as crossings and special endorsements; the path followed by a cheque in a simple transaction; the reason for the prevalence of the cheque system in this country; the dependence of the cheque system on mutual trust.

Post Office: a means of communication and of making payments.

Stock Exchange: a means of transferring ownership.

Transport: methods in general use.

Insurance: a means of spreading risk; the procedure followed in taking out a policy and in making a claim; the requirement of 'the utmost of good faith' in contracts of insurance; the significance of 'insurable interest'.

Advertising: purpose; devices; dangers.

Commercial travellers and other agents.

II. *Arithmetic* (1 $\frac{3}{4}$ hours).

Decimalization of money and the reverse process, weights, and measures. Calculations based upon British and foreign systems.

Practical applications of the arithmetical mean, the median, and the mode.

Ratio and proportion. Proportional parts.

Simple interest. Its applications to cash and trade discounts, commission, and depreciation. Equation of payments.

The compound interest law and its application to future and present values, to the value of freehold and leasehold property, to annuities, and to sinking funds.

Calculations based upon transactions in stocks and shares and upon the capital and profits of joint stock companies.

Foreign bills of exchange. Arbitrage transactions.

Calculations based upon rates and taxes.

Graphs of statistics.

(Logarithms and algebraic methods may be employed in answering questions.)

III. *Accounts* (1 $\frac{3}{4}$ hours).

The capital of a business and its relationship to assets and liabilities. The structure of simple balance sheets and their preparation from given data.

The recording of the purchase and sale of goods for trading purposes for cash and on credit. Capital and revenue. The invoice: its uses and compilation. Discounts and terms of payment. Adjustments to price-lists.

Debit and credit notes: their preparation and incorporation with accounts. Statements. Progressive balancing and balancing by complementary addition. The recording of the commoner methods of payment and their acknowledgement by receipts.

The cash-book; debit and credit; the purpose of the Bank column, contra entries; the striking of a balance. Simple reconciliation statements. The petty cash-book.

Gross and net profits; their arithmetical relationship; a debit and credit presentation. The significance of the constituent items of trading and profit and loss accounts. Turnover and its relationship to gross and net profit and to operational expenses. The sharing and disposal of profits and losses. Variations in the constituent items of trading and profit and loss accounts over periods of time.

DOMESTIC SUBJECTS

A special application form (E/DS) for the practical examinations must reach Oxford by 1 February for the Summer Examination or by 1 October for the Autumn Examination. Entry for Domestic Subjects must also be made on the normal broadsheet entry form. The practical examinations in Cookery and in Housecraft are conducted by visiting examiners. The practical examination in Needlework is conducted by the school in accordance with instructions issued from Oxford. Forms are supplied from Oxford on which Heads of schools are invited to submit assessments of the Needlework course work. This course work must be available when required for inspection by a visiting examiner. At least ten days' notice of such an inspection will be given.

If three or more candidates are entered by a school for Domestic Subjects practical examinations conducted by visiting examiners (irrespective of which subject or at which Level any particular candidate enters), no special fee is charged. If the number of candidates so entered is two or one a special fee of £2 is charged. These fees are in addition to the normal subject entry fee. A second session by the examiner for practical examinations in Cookery is not arranged unless there are more than eight candidates for the subject at the school. Schools are expected to have sufficient equipment to make this possible. In all cases the expenses of the examiner visiting the school are paid by the Delegates.

Suitable equipment and all the materials needed must be provided by the school.

Candidates may take either one, two, or all three of the subjects Cookery, Needlework, and Housecraft. Success in each subject is recorded separately on certificates. In each subject two papers are set, a theoretical paper (1½ hours) and a practical paper (2½ hours, excluding preparation time). In the theoretical papers some simple questions are set which give candidates an opportunity to show knowledge of the scientific basis of the work. The theory paper carries 40 per cent. of the total marks for the subject.

O 90

Cookery

The nutritive value of foods. Planning meals for the family to include vegetarian, invalid, and convalescent dishes, and packed meals.

Choice and cost of foods. Storage of food in the home, including the use of the refrigerator.

Elementary knowledge of the commodities normally used in home cookery.

Choice and care of modern kitchen fittings, equipment, and utensils. The relative merits and advantages of different types of cooking stoves; candidates are not expected to have practical experience of all types of stoves.

Methods of cookery including boiling, steaming, stewing, roasting, baking, frying, poaching, and grilling, illustrated by simple dishes involving the use of common foods. Scientific principles underlying these methods of cooking.

Preparation and serving of meals for the family to include soup-making, fish and meat dishes with suitable accompaniments, the cooking of vegetables to preserve their nutritive value, simple sauces, scones, pastry-making (short, suet, and rough puff), cake-making (rubbing-in, creaming, and melting methods), bread-making, biscuits, simple decoration of cakes and biscuits, hot and cold sweets, cheese dishes, egg cookery, salads, vegetarian dishes, invalid dishes, batters, dishes made from left-over food, beverages.

Jam-making and fruit bottling.

Simple hygiene and safety precautions in the kitchen.

In the practical examination, economy in the use of equipment, food, fuel, and labour is looked for. Fresh food should be used whenever possible. Candidates are required to dish-up the food they have cooked ready for table, but the table need not be laid for the meal.

O 91

Needlework

The choice of suitable clothes for various purposes.

The nature, suitability, hygienic value, and safety in use of various clothing materials for children and adults, and their comparative costs.

Candidates should know the component parts of patterns and how to make minor adjustments to allow for individual differences of figure. They should be familiar with the processes and stitches most commonly used in the construction and decoration of clothes, including the economical lay-out of patterns on material, cutting out, and making-up with machine and hand sewing.

The care, maintenance, and repair of clothes.

Simple repairs to household linen.

The use and care of sewing equipment, including the sewing machine.

Each candidate must make for assessment as her course work **one** of the following for herself; a blouse and skirt, a cotton or wollen dress, an overall, a housecoat; **together with either** an undergarment **or** child's garment.

O 92

Housecraft

Personal hygiene. The general structure of the body. An elementary knowledge of the chief functions of the organs concerned with respiration, circulation, digestion, and excretion. The laws of personal health. Simple rules of diet. The care of personal toilet apparatus. The First-Aid Box. Common antiseptics and methods of applying them. First-aid treatment of cuts, burns and scalds, sprains, bleeding, fainting, choking, and shock.

The house. Effects of environment, site, aspect, building material.

Sanitation, construction of simple drains, disposal of refuse, advantages of a garden.

Flies, moths, and other household pests.

Water-supply, hard and soft water, action on pipes.

Hot-water systems.

Ventilation, reasons for and methods.

Heating and lighting, advantages of different systems.

Furnishing, the principal materials used, colour schemes.

Apparatus and cleaning materials. Choice and care of utensils and apparatus employed in ordinary household work including laundry work.

The composition, use, and effects of common cleaning materials used in house cleaning, in laundry work, and in the removal of stains.

The reaction to heat, to moisture, and to soaps and other cleaning materials, of the textiles, and other materials in common use in the home.

Labour-saving devices.

Housework and home management. Daily, weekly, and spring cleaning of all rooms, w.c. and lavatory basins, and staircases. Use of household disinfectants.

Care and maintenance of clothing.

Methods of washing and finishing household linen, white and coloured cotton, silk, and woollen garments.

The removal of stains from materials.

Very simple household repairs.

The larder. Its care and management.

Household accounts. Budgeting for the family.

Shopping lists, current prices.

Table appointments, their care, laying the table, clearing the table and washing up, choice and arrangement of flowers.

The care of invalids, prevention of spread of infectious and contagious diseases.

The practical paper may include questions on any part of the syllabus and the necessary equipment and accommodation must be available.

MUSIC

O 93

Three written papers are set, I Aural tests ($\frac{1}{4}$ hour), II Theory paper ($1\frac{3}{4}$ hours), III Prescribed Composers (2 hours). Paper III is compulsory for all candidates in this subject, and in addition, candidates must offer **either** Paper I and Paper II **or** Paper I and a practical examination **or** Paper II and a practical examination. In order to pass, a candidate is required to reach a certain standard in the subject as a whole.

Practical examination

This must be a practical examination of the Associated Board of the Royal Schools of Music, and must be of at least Grade V. The practical examination in general musicianship of Grade V or a higher grade is accepted in this connexion.

Heads of schools whose candidates intend to offer a practical examination must give full details on the special form E/M/O which must be obtained from and returned to Oxford not later than 18 March for the Summer Examination or 5 October for the Autumn Examination.

Candidates must enter for their Associated Board examination in the normal way, in accordance with the regulations of that Board, paying the normal fee required. The practical examination must be taken not later than the end of the term in which the written examination is taken. If more than three terms, including the term in which the written examination is taken, have elapsed since the practical examination was taken, the candidate's teacher must certify on form E/M/O that practical study has been continued in the meantime.

(The address of the Associated Board is 14 Bedford Square, London, W.C. 1.)

Paper I. Aural tests ($\frac{3}{4}$ hour)

These are conducted at each centre in accordance with instructions sent from Oxford. They are designed to occupy not more than 45 minutes and candidates are required to work all of the following seven tests:

- (i) (a) Distinguish which of two notes played consecutively is the higher.
- (b) Describe an interval which is diatonic in a major key.
- (c) Enumerate the number of notes in a given chord of not more than four notes.
- (ii) Recognize the time values of notes and rests, the nature of the pulse having been stated.
- (iii) Listen to a short phrase (the notation of which is given) and add expression marks appropriate to its performance.
- (iv) (a) Recognize the differences of rhythm, if any, in two passages of the same melodic outline.
- (b) Write on a monotone the rhythm of a melody in simple time; and prefix the time signature.
- (v) Write from dictation two melodies, the second of which may be a variation on the first. The melodies begin on the first beat of a bar, the key and time signatures being stated, and the key-note and tonic chord sounded first. Candidates may be asked to comment on any relationship between the two phrases.
- (vi) Name the cadences (perfect, imperfect, plagal, or interrupted) at the end of two phrases in a major or minor key.
- (vii) Describe two major chords (in four parts) as in root position, first or second inversion.

Paper II. Theory paper ($1\frac{3}{4}$ hours)

Candidates are expected to have a knowledge of:

All major and minor scales and keys with signatures. Technical names of the notes of the scale. Treble clef, Alto and Tenor C clef, and Bass clef.

Intervals and their inversions on any degree of the major and harmonic minor scales.

Primary triads and their inversions in major keys and in minor keys formed from the harmonic minor scale. (Four-part chords may be written with three notes on the treble stage and one on the bass stave.)

Cadences—perfect, imperfect, plagal, interrupted.

Simple and compound time with signatures.

The usual terms and signs, e.g. *cresc.*, *<*, *a tempo*, &c.

Candidates may be required to:

Transpose a simple tune, containing a few accidentals, up or down, or from one clef to another, or from short score to open score.

Recognize cadences and insert cadences at the end of a given phrase.

Recognize simple modulations in short extracts, stating name of the new key and relationship to the original. Modulations are limited to the relative major or minor keys, and to the dominant and sub-dominant.

Phrase a simple melody, recognizing its structure or form. Recognize simple dance forms in short extracts, e.g. Minuet, Sarabande, &c.

Either complete a tune, or write a tune to given words.

Bar an unbarred passage, correct incorrect barring and grouping, and complete incomplete bars with notes and rests.

Paper III. Prescribed Composers (2 hours)

Candidates must choose three from the following nine prescriptions. The three must be chosen one from each of the sections (i), (ii), and (iii) in such a way that they comprise one lettered A, one lettered B, and one lettered C.

Section (i)

- A. Purcell, *Dido and Aeneas*, Act I (O.U.P.).
- B. Bach, *The Well-tempered Clavier*, three Preludes and Fugues: Book I, no. 8 and no. 22, and Book II, no. 14 in C \sharp minor, op. 27, no. 2 (Associated Board).
- C. Handel, *Concerto Grosso*, op. 6, no. 6 (miniature score by Eulenburg available).

Section (ii)

- A. Schubert, *Twenty-four Favourite Songs* (for High Voice) (Schirmer's Library of Musical Classics), nos. 1, 2, 3, 4, 7, 8, 10.
- B. Beethoven, Piano Sonata no. 14 in C \sharp minor, op. 27, no. 2 (Associated Board).
- C. Mendelssohn, *Hebrides Overture*, op. 26 (miniature scores by Eulenburg† and by Boosey and Hawkes available).

† The paper is set from this edition.

Section (iii)

- A. Brahms, *Twenty Famous Songs* (for Low Voice) (Lengnick, First Collection), nos. 2, 3, 5, 14, 15, 18, 20.
- B. Ravel, *Le Tombeau de Couperin*, suite pour le piano, nos. I, III, IV, V (United Music Publishers).
- C. Vaughan Williams, *Fantasia on a Theme by Thomas Tallis* (miniature scores by Boosey and Hawkes† and by Curwen available).

Straightforward questions are set on the specified works which should be studied in the context of the lives and times of the composers. An outline knowledge only is expected of the lives and musical development of the composers studied. The questions on the selected works include the identification and contexts of themes, and may require an elementary knowledge of the more usual instruments. Quotations from music for transposing instruments are given as printed in the score. Candidates are not allowed to take copies of the scores into the examination room.

ART

O 94

Heads of schools who cannot provide the accommodation or equipment necessary must not enter candidates for Art. Confidential instructions about any special models or objects required are sent to Heads of schools concerned about six weeks before the examination. These instructions cannot be sent earlier. No report on individual papers can be made to schools or to candidates. The grade reported is that for Art as a whole.

Candidates must bring to the examination:

- (1) their own media for each paper;
- (2) a pan or cup for water if they wish to use a medium requiring water;
- (3) fixative and a spray diffuser if they wish to work in a soft or powdery medium, e.g. in charcoal or powdery chalks (any fixation must be done within the time allowed for working the paper);
- (4) a drawing-board of a suitable size, with drawing-pins.

The use of geometrical instruments or any means of ruling is allowed only in the papers on Design, History of Architecture, and History of Painting; for Design, tracing-paper (which candidates must themselves supply) may also be used.

The paper supplied is half-imperial, 22" × 15". Candidates who wish to work in a medium for which the ordinary drawing-paper supplied by the Delegates would not be suitable may provide themselves with a different kind of paper; but it must be 22" × 15" in size, and they must write headings on the paper exactly the same as those on the drawing-paper supplied by the Delegates.

Eight papers are set, **A** to **H**. Candidates must take three and only three of these papers. They may not take both **C** and **D** or both **G** and **H** at the same examination. It is strongly recommended that candidates should work in colour in at least one of their three papers.

A. Imaginative Picture-making (2½ hours). Five or six scenes, themes, quotations, &c., are set, and candidates are required to make a picture with one of these as subject. A colour medium, other than oil paint, must be used.

B. Life Drawing (2¼ hours). Drawings from a living model in games clothes. Candidates are required to make drawings of at least two different poses, each of sixty minutes. Time is allowed for a rest for the model in the middle of each posing and for a rest for the candidates between the poses. Any medium, except oil paint, may be used. (This paper cannot be offered unless the Head of the school undertakes to provide a model.)

C. Picture-making from Objects (2½ hours). Several objects are placed before the candidates, who are required to make a picture including some or all of the objects, mentally adjusting the colour and composition of the group as they please. A colour medium, other than oil paint, must be used.

D. Object Drawing (2 hours). The group includes common objects. Any medium, except oil paint, may be used.

E. Design (2½ hours). Candidates are required to make a design in relation to one of the following crafts which they have practised: lettering, embroidery, stencilling, lino-block printing, fabric printing. A colour medium, other than oil paint, may be required. For crafts other than lettering, schools are required to send with the scripts to examiners one specimen of work done by each candidate in the course of the year. This work is not returned, except in the case of embroidery.

† The paper is set from this edition.

(The Delegates are prepared to consider applications for the inclusion of other crafts, if the application with full particulars is submitted to them by Heads of schools during the preceding December for the Summer Examination or June for the Autumn Examination, and provided that there are not fewer than 10 candidates for the craft concerned.)

F. *Plant Drawing* (1¾ hours). Candidates may draw either one or two of the specimens provided. Any medium, except oil paint, may be used. The vessel holding the plant or plants must not be drawn.

G. *History of Architecture* (2¼ hours).

- (i) The origins and development of building in England as exemplified by the following types: dwelling-house, parish church, castle. (At least one question is set on modern developments.)
 - (ii) The Decorated period in architecture in England.
- Candidates may be required to illustrate their answers on architecture with drawings and diagrams. Drawing-paper is provided for this purpose.

H. *History of Painting* (2¼ hours).

There is a compulsory question calling for comment on a work of a great master, of which a reproduction is supplied, and the rest of the paper is divided into three sections:

- A. Duccio, Giovanni Bellini, Michelangelo, Giorgione.
- B. Jan van Eyck, Rubens.
- C. Monet, Camille Pissarro, Cézanne, Matisse.

Candidates may answer questions from all three sections, or may confine their answers to questions from any two sections. They are required to have knowledge of the main Schools of Painting exemplified by the above painters. Drawing-paper is provided so that candidates may illustrate their answers.

ADVANCED LEVEL SYLLABUSES, 1966

ENGLISH LITERATURE

A 3

Three papers are set (3 hours each), Paper I being marked out of 104, Paper II out of 95, and Paper III out of 100. Papers I and II are the normal Advanced Level papers. Paper III is the Special Paper.

Paper I. Four books are set for detailed study but the paper is arranged so that candidates may, if they wish, confine their answers to questions on the Shakespeare play and two of the other three books.

Paper II. Candidates must take one of the Papers A to G. Papers A to F are period papers and candidates will be expected to show a general knowledge of the social and literary history of the period, with special reference to the works named, some of which—those marked with an asterisk—are prescribed for detailed study. Paper II G consists of questions on the content, form, and style of twelve books; candidates must answer one question on each of four books.

Paper III is set in such a way as to test whether candidates have studied the works prescribed for Papers I and II against the wider background of study normally explored in a sixth-form English Literature course. An optional appreciation question is included. No candidate is allowed to attempt more than three questions.

Paper I. Books for detailed study:

- †Chaucer, *The Knight's Tale* (passages for translation and comment are chosen from Part I, lines 1-496)
- Shakespeare, *King Lear*
- Milton, *Paradise Lost*, Book X
- †Conrad, *Nostromo*.

Paper II A (Period: 1550-1637):

- *Spenser, *The Faerie Queene*, Book I
- *Bacon, *The Advancement of Learning*, Book I
- †**Elizabethan Lyrics*, ed. Muir (Harrap)
- Sidney, *An Apologie for Poetrie*
- †Webster, *The Duchess of Malfi*
- †Dover Wilson, *Life in Shakespeare's England* (either the C.U.P. edition, now out of print, or Penguin)

Paper II B (Period: 1625-1700):

- *Herbert, *Selected Poems of George Herbert*, ed. Brown (Hutchinson Educational)¹
- *Milton, *Samson Agonistes*
- †*Dryden, *Absalom and Achitophel*, Part I, and *Preface to the Fables*²
- Bunyan, *The Pilgrim's Progress*
- †Pepys, *A Shorter Pepys*, ed. Tickner (Nelson)
- †Congreve, *The Way of the World*

Paper II C (Period: 1700-1790):

- *Pope, *Epistles and Satires*, ed. Trott and Axford (Scholar's Library, Macmillan), pp. 31-97, 168-186¹
- †*Johnson and Boswell, *A Tour to the Hebrides* (O.U.P.) (passages for comment are chosen only from the account by Johnson)
- †*Gray, *Odes*
- Burke, *Selections*, ed. Hughes (O.U.P.)¹
- †Goldsmith, *The Vicar of Wakefield*
- Sheridan, *The Rivals*

Paper II D (Period: 1790-1832)

- †*Wordsworth, *Poems* (Golden Treasury Series, Macmillan), *Song at the Feast of Brougham Castle*, *The Leech-Gatherer*, *The Brothers*, the lyrical poems contained on pp. 128-141 (*I wandered lonely as a cloud to O Nightingale, thou surely art*, inclusive), *Ode on Intimations of Immortality*, *Sonnets* III, IV, VI, VIII, IX, X
- *Coleridge, *Poetry and Prose*, ed. Garrod (O.U.P.)¹
- *Keats, *Poems published in 1820* (O.U.P.)
- †Scott, *The Antiquary*
- Peacock, *Nightmare Abbey*
- †*English Critical Essays, Nineteenth Century*, ed. Jones (O.U.P.), from Wordsworth, *Poetry and Poetic Diction*, to Hazlitt, *My First Acquaintance with Poets*, inclusive.

[The syllabuses for Papers II E, F, and G are printed overleaf.]

† These books will be set again for 1967.

¹ Only the writings of the author named are prescribed.

² Copies of the text of *Preface to the Fables* may be obtained from the Secretary of Local Examinations, Oxford, price 1s. 6d. each, post free.

Paper II E (Period: 1832-1896)*Tennyson, *Maud*, and *The Princess**Browning, *Poetry and Prose*, ed. Milford (O.U.P.)¹†**English Critical Essays, Nineteenth Century*, ed. Jones (O.U.P.), from Leigh Hunt, *What is Poetry?* to Bagehot, *Tennyson and Browning*, inclusive
Trollope, *Dr. Thorne*†Hardy, *The Woodlanders*†Hopkins, *Selected Poems* (Heinemann)*Paper II F* (Period: 1896 to the present day)*Shaw, *Major Barbara*. (Candidates are expected to read the Preface as well as the play, but context questions are set from the play only, the original stage version, not the screen version.)*Forster, *A Passage to India***Ten Twentieth-century Poets*, ed. Wollman (Harrap)†Yeats, *Poems of W. B. Yeats*, ed. Jeffares (Macmillan)†Lawrence, *Sons and Lovers*†Greene, *The Lost Childhood and Other Essays* (Penguin)*Paper II G*. Questions are set on the following books:Spenser, *The Faerie Queene*, Book I†Jonson, *Every Man in his Humour*Milton, *Samson Agonistes*Pope, *The Rape of the Lock* and *The Epistle to Dr. Arbuthnot*†Fielding, *Tom Jones*†Wordsworth, *Selections from Wordsworth*, ed. B. Ifor Evans (Methuen) (excluding the extracts from *The Prelude* and *The Excursion*)Jane Austen, *Mansfield Park*Keats, *Poems of 1820*†Browning, *Men and Women*, ed. Hadow (O.U.P.)†G. M. Hopkins, *Selected Poems* (ed. J. Reeves, Heinemann, or W. H. Gardner, Penguin)†D. H. Lawrence, *Sons and Lovers*T. S. Eliot, *Murder in the Cathedral*

GREEK

A 10

Five papers are set, I, II, III, IV, V, each marked out of 100 except II (max. 80) and III (max. 60). Papers I, II, and III are the normal Advanced Level papers. Paper IV is the Special paper. Paper V (verse) is optional. Good work in it may compensate slight weakness in other Greek papers, and success in it is recorded on the candidate's certificate, provided that a pass in Greek as a whole, either at Advanced or Ordinary Level, is obtained.

I (3 hours). Books for detailed study. Candidates are expected to show such knowledge of the social, literary, and historical background as is necessary for the appreciation of these texts. Some passages for syntactical comment are set.

The set books are:

Either Herodotus IX 1-75

or Demosthenes, *Philippic* I and *Olynthiacs* I-III

with either †Homer, *Odyssey* I-III (passages from Book II may be set for translation, but are not set for comment).

or †Sophocles, *Antigone* (passages from lines 944-1353 may be set for translation, but are not set for comment; the Jebb text is used for the question paper).

II (2½ hours). Unprepared translation into English of a prose and of a verse passage.

III (2 hours). A passage of moderate difficulty for translation into Greek prose.

IV (3 hours). Unprepared translation into English of a prose passage more difficult than that in Paper II, and translation into Greek prose of a passage more difficult than that in Paper III.

V (2¼ hours). Greek verse composition.

LATIN

A 11

Five papers are set, I, II, III, IV, V, each marked out of 100 except II (max. 80) and III (max. 60). Papers I, II, and III are the normal Advanced Level papers. Paper IV is the Special paper. Paper V (verse) is optional. Good work in it may compensate

† These books will be set again for 1967.

¹ Only the writings of the author named are prescribed.

slight weakness in other Latin papers, and success in it is recorded on the candidate's certificate, provided that a pass in Latin as a whole, either at Advanced or Ordinary Level, is obtained.

I (3 hours). Books for detailed study. Candidates are expected to show such knowledge of the social, literary, and historical background as is necessary for the appreciation of these texts. Some passages for syntactical comment are set.

The set books are:

Either Cicero, *Verrine V*, 1-11 and 14-40 (sections 1-28 and 35-105)
or Tacitus, *Histories I*, 1-51
with either †Virgil, *Aeneid XII*, 1-696
or †Lucretius, *De Rerum Natura V*, 772-1457

II. (2½ hours). Unprepared translation into English of a prose and of a verse passage.

III (2 hours). A passage of moderate difficulty for translation into Latin prose.

IV (3 hours). Unprepared translation into English of a prose passage more difficult than that in Paper II, and translation into Latin prose of a passage more difficult than that in Paper III.

V (2½ hours). Latin verse composition.

ANCIENT HISTORY

A 12

Three papers are set, I, II, and III, each marked out of 100. Papers I and II are the normal Advanced Level papers. Paper III is the Special paper.

I (3 hours). Greek History. The paper is set on the period 594-321 B.C., and candidates are instructed to answer any five of the questions set.

II (3 hours). Roman History. The paper is set on the period 264 B.C.-138 A.D., and candidates are instructed to answer any five of the questions set.

Questions are included on the literature, art, antiquities, and social life of the Greeks and Romans during the periods covered.

III (3 hours). Detailed study of a subject within the periods covered in Paper I or in Paper II. Candidates are expected to show knowledge of the original sources, which may be read in translation.

The prescribed subjects are:

Either (a) *The Peisistratids*.
or (b) *The First Punic War*.

MODERN LANGUAGES

A 20-A 24

Oral examinations

Candidates who offer French, German, Spanish, Italian or Russian at Advanced Level must take as part of the subject examination in each case an oral examination consisting of tests in reading, conversation, and dictation, for which tests the total maximum mark is 56. The oral examinations in reading and conversation are conducted by examiners appointed by the Delegates. The dictation tests are given by the teachers of the candidates, the date, early in the Summer Term, being fixed and the materials supplied by Oxford. An oral entry form must be completed and returned by the Head of the school to the Secretary at Oxford by 1 February.

FRENCH

A 20

All candidates must take an oral examination (see above). Four written papers are set, I, II, III, and IV, each marked out of 100 except III (max. 80). Papers I, II, and III are the normal Advanced Level papers. Paper IV is the Special paper.

In order to pass at Advanced Level a candidate must reach a satisfactory standard on the aggregate of Papers I, II, III and the oral examination, and must also reach a satisfactory standard on Papers II and III considered together.

† These books will be set again for 1967.

The written papers are:

Paper I (3 hours). Prescribed Books. Candidates are expected to show such knowledge of social and literary history as is necessary for the appreciation of the books. Of the following six possibilities they must offer four only, which must include (a) or (b) and may include both.

- (a) †Racine, *Mithridate*
- (b) Molière, *L'Avare*
- (c) *Nine French Poets*, ed. Berthon (Macmillan), pp. 1-105
- (d) Beaumarchais, *Le Mariage de Figaro*
- (e) †Balzac, *Eugénie Grandet*
- (f) †Camus, *La Peste*

Paper II (2½ hours). Prose composition, and essay in French.

Paper III (2 hours). Unprepared translation from French.

Paper IV (3 hours). Prose composition, and a commentary in English on an unprepared passage of French prose or verse; for the purposes of the commentary candidates may be required to translate a section or sections of the passage.

GERMAN

A 21

All candidates must take an oral examination (see p. 57). Four written papers are set, I, II, III, and IV, each marked out of 100 except III (max. 80). Papers I, II, and III are the normal Advanced Level papers. Paper IV is the Special paper.

In order to pass at Advanced Level a candidate must reach a satisfactory standard on the aggregate of Papers I, II, III and the oral examination, and must also reach a satisfactory standard on Papers II and III considered together.

The written papers are:

Paper I (3 hours). Prescribed Books. Candidates are expected to show such knowledge of social and literary history as is necessary for the appreciation of the books. They must offer (a) and three of the other five possibilities.

- (a) †Goethe, *Egmont*
- (b) *A Book of German Verse for Schools*, ed. Fiedler (O.U.P.), pp. 22-150 (not *The Oxford Book of German Verse*)
- (c) Lessing, *Emilia Galotti*
- (d) †Kleist, *Der zerbrochene Krug*
- (e) Stifter, **either** *Kalkstein* (with the Vorrede to *Bunte Steine*) **or** *Granit* (including the Vorrede to *Bunte Steine*) Reclam edition†
- (f) †Zweig, *Vier Novellen* (Harrap)

Paper II (2½ hours). Prose composition, and essay in German.

Paper III (2 hours). Unprepared translation from German.

Paper IV (3 hours). Prose composition, and a commentary in English on an unprepared passage of German prose or verse; for the purpose of the commentary candidates may be required to translate a section or sections of the passage.

SPANISH

A 22

All candidates must take an oral examination (see p. 57). Four written papers are set, I, II, III, and IV, each marked out of 100 except III (max. 80). Papers I, II, and III are the normal Advanced Level papers. Paper IV is the Special paper.

In order to pass at Advanced Level a candidate must reach a satisfactory standard on the aggregate of Papers I, II, III and the oral examination, and must also reach a satisfactory standard on Papers II and III considered together.

The written papers are:

Paper I (3 hours). Prescribed Books. Candidates are expected to show such knowledge of social and literary history as is necessary for the appreciation of the books. They must offer (a) and three of the other five possibilities.

- (a) †Cervantes, *Páginas del Quijote*, ed. Lester and Terrádez (U.L.P.)
- (b) †Lope de Vega, *Fuenteovejuna*
- (c) *The Oxford Book of Spanish Verse* (2nd edn.), pp. 59-74, 88-95, 105-127, 219-229, 285-312
- (d) †Pedro Antonio de Alarcón, *El sombrero de tres picos*
- (e) Benavente, *Tres comedias*, ed. Horne (Harrap)
- (f) Camilo José Cela, *Viaje a la Alcarria* (Harrap)

† These books will be set again for 1967.

† Copies of this latter text may be obtained from the Secretary at Oxford, price 1s. 9d. each, post free.

Paper II (2½ hours). Prose composition, and essay in Spanish.

Paper III (2 hours). Unprepared translation from Spanish.

Paper IV (3 hours). Prose composition, and a commentary in English on an unprepared passage of Spanish prose or verse; for the purposes of the commentary candidates may be required to translate a section or sections of the passage.

ITALIAN

A 23

All candidates must take an oral examination (see p. 57). Four written papers are set, I, II, III, and IV, each marked out of 100 except III (max. 80). Papers I, II, and III are the normal Advanced Level papers. Paper IV is the Special paper.

In order to pass at Advanced Level a candidate must reach a satisfactory standard on the aggregate of Papers I, II, III and the oral examination, and must also reach a satisfactory standard on Papers II and III considered together.

The written papers are:

Paper I (3 hours). Four books are prescribed for study. Candidates are expected to show such knowledge of social and literary history as is necessary for the appreciation of the books.

- (a) Alfieri, *Saul*
- (b) †Pascoli, *Selected Poems* (C.U.P.)
- (c) †Deledda, *Marianna Sirca*
- (d) Pirandello, *Così è se vi pare*

Paper II (2½ hours). Prose composition, and essay in Italian.

Paper III (2 hours). Unprepared translation from Italian.

Paper IV (3 hours). Prose composition, and a commentary in English on an unprepared passage of Italian prose or verse; for the purposes of the commentary candidates may be required to translate a section or sections of the passage.

RUSSIAN

A 24

All candidates must take an oral examination (see p. 55). Four written papers are set, I, II, III, and IV, each marked out of 100 except III (max. 80). Papers I, II, and III are the normal Advanced Level papers, Paper IV is the Special paper.

In order to pass at Advanced Level a candidate must reach a satisfactory standard on the aggregate of Papers I, II, III and the oral examination, and must also reach a satisfactory standard on Papers II and III considered together.

The written papers are:

Paper I (3 hours). Four books are prescribed for study. Candidates are expected to show such knowledge of social and literary history as is necessary for the appreciation of the books.

- (a) †Turgenev, *Mumu* (Bradda)
- (b) Tolstoy, *Childhood* (Bradda), Chapters I–XV inclusive
- (c) †Panova, *Serezha* (Pergamon Press)
- (d) *The Oxford Book of Russian Verse* (second edition), numbers 26, 29, 31, 32, 33, 34, 35, 43, 49, 53, 70, 74, 75, 77, 78, 81

Paper II (2½ hours). Prose composition, and essay in Russian.

Paper III (2 hours). Unprepared translation from Russian.

Paper IV (3 hours). Prose composition, and a commentary in English on an unprepared passage of Russian prose or verse; for the purposes of the commentary candidates may be required to translate a section or sections of the passage.

HISTORY

A 30

Three papers (3 hours each) are set, each marked out of 100. Papers I and II are the normal Advanced Level papers. Paper III is the Special paper.

There are four schemes.

Papers I and II.

- Either** I A (British) 1066–1485 with II A (Foreign) 1073–1494;
 or I B (British) 1485–1714 with II B (Foreign) 1494–1715;
 or I C (British) 1660–1832 with II C (Foreign) 1648–1815;
 or I D (British) 1783–1919 with II D (Foreign) 1789–1919.

† These books will be set again for 1967.

Important note:

Paper I A (British) 1066-1485 is divided into three sections: (i) 1066-1216, (ii) 1217-1377, (iii) 1378-1485; candidates must answer questions from at least two sections.

Paper II A (Foreign) 1073-1494 is divided into three sections: (i) 1073-1216; (ii) 1217-1377, (iii) 1378-1494; candidates must answer questions from at least two sections.

The other papers are each divided into two sections; candidates are required to answer questions from both sections.

Paper III contains general historical questions appropriate to the various periods in the Advanced Level syllabus, and also questions on related subjects (e.g. the development of political ideas and constitutional forms, religious, economic, and geographic factors in history) in which reading is normally undertaken as part of a sixth-form History course. A considerable choice of questions is given, of which three are to be attempted.

The following books are mentioned, not as prescribed texts, but as a guide to the kind of reading appropriate for a candidate for the Special paper: A. F. Pollard, *Factors in American History* (C.U.P.); H. A. L. Fisher, *A History of Europe* (Arnold); Mill, *Essay on Liberty and Essay on Representative Government*; Sir E. Barker, *Essays on Government* (O.U.P.); R. H. Soltau, *Introduction to Politics* (Longmans, Green & Co.); C. F. Strong, *Modern Political Constitutions* (Sidgwick & Jackson); M. Stewart, *Modern Forms of Government* (Allen & Unwin); E. R. Bevan, *Christianity* (Home University Library, O.U.P.); C. A. Alington, *Christianity in England* (O.U.P.); D. C. Hague and A. W. Stonier, *Essentials of Economics* (Longmans, Green & Co.); J. R. Hicks, *The Social Framework* (O.U.P.); Sir G. N. Clark, *The Wealth of England* (Home University Library, O.U.P.); T. S. Ashton, *The Industrial Revolution* (Home University Library, O.U.P.); H. C. Darby, *Historical Geography of England before A.D. 1800* (C.U.P.); A. L. Rowse, *The Use of History* (E.U.P.).

ECONOMIC HISTORY**A 31**

Two papers (3 hours each) are set, which must be taken by candidates at Advanced Level. Each paper is marked out of 100. Candidates wishing to take a Special paper in this subject may take Paper III of A 30 History at Advanced Level, provided that they are not taking this paper as a Special paper in that subject. The list of topics given below under the dates for the papers is intended only as a general guide to the scope of the papers.

Paper I. c. 1300-1750

Agriculture: The manor—its break-up—commutation of services; labour laws; the Black Death; the Peasants' Revolt.

Enclosure in fifteenth and sixteenth centuries; effects on agricultural society.

Agrarian changes of the seventeenth and eighteenth centuries.

Industry: The Guild Merchant and decay of the boroughs.

Craft Guilds. The woollen industry—the seeds of Capitalism.

Textile, iron, and coal industries; development in sixteenth and seventeenth centuries.

The state and industry; protection of industry; apprenticeship, wages, poor relief, trade clubs, patents of monopoly.

Trade: Mercantilism; regulated and joint-stock companies.

Navigation and Old Colonial Systems.

Banking; origins and development; importance to industry and trade.

Transport; roads and river navigation; importance to industry and trade.

Paper II. 1750-1914

Agriculture: Enclosures; distress and Poor Law reform; the Corn Laws; changes in structure.

Industry: The change from the domestic system; adaptation to new techniques; factories; localization.

Effects of machine industry; the conditions for enterprise and invention.

Trade: Tariff changes; pattern of foreign trade; foreign investment.

Price movements; the trade cycle.

The Bank of England and joint-stock banks.

Joint-stock reform and Limited Liability.

Communications: railways; shipping; telegraph; Post Office.

Social: From *Laissez-faire* to Collectivism.

Labour legislation; Factory Acts; Industrial Insurance.

Public Health.

Trade Unions; the Co-operative Movement.

Population: trends; movements; composition.

The following list of books, from which selection could be made, is suggested for the guidance of teachers and for inclusion in school libraries. Those marked with an asterisk are thought likely to be especially helpful.

H. Heaton, *Economic History of Europe* (Harper, 2nd edn. 1948); M. W. Thomas, *A Survey of English Economic History* (Blackie, 1957); P. Ramsey, *Tudor Economic Problems* (Gollancz, 1963); W. J. Ashley, *Economic Organization of England* (Longmans, Green, 3rd edn. 1949); Sir John Clapham, *Concise Economic History of Britain from the earliest times to 1750** (C.U.P., 1949); E. Lipson, *Economic History of England*, vol. 1, *The Middle Ages*; vols. ii and iii, *The Age of Mercantilism* (Black, 1915-59); A. R. Bridbury, *Economic Growth: England in the Later Middle Ages* (Allen & Unwin, 1962); Sir George Clark, *The Wealth of England from 1496 to 1760** (O.U.P., 1946); T. S. Ashton, *The Industrial Revolution 1760-1830** (O.U.P., 1948); P. Mantoux, *The Industrial Revolution in the Eighteenth Century** (Cape, 1931); A. Redford, *Economic History of England, 1760-1860* (Longmans, Green, 2nd revised edn., 1960); C. R. Fay, *Great Britain from Adam Smith to the Present Day** (Longmans, Green, 5th edn., 1950); Sir Robert Ensor, *England 1870-1914* (O.U.P., 1936); W. W. Rostow, *British Economy of the Nineteenth Century** (O.U.P., 1948); G. P. Jones and A. G. Pool, *A Hundred Years of Economic Development in Great Britain** (Duckworth, 1940) (covers the period 1837-1939); W. H. B. Court, *Concise Economic History of Modern Britain from 1750 to recent times** (C.U.P., 1954); T. S. Ashton, *An Economic History of England: The Eighteenth Century** (Methuen, 1955).

For reference: Sir John Clapham, *Economic History of Modern Britain*, 3 vols. (C.U.P., 1926-38) (covers the period 1820-1914).

For specialist studies: D. G. Barnes, *History of the English Corn Laws* (Routledge, 1930); M. W. Thomas, *The Early Factory Legislation* (Thames Bank Pub. Co., 1948).

BRITISH CONSTITUTION

A 36

Three papers (3 hours each) are set, each marked out of 100. Papers I and II are the normal Advanced Level papers. Paper III is the Special paper.

Paper I. The British Constitution To-day

Outlines of the constitution and political system of Great Britain at the present time, including:

The Crown in Parliament: the Monarchy and its part in British government; the Ministry and Cabinet, their internal organization, and the relations of Ministers and Cabinet to the Crown, to Parliament, and to the Civil Service; the function, organization, and working of Parliament.

The electorate, elections, and parties: the basic elements of the law relating to elections, their theory and practice; the organization of parties in the country and in Parliament, and the formation of public opinion.

The Judicial system of England and Wales in broad outline.

The organization and functions of the Civil Service; public corporations in their relations to Government and Parliament.

Local Government: the organization and function of the local authorities in England and Wales.

Paper II. Candidates must answer questions **either** on Section A **or** on Section B, but not on both.

Section A. British Constitutional History since 1830

The development of central and local government in Britain since 1830.

Section B. American Government

National government in the United States, including the outlines of federal government (but not state or local government): the Presidency; Congress; the Supreme Court and judicial review (but not the judicial system); political parties and elections. Questions will be asked both directly on American government and on a comparison with British government.

Paper III. This paper contains questions on the syllabus for Papers I and II.

ECONOMICS

A 40

Three papers (3 hours each) are set, each marked out of 100. Papers I and II are the normal Advanced Level papers. Paper III is the Special paper.

Paper I. Principles of Economics

The National Income as a flow of goods and services. The meaning of the terms 'national income', 'consumption', 'saving', 'investment'. The origin of the national income in raw materials, labour, and capital.

Production and Distribution under private enterprise. Elementary analysis of consumer demand and the theory of supply in simple competitive and monopolistic markets (but not the theory of oligopoly and other complex relationships). The formation of prices in such markets. The response of supply and demand to price changes; the concept of the 'margin'. The principal types of private income to which the working of private enterprise gives rise (wages, interest, profits, and rent).

Money. Elementary consideration of the nature and functions of money and credit; definition and measurement of the value of money. (The theory of the Gold Standard may be omitted.)

International Trade. The theory of Comparative Costs. The structure of the Balance of Payments and the factors influencing it; free trade and protection.

Elementary Theory of National Income Determination. Inflation and deflation; the principal types of unemployment.

In discussing aspects of the National Income, the Balance of Payments, and Unemployment, reference should be made as far as possible to the relevant statistical data.

Paper II. Economic Development and Policy in the United Kingdom

Questions relate principally to the years since the Second World War, but a general background knowledge of the decade before the war is expected. Questions are set on such subjects as population problems, employment, the balance of payments, wages, monopoly policy, nationalization, and the development of particular industries including agriculture.

Paper III contains a considerable choice of subjects for essays, of which three are to be attempted. The questions are set on topics included in the syllabus for Papers I and II.

The following titles are offered not as prescribed texts, but as an indication of the manner and standard of treatment of the topics in Paper III to which candidates should be introduced: A. Cairncross, *Introduction to Economics* (Butterworth); J. R. Hicks, *The Social Framework*, Part I (O.U.P.); Croome and King, *The Livelihood of Man* (Chatto & Windus); W. A. Lewis, *Economic Survey, 1919-1939* (Allen & Unwin); G. D. N. Worswick and P. H. Ady, *The British Economy 1945-1950* (O.U.P.); G. D. N. Worswick and P. H. Ady, *The British Economy in the 1950's* (O.U.P.); R. G. Lipsey, *Introduction to Positive Economics* (Weidenfeld & Nicolson); E. A. G. Robinson, *The Structure of Competitive Industry* (Cambridge Economic Handbooks); E. A. G. Robinson, *Monopoly* (C.E.H.); H. D. Henderson, *Supply and Demand* (C.E.H.); E. Nevin, *Textbook of Economic Analysis* (Macmillan); G. Crowther, *An Outline of Money* (Nelson); H. Croome, *Introduction to Money* (Methuen); A. J. Brown, *Introduction to the World Economy* (Allen & Unwin); G. C. Allen, *British Industries and their Organization*, 4th edn. (Longmans, Green).

Candidates offering the Special paper should be encouraged to read *The Economist*, the reviews published by the Joint Stock Banks, and similar material.

RELIGIOUS KNOWLEDGE

A 43

Three papers (3 hours each) are set, each marked out of 100. Papers I and II are the normal Advanced Level papers. Paper III is the Special paper. The Revised Version is used, but Papers I and II based on the Douay Version are prepared for candidates who are specially entered for them on the broadsheet entry forms.

The following books are suggested as guides to the scope and standard of the general parts of the papers: Volume I in *The Clarendon Bible* (Old Testament Series, O.U.P.), or H. Wheeler Robinson, *The Old Testament: its Making and Meaning* (University of London Press); F. Bertram Clogg, *An Introduction to the New Testament* (University of London Press), or A. M. Hunter, *Introducing the New Testament* (S.C.M. Press).

Paper I tests general knowledge of the main outlines of Old Testament history, religion, and literature, including the Apocrypha, with detailed knowledge of certain portions of the Bible.

The portion of the Bible prescribed for special study is:

Isaiah XL-LXVI.

There are no 'context' questions requiring detailed comment.

Paper II tests general knowledge of the main outlines of New Testament history, religion, and literature, with detailed knowledge of certain portions of the Bible.

The portion of the Bible prescribed for special study is:

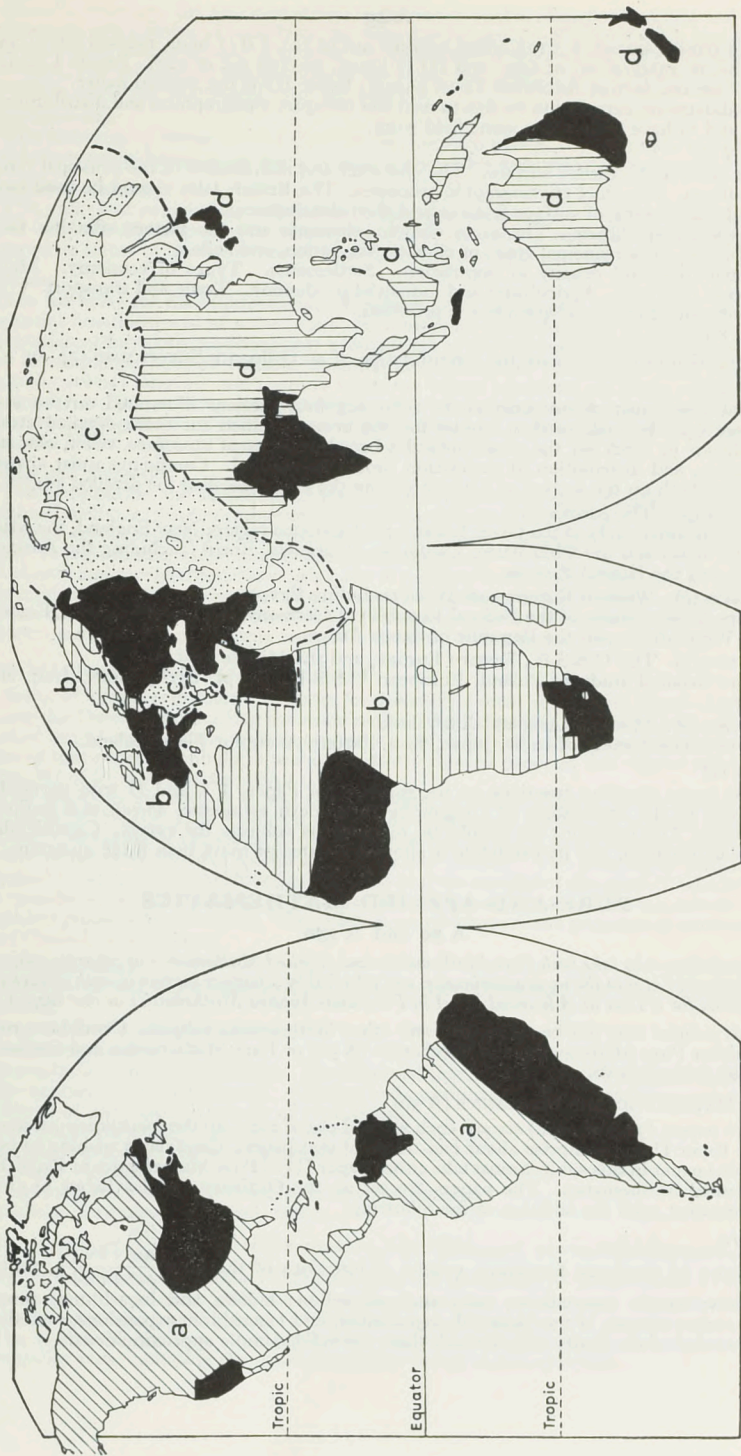
John's Gospel.

There are no 'context' questions requiring detailed comment.

Paper III is set in such a way as to test whether candidates have studied the syllabus for Papers I and II in the light of subsequent Christian thought and practice, and in relation to other religions, and to current secular thought normally explored in a sixth-form Religious Knowledge course. A considerable choice of questions is given, of which three are to be attempted.

Advanced Level Geography. Paper II

Map defining the regions



GEOGRAPHY

A 45

Four papers are set, I A (2½ hours, marked out of 72), I B (1 hour, marked out of 28), II (3 hours, marked out of 100), and III (3 hours, marked out of 100). Papers I A, I B and II are the normal Advanced Level papers; Paper III is the Special paper.

Candidates are expected to be able to read and interpret topographical and distributional maps and to have undertaken some field work.

Paper I A

The relief of the earth's surface. The character and distribution of the principal types of landform. The chief physiographic processes. The British Isles should be used for a more detailed study of surface features and their development.

Weather and climate. The main climatic elements and the factors affecting their distribution. The principal types of climate, vegetation, and soils.

Distribution and density of population. Settlements. Types of economy. Major economic resources. Agricultural and industrial production. Trade and transport.

A substantial choice of questions is provided.

Paper I B

A question or questions on the interpretation of an Ordnance Survey map (2½" or 1").

Paper II

Candidates must choose **one** of the following four sections illustrated on the map on page 63. In each section, except for the areas specified for more detailed study and shown in black on the map, only the broad outlines of structure, relief, climate, vegetation, and distribution of population should be studied. Candidates must answer questions both on the section as a whole and on the areas specified for detailed study.

Section (a). The Americas.

More detailed study of the Great Lakes—St. Lawrence region, New England, the Mid-Atlantic states and the Ohio Basin, California, Venezuela, Brazil (excluding the Amazon Basin), and the Humid Pampas.

Section (b). Western Europe and Africa excluding Egypt.

More detailed study of the Federal Republic of Germany, the Low Countries, France, Italy, West Africa, and the Republic of South Africa.

Section (c). The U.S.S.R., Eastern Europe, and the Middle East.

More detailed study of Poland, European U.S.S.R., Egypt, Syria, Israel, Iraq, and Turkey.

Section (d). Monsoon Asia and Australasia.

More detailed study of India, Japan, Java, Eastern Australia, New Zealand.

Paper III

This paper contains questions on the syllabus for Papers I A and II with particular reference to the application of Geography to modern economic, social, and political problems. The questions set should be regarded as subjects for essays. Considerable choice is provided, and no candidate is allowed to attempt more than three questions.

PURE-AND-APPLIED MATHEMATICS

A 50 and A 150

(Candidates who take both Pure Mathematics and Applied Mathematics as separate subjects at Advanced Level in the same examination and who fail by a narrow margin in each subject are considered for a Pass at Advanced Level in Pure-and-Applied Mathematics as one subject.)

This subject may not be taken with any other Mathematics subject. Candidates may take either Pure Mathematics and Mechanics (A 50) or Pure Mathematics and Statistics (A 150), but not both.

PURE MATHEMATICS AND MECHANICS (A 50)

Two papers (3 hours each) are set, each marked out of 200. All the mechanics questions are in Paper II and comprise about two-thirds of that paper. Candidates wishing to take a Special paper in this subject must take either Paper III of Pure Mathematics or Paper III of Applied Mathematics. The papers are set on the Ordinary Level syllabus O 51 in Mathematics, with the addition of the following:

Algebra

Theory of quadratic functions; graphs of functions of the form $\frac{ax^2+bx+c}{px^2+qx+r}$; partial fractions; simple inequalities; ratio and proportion; indices and logarithms; simple finite series; the use of the binomial, exponential, and logarithmic expansions, including a knowledge of the limits within which these are valid; simple approximations.

Trigonometry

Circular measure; the trigonometrical functions of angles of any magnitude and their graphs; general solution of equations; the formulae for $\sin(A \pm B)$, $\cos(A \pm B)$, $\tan(A \pm B)$ and associated formulae; easy identities; the formulae for the radii of the circumscribed, inscribed, and escribed circles in terms of the sides; the solution of triangles; applications to simple problems in two and three dimensions.

Pure Geometry

The theorems of Menelaus and Ceva; angles between planes, between lines and planes, and between non-intersecting lines; shortest distance between two non-intersecting lines.

Analytical Geometry

The point and straight line referred to rectangular cartesian axes; the parabola referred to its axis and the tangent at its vertex; the ellipse referred to its major and minor axes; parametric forms of the equations of the ellipse and parabola referred to the above axes.

Calculus

The formulae for the differentiation of powers of x , of circular, logarithmic, and exponential functions, and of sums, products, quotients, and a function of a function; the integration of functions requiring only a knowledge of the differential coefficients specified and of simple changes of variable; maxima and minima of functions of one variable; approximations; tangents and normals to curves whose equations are given explicitly in the form $y = f(x)$, or in terms of a parameter; the tracing of simple curves whose cartesian equations are given; the determination of plane areas and of volumes of solids of revolution, and of the centres of mass of these areas and volumes.

Statics and Dynamics

The composition and resolution of forces in one plane; moments, couples; elementary graphical methods; the determination of the centre of mass in simple cases; friction; simple examples on the equilibrium of systems of rigid bodies, including simple frameworks; elastic strings, Hooke's law; simple machines, efficiency.

Velocity and acceleration; Newton's Laws of motion; work, energy, and power; elementary applications of the principles of conservation of energy and of linear momentum; the motion of particles in two dimensions under forces constant in magnitude and direction; uniform circular motion; simple harmonic motion; direct impact, Newton's law.

PURE MATHEMATICS AND STATISTICS (A 150)

Notice of intention to enter candidates for this subject must be given by Heads of schools during the December preceding the examination. Two papers (3 hours each) are set, each marked out of 200. All the statistics questions are in Paper II and comprise about four-fifths of that paper. Candidates wishing to take a Special paper in this subject must take Paper III of Pure Mathematics A 51.

The questions are such as to test understanding of statistical principles, experience in the handling of elementary problems, and ability to interpret results and to avoid common pitfalls. Candidates are expected to show a thoughtful approach to the subject, rather than merely to quote definitions and to apply formulae blindly. The amount of calculation required is not great, but arithmetical accuracy and the intelligent checking of calculations are considered in the marking, as also are competence and neatness in the tabular and graphical presentation of results. The syllabus, on which specimen papers may be obtained from Oxford, is as follows:

Pure Mathematics

The algebra and trigonometry of the Ordinary Level syllabus O 51, together with the following:

Properties of quadratic functions.

Partial fractions.

Permutations and combinations. The binomial theorem for positive integral indices.

Elementary probability theory. Addition and multiplication of probabilities and simple problems of 'urn' type. Concept of expectation.

Use of the binomial, exponential, and logarithmic series.

Simple approximations and inequalities.

Circular measure.

Trigonometric functions of angles of any magnitude.

Addition formulae, and allied results.

The graphs of $\frac{ax^2+bx+c}{px^2+qx+r}$, of the circular, logarithmic and exponential functions, and of simple combinations of these. Differentiation and integration of these functions (proofs of formulae not required). Maxima and minima; tangents and normals; approximations; the determination, in simple cases, of lengths, areas, first and second moments.

The analytical geometry of straight line, parabola, and ellipse, referred to the usual rectangular axes, including the usual parametric forms of the equations.

*Statistics**Frequency Distributions*

Tabulation and graphical representation of data. Discrete and continuous variation. Histograms, frequency polygons, and cumulative frequency diagrams. Elementary descriptive properties of distributions in respect of skewness, limitation of range, &c.

Mean (arithmetic), mode, median. Standard deviation, variance, and range. Calculation of mean and standard deviation using arbitrary origin, with or without grouping (not Sheppard's correction). Standard measure (i.e. expression of measurements relative to arithmetic mean and in units of standard deviation).

Particular distributions. Binomial, Rectangular, Normal—including equation, main characteristics, and elementary uses of tables of normal integral, but no proofs. (Not Poisson distribution.)

Two-variate Distributions

Tabulation. Scatter diagrams. Descriptive and graphical treatment of linear regression. Drawing of regression lines by eye, and expression by equations. Definition and interpretation of product-moment correlation coefficient.

Simple contingency tables, and expected frequencies calculated on hypothesis of independence. Discussion of results without tests of significance.

Sampling

Distinction between population parameters and sample statistics. Repeated sampling from normal distribution. Distribution of means of these samples. Standard error of these means (σ/\sqrt{n}). Tests of significance of difference between mean of single sample and postulated population mean, and fiducial or confidence limits to mean derived from sample. (No rigorous treatment expected, but questions on general principle and application to normal distributions may be set.)

Index Numbers

Introduction to their purpose, calculation, and use in economic problems.

Time Series

Graphical representation of time series. Pitfalls.

PURE MATHEMATICS**A 51**

(Candidates who take both *Pure Mathematics* and *Applied Mathematics* as separate subjects at *Advanced Level* in the same examination and who fail by a narrow margin in each subject are considered for a *Pass at Advanced Level in Pure-and-Applied Mathematics* as one subject.)

Three papers (3 hours each) are set, each marked out of 200. Papers I and II are the normal *Advanced Level* papers. Paper III is the *Special paper*. The papers are set on the syllabus for O 51 with the following additions:

Algebra

Simultaneous quadratic equations (simple examples only); simple exercises in elimination; simple inequalities; ratio and proportion; indices and logarithms; partial fractions; functions of the form $\frac{ax^2+bx+c}{px^2+qx+r}$; the relation between the roots of an equation and its coefficients; permutations and combinations; easy cases of summation of finite series; the method of induction; the use of the binomial, exponential, and logarithmic expansions, including a knowledge of the limits within which these are valid; simple approximations.

Trigonometry

Circular measure; the trigonometrical functions of angles of any magnitude and their graphs; inverse circular functions; general solution of equations; the formulae for $\sin(A \pm B)$, $\cos(A \pm B)$, $\tan(A \pm B)$ and associated formulae; identities, inequalities, and elimination; the summation of simple finite series; the solution of triangles; applications to simple problems in two and three dimensions.

Pure Geometry

Elementary properties of the triangle and its associated points and circles, including the nine-points circle and the usual formulae for the radii of the circumscribed, inscribed, and escribed circles; the theorems of Menelaus and Ceva; angles between planes, between lines and planes, and between non-intersecting lines; shortest distance between two non-intersecting lines.

Analytical Geometry

The point and straight line referred to rectangular cartesian axes; the parabola referred to its axis and the tangent at its vertex; the ellipse and hyperbola referred to their principal axes, and the rectangular hyperbola referred to its asymptotes; parametric forms of the equations of the parabola, ellipse, and hyperbola referred to the above axes; the circle, and systems of circles $S_1 + kS_2 = 0$.

Calculus

The formulae for the differentiation of powers of x , of circular, inverse circular, logarithmic, and exponential functions, and of sums, products, quotients, and a function of a function; the integration of functions requiring only a knowledge of the differential coefficients specified, of simple changes of variable, and of integration by parts; simple reduction formulae; maxima and minima of functions of one variable; approximations; tangents, normals, and points of inflexion of curves whose equations are given explicitly in the form $y = f(x)$, or in terms of a parameter; the tracing of simple curves whose cartesian or polar equations are given; the determination of plane areas and of volumes of solids of revolution, and of the centres of mass of these areas and volumes; the determination of the length of an arc of a plane curve and of the area of a surface of revolution.

APPLIED MATHEMATICS**A 52**

(Candidates who take both Pure Mathematics and Applied Mathematics as separate subjects at Advanced Level in the same examination and who fail by a narrow margin in each subject are considered for a Pass at Advanced Level in Pure-and-Applied Mathematics as one subject.)

Three papers (3 hours each) are set, each marked out of 200. Papers I and II are the normal Advanced Level papers. Paper III is the Special paper. Candidates are expected to show knowledge of methods involving the use of calculus, and the papers are set on the following syllabus:

The composition and resolution of forces in one plane; moments, couples, elementary graphical methods; the general conditions of equilibrium of a system of coplanar forces; the determination of centres of mass; friction; the equilibrium of systems of rigid bodies, including simple cases involving forces in three dimensions acting through a point; frameworks, including Bow's notation; potential energy and stability; elastic strings, Hooke's law; simple machines, efficiency.

Velocity and acceleration; Newton's Laws of motion; work, energy, and power; elementary applications of the principles of conservation of energy and of linear momentum; the motion of particles in two dimensions under forces constant in magnitude and direction; simple cases of circular motion, not necessarily uniform; simple harmonic motion; impact (direct and oblique), Newton's law; the determination of moments of inertia; simple cases of rotation of a rigid body about an axis whose direction remains fixed, including cases of impulsive motion.

HIGHER MATHEMATICS**A 53**

Two papers (3 hours each) are set, each marked out of 200, and both must be taken. No Special paper is set in this subject. The questions are reasonably straightforward tests of further reading and not problems of open scholarship type. Each paper contains ten questions and full marks may be obtained on six questions per paper. The papers are set on the following syllabus, but candidates are expected to have at their disposal the technique and knowledge involved in the syllabuses A 51 and A 52.

Algebra and Trigonometry

Hyperbolic functions; determinants (not of higher order than fourth and not including multiplication); complex numbers, Argand diagram, De Moivre's theorem and easy applications; convergence of series (by first principles and by comparison with G.P.).

Geometry

Orthogonal projection; inversion; reciprocation with respect to a circle; the general equation of the conic; systems of conics; the use of homogeneous coordinates (not for metrical properties).

Calculus

Leibniz's theorem for repeated differentiation of a product; easy differential equations of the forms

$$(i) P \frac{dy}{dx} + Qy = R, \text{ where } P, Q, R \text{ are functions of } x,$$

$$(ii) l \frac{d^2y}{dx^2} + m \frac{dy}{dx} + ny = f(x), \text{ where } l, m, n \text{ are constants;}$$

asymptotes and double points of curves in simple cases; tracing of curves whose equations are given in terms of a parameter; elementary differential geometry of plane curves, including the standard formulae for radius of curvature; determination of envelopes in simple cases; partial differential coefficients of the first and second order.

Applied Mathematics

Virtual work; heavy strings hanging freely in catenary or parabola; application of differential equations of the forms specified above to the solution of dynamical problems; action of impulsive forces on rigid bodies moving in two dimensions.

PHYSICS**A 54**

Four papers I, II, III, and IV (3 hours each), are set. Each paper is marked out of 150 except III, which is marked out of 100. All candidates at Advanced Level must take Papers I, II, and III. The 'S' grading is assessed on Papers III and IV.

Paper III is a practical paper. Heads of schools who cannot provide adequate accommodation and equipment must not enter candidates for this subject. Information on the apparatus which must be available is given at the end of the syllabus. Confidential information about any special apparatus required may be obtained from Oxford by Heads of schools in March of the year of the examination.

Paper I is set on those parts of the following syllabus which are not printed in italics. It is divided into five sections, each covering a section of the syllabus, and candidates are expected to answer one question from each section.

Papers II and IV are set on the whole syllabus. They are each divided into five sections, covering the five sections of the syllabus, and candidates are expected to answer five questions, chosen from at least three sections. A more advanced treatment is expected in Paper IV.

Paper III is set on the whole syllabus; experiments set on italicized topics do not require a previous acquaintance with them.

For the benefit of candidates taught in terms of M.K.S. units, alternative questions are set on section (d) in the phraseology appropriate to this approach.

Candidates should be acquainted with some of the refinements necessary for accurate experimental work and should have developed some critical power in the choice of methods and apparatus used in laboratories. The range of their reading should not be limited to school textbooks. The examiners look for clear descriptions and well-reasoned explanations of phenomena as well as for ability to arrive at accurate results in numerical problems.

(a) GENERAL

Dimensions of physical quantities; *applications to derivation of simple formulae by the method of dimensions.*

Uniform and uniformly accelerated motion in a straight line; uniform motion in a circle. Falling bodies, *time of flight, greatest height and horizontal range of projectile*, neglecting air resistance and variation of g .

Newton's laws of motion; mass and weight.

Composition and resolution of velocities, accelerations, momenta, and forces. Relative velocity.

Couples and moments. Theory of the balance: sensitivity and accuracy.

Linear momentum and its conservation. *Angular momentum and its conservation.* Energy, work, and power.

Simple cases of equilibrium of a rigid body under coplanar forces. Centre of mass.

Definition and experimental determination of moments of inertia. Motion of a rigid body about a fixed axis.

Simple harmonic motion; the simple pendulum and the vibrating spring. Free, damped, and forced vibrations, and resonance (treated experimentally).

Newton's law of gravitation; relation between G and g ; *determination of the mean density of the earth.*

Definition of a modulus of elasticity; measurement of Young's modulus.

Fluid pressure. Archimedes' Principle. Determination of specific gravity; the common hydrometer. Manometers and pressure gauges (Bourdon, mercury, and McLeod).

Elementary ideas of surface tension; measurement of surface tension by capillary rise method. *Pressure change across a spherical surface.*

Elementary treatment of non-viscous and viscous flow, including Bernoulli's Principle and Stokes' law (treated by the method of dimensions).

(b) HEAT

Temperature and its measurement.

Elementary calorimetry; units of heat; specific heats and latent heats.

Thermal expansion of solids and liquids; definitions of coefficients of expansion.

The ideal gas laws; the equation of state of an ideal gas. The ideal gas scale of temperature; the constant volume gas thermometer. *Kinetic Theory interpretation of the ideal gas equation.*

Real gases. Deviation from the ideal gas laws; *Van der Waals' equation and its qualitative explanation.*

The critical temperature; distinction between a gas and a vapour. Saturated and unsaturated vapours. Measurement of saturated vapour pressure. Dalton's law of partial pressures.

The specific heats and molar heats of gases at constant pressure and at constant volume; *their difference and ratio (experimental determination of their ratio only). Reversible isothermal and reversible adiabatic expansion (proof of formulae $pv^\gamma = k$ not required).*

The first law of thermodynamics. Determination of J by one mechanical method.

Thermal conductivity of a solid (cases of parallel flow only). Determination of the thermal conductivity of good and of bad conductors, by one simple method in each case.

Radiation as a form of energy. Use of thermocouple and bolometer. *Black body radiation; distribution of energy in the spectrum (qualitative treatment only); Stefan's law. Pyrometers.*

(c) SOUND AND LIGHT

Characteristics of wave motion; sound as a wave motion. Propagation of sound in a gas; *dependence of velocity on temperature; formula $V = \sqrt{\gamma p/\rho}$ (proof not required); measurement of velocity of sound in free air; effect of wind.*

Characteristics of a musical note; intensity, pitch, quality. Measurement of frequency. *Doppler effect.*

Stationary waves. Vibrations of strings; experiments with the sonometer. Vibration of air columns, Kundt's tube.

Harmonics; *superposition of harmonics (graphically); modulated wave.*

Interference; beats.

Laws of reflection and refraction of light; determination of the index of refraction of transparent solids and liquids. Formulae for spherical mirrors and thin lenses (relations between u , v , f , and r for mirrors; u , v , and f for thin lenses; focal length as a function of refractive index and radii of curvature for thin lenses). Long and short sight and their correction. The prism; minimum deviation; the spectrometer and analysis of spectra. Astronomical (refracting and reflecting) and terrestrial telescopes, microscopes; magnification and magnifying power.

Outlines of the corpuscular and wave theories of light; the velocity of light and one terrestrial method for its determination. The reflection, refraction, and interference of light waves. *Interference by division of wave front (e.g. Young's slits, Fresnel's biprism) treated quantitatively; interference by division of amplitude (e.g. thin films), treated simply.* Diffraction of light; simple qualitative treatment of diffraction phenomena; plane transmission grating. Qualitative treatment of plane polarization; *polarization of light by reflection, double refraction (including Nicol prism, tourmaline, and Polaroid), and scattering.*

(d) ELECTRICITY AND MAGNETISM

The following syllabus, which is not intended to indicate order or method of teaching, is for use by all candidates, whether or not they use the rationalized M.K.S. system.

Magnetic field, magnetic field intensity (magnetizing force). Magnetic flux, magnetic flux density (magnetic induction). Magnetic moment. (Questions involving the use of magnetometers will not be set.)

Simple qualitative treatment of ferro-magnetism, including hysteresis.

Electrolysis; Faraday's laws; simple ionic theory; electrochemical equivalent.

Magnetic effects of a current; field at the centre of a plane circular coil carrying a current; field due to a long straight current-carrying conductor; field inside a long solenoid. (Proofs of formulae not required.)

Force on a conductor carrying a current in a magnetic field, treated quantitatively; moving coil galvanometer; force between current-carrying conductors.

Electromagnetic induction treated quantitatively. *The Lorentz experiment for determination of the ohm.* Simple a.c. and d.c. generators; d.c. motors, back e.m.f.; mutual and self inductance.

Relation between current and p.d. in solid, liquid, and gaseous conductors. Ohm's law. Resistance; resistivity, temperature coefficient; internal resistance of a generator.

Heating effects of current; practical applications; the kilowatt-hour.

Electrical units and measurements; instruments; range extension by shunt and series resistors; Wheatstone bridge; potentiometer; use of ballistic galvanometer.

Thermoelectric (Seebeck) effect; measurement of e.m.f. of a thermocouple and applications in thermometry.

Elementary electrostatics experiments, including use of electroscope and Faraday's induction experiments. Inverse square law.

Electric field; electric field intensity, potential and their relation; lines of force.

Total normal induction: Gauss's theorem (proof for a charge at the centre of a sphere only).

Normal component of electric field strength close to a conducting surface; Coulomb's theorem.

Attracted disc electrometer.

Capacitance; capacitors; parallel-plate capacitor; combination of capacitors; capacitance of a sphere; distribution of charge on the surface of a conductor. Van de Graaff generator.

Relative permittivity (dielectric constant). Effect of dielectric on field and capacitance.

Energy of a charged capacitor.

Alternating currents; r.m.s. values; *resistance, capacitance, and inductance in series (simple vector treatment).*

(e) ATOMIC PHYSICS AND ELECTRONICS

Particle aspect of radiation; photoelectric effect; *Planck's constant.*

Energy levels and spectra; types of spectra.

Ionization in gases; elementary evidence for nature of ions; ionization current; the discharge tube, excitation and ionization by collision (visual changes due to pressure changes not required).

Cathode rays; elementary evidence for electrons; deflection of an electron beam in electric and in magnetic fields; the electron-volt.

Thomson's experiment for determining e/m (quantitative).

Millikan's experiment for determining e .

Positive rays as streams of positive ions.

Existence of isotopes; *a simple form of mass spectrometer.*

Thermionic emission; cathode ray tube; thermionic diode and triode; use of diode in rectification; use of triode as an amplifier and oscillator.

Radio waves. Principles of generation, transmission, and reception.

X-rays; production and properties; *X-ray spectra, atomic number.*

The complete electromagnetic spectrum.

Properties of radioactive substances; α , β , and γ radiations, their detection and properties.

APPARATUS REQUIRED FOR THE PRACTICAL EXAMINATION.

Each candidate has to choose two questions out of three allocated to him by the teacher in charge of the examination. Apparatus need not necessarily be prepared for all the questions; and with these arrangements the practical examination is within the resources of any laboratory that is reasonably equipped for Advanced Level work. Examples of apparatus of which at least one should be available are: prism spectrometer with high dispersion prism; constant-volume air thermometer; sonometer; resonance tube; set of tuning forks.

CHEMISTRY

A 55

Five papers, I, II, III (2 hours each), and IV, V (3 hours each) are set. Papers I, II, III, and IV are marked out of 100 each, Paper V out of 150. All candidates at Advanced Level must take Papers I, II, III, and IV. The 'S' grading is assessed on Papers IV and V.

Papers I, II, and III deal with physical chemistry, inorganic chemistry, and organic chemistry respectively. It must not be assumed, however, that there will be no overlap between these sections. Thus, for example, questions might be set in the Paper on Inorganic Chemistry which involve a knowledge of the underlying physical principles. Each of these papers contains a compulsory question or questions which are set on those parts of the following syllabus which are not in italics. The remainder of these papers is set on the whole of the relevant section of the syllabus but some choice of question is provided. The questions set in these papers may not be entirely factual but may call for some ability to handle a problem, numerical or other. Candidates must satisfy the examiners in each of Papers I, II, and III as well as in the subject as a whole.

Paper IV is a practical paper. Heads of schools who cannot provide adequate accommodation and equipment must not enter candidates for this subject. Confidential information about any special apparatus or material required is sent to schools about six weeks before the examination; it cannot be supplied earlier. No textbooks or analytical tables may be used in the examination.

Paper V is set on the whole syllabus. More difficult questions are set and a more advanced treatment is expected.

Physical Chemistry

The laws of chemical combination. The accurate determination of atomic weights. *Isotopes in relation to atomic weights.* The determination of the equivalent weights of elements, acids, bases, oxidizing and reducing agents. The determination of molecular weights by vapour density measurements (Dumas' and Victor Meyer's methods) and from the elevation of the boiling-point and the depression of the freezing-point of solutions.

Simple treatment of the kinetic theory of the perfect gas, and the interpretation of the laws of Graham, Gay-Lussac, Avogadro, and Dalton. (The derivation of the relation $pv = \frac{1}{3}nmc^2$ will not be required.) The experimental determination of the volume composition of steam, hydrogen chloride, ammonia, sulphur dioxide, carbon monoxide, and carbon dioxide.

Raoult's law and its relation to the freezing-point and boiling-point of ideal solutions. *Osmotic pressure. The effects of dissociation and association on the latter properties. Simple treatment of the distillation of binary liquid mixtures which do not form constant-boiling mixtures. Steam distillation. Partition between two immiscible solvents.*

Reaction velocity. Velocity constant. The law of mass-action and its experimental verification. *Simple qualitative explanation of the effect of temperature on reaction velocity.* Homogeneous and heterogeneous catalysis. Chemical equilibrium. The effect of concentration, temperature, and (where relevant) pressure on the following types of equilibria: (a) wholly gaseous equilibria; (b) *solid-gas equilibria* (e.g. the dissociation of calcium carbonate or of a salt hydrate); (c) equilibria between dissolved substances (e.g. esterification) including the ionization of a weak electrolyte (i.e. Ostwald's Dilution Law) and the hydrolysis of salts; (d) equilibria between ionic solids and their ions (solubility product).

Ionic theory. *Evidence for the almost complete ionization of strong electrolytes.* Measurement of conductivity of electrolytes and interpretation of change of conductivity with concentration (a) for strong electrolytes (qualitative only), (b) for weak electrolytes. pH. *Elementary theory of acid-base indicators.* Electrolysis and Faraday's Laws.

Thermochemistry. Law of Hess. Use of heats of combustion, reaction, and formation. (Details of calorimeters not required.)

Inorganic Chemistry

(N.B. It is hoped that as far as possible descriptive inorganic chemistry is taught on a comparative basis or in relation to the position of the elements concerned in the Periodic Table. For the elements and compounds named below which are important industrially or in everyday life, knowledge of the essential features of their manufacture and especially of the chemical principles involved therein is expected unless otherwise stated, but details of the plant used are not required. The uses of such elements or compounds in relation to their physical or chemical properties should also be studied.)

The Periodic Table. *Its interpretation in terms of the electronic structures of atoms. The essential nature of ionic, covalent, and metallic bonds. The physical properties of simple inorganic solids in relation to the type of bonding or force between the particles in the lattice. Simple treatment of directed valency.*

Oxidation and reduction. *Their electronic interpretation. Electrode potentials* (details of the measurement of electrode potentials are not required). The electrochemical series. The theory of volumetric analysis involving acids, alkalis, potassium permanganate, potassium dichromate, silver nitrate, iodine, and sodium thiosulphate.

Practical details of the following laboratory preparations:

Sodium thiosulphate, cuprous oxide, cuprous chloride, potash alum, chrome alum, ferrous ammonium sulphate, ferric chloride, phosphorus trichloride, phosphorus pentachloride, lead dioxide, potassium dichromate, potassium permanganate.

The chemistry of the following substances: hydrogen; oxygen; *ozone*; hydrogen peroxide; nitrogen; ammonia and ammonium salts; nitric oxide, nitrous oxide; nitrogen peroxide; nitric acid and nitrates; nitrites; *the inert gases*; carbon (including its allotropy); carbon monoxide and dioxide; carbonates and bicarbonates; *carbon disulphide*; *cyanides*; sulphur (including its allotropy); hydrogen sulphide; sulphides; sulphur dioxide and sulphites; sulphur trioxide; sulphuric acid and sulphates; sodium thiosulphate; phosphorus (including its allotropy); *phosphine*; phosphorus pentoxide and tri- and pentachloride; *ortho-, meta-, and pyro-phosphoric acids*; *silicon*; *carborundum*; *uses of silica gel*; *glass*;

fluorine, chlorine, bromine, and iodine; their hydrides; their reaction with alkalis; the manufacture of chlorine, but isolation only of fluorine, bromine, and iodine.

The extraction of the following metals:

- (a) Iron (to include the production of steel).
 (b) **One** of the following: sodium, magnesium, aluminium.
 (c) **Either** copper **or** silver.
 (d) **Either** lead **or** tin.
 (e) **Either** zinc **or** mercury.

The chemistry of the following metals:

sodium; potassium; magnesium; calcium; aluminium; iron; **either** chromium **or** manganese; **either** copper **or** silver; **either** tin **or** lead; **either** zinc **or** mercury.

Organic Chemistry

The methods of preparation and/or large-scale production and purification (without experimental details except in the case of those compounds marked with an asterisk in the following list), important physical properties, chemical reactions (including those of simple derivatives such as the salts of an acid), uses, structural formulae and *the evidence therefor*, of:

methane, ethylene*, acetylene;
 methyl alcohol, ethyl alcohol;
 ethyl bromide*, ethyl iodide, ethylene dibromide*;
 chloroform*, carbon tetrachloride;
 diethyl ether;
 formaldehyde, acetaldehyde*, acetone;
 formic acid, acetic acid;
 acetyl chloride, acetic anhydride, acetonitrile;
 acetamide, *urea*;
 methylamine, di- and tri-methylamine, and *other simple amines*;
 ethyl acetate and *esters of other simple carboxylic acids*;
 oxalic acid, *lactic acid, glycine*;
glycerol, fats and soaps;
 benzene, bromobenzene, nitrobenzene*;
 aniline*, acetanilide*, *diazonium salts*;
 phenol, *phenyl benzoate**;
 toluene, benzyl alcohol (side chain reactions only);
 benzaldehyde, benzoic acid.

Homologous series.

Isomerism, *including the elements of stereoisomerism and the isomerism of the di-derivatives of benzene*.

Comparison of the chemical properties of the halide atom in ethyl bromide, bromo-benzene, and benzyl bromide; consideration of the chlorination products of toluene.

The principles involved in the determination of empirical and molecular formulae, and of structural formulae; *chemical properties conferred by the presence of characteristic groups such as —OH, —Cl, —CHO, >CO, —COOH, —CN, —NH₂.*

Methods of purification of organic compounds and criteria of their purity.

Practical Chemistry

All candidates are required to carry out:

- (i) a quantitative experiment,
 and (ii) a choice of **either**
 an exercise intended to test powers of observation, description, and deduction,
 or
 the qualitative analysis of a single substance or an easy mixture involving the following ions: sodium, potassium, ammonium, magnesium, calcium, aluminium, iron, chromium, manganese, copper, silver, zinc, mercury, lead, chloride, bromide, iodide, sulphide, sulphite, sulphate, thiosulphate, nitrite, nitrate, orthophosphate, carbonate, formate, oxalate, chromate. Neither mixtures containing two cations from the same analytical group, nor those involving complications such as the premature precipitation of calcium, &c., as phosphate or oxalate from alkaline solution, are included.

Only one quantitative experiment will be set in any one paper, and it may involve either a gravimetric operation which does not necessitate transference (such as determination of percentage loss of weight on heating, percentage non-volatile matter in a solution, equivalents of metals by oxidation, &c.), or the use of standard solutions of the volumetric reagents specifically mentioned in the **Inorganic Chemistry** section.

BOTANY

A 60

Four papers, I, II, III, and IV (3 hours each), are set, each marked out of 140. All candidates at Advanced Level must take Papers I, II, and III. The 'S' grading is assessed on Papers III and IV.

Paper III is a practical paper. Heads of schools who cannot provide the necessary accommodation and equipment must not enter candidates for this subject. The apparatus required is that normally to be found in a sixth-form biological laboratory, including microscopes having low power (1 in. or $\frac{3}{4}$ in.) and high power ($\frac{1}{4}$ in.) objectives and table lamps suitable for use with them, together with the usual stains and reagents. Confidential information of any special materials required is sent to Heads of schools about six weeks before the examination. This information cannot be supplied earlier. Candidates must bring to the practical examination dissection instruments, a razor, camel-hair brushes, a pocket hand lens, and one copy of a British Flora (Clapham, Tutin, and Warburg's *Excursion Flora of the British Isles*, or *Flora of the British Isles*, without the illustrations by S. J. Roles, C.U.P. Candidates wishing to use any other Flora must apply for the approval of the Delegates before commencing their courses of study).

All four papers are set on the whole of the following syllabus, but for Paper IV a more advanced treatment of the subject is expected.

1. Differences between plants and animals. The external morphology and main anatomical features of monocotyledons and dicotyledons. Root and shoot systems; roots, stems, and leaves, their anatomy in relation to their functions. Primary and secondary growth; the differences between herbaceous and arborescent plants. Absorption of raw material, transpiration, carbon assimilation and the synthesis, translocation, and storage of food; enzymes; respiration; growth; reactions of plants to external stimuli. Simple biochemical and physiological experiments.

2. Sexual and asexual reproduction; perennation. The flower. Main tendencies in floral evolution. Pollination; fertilization. Structure and development of seeds and fruits, dispersal; germination. Life-history and main anatomical features of *Pinus sylvestris*. Comparison of Angiosperms and conifers.

3. Classification of the major plant groups. The structure and life-history of *Euglena*, *Spirogyra*, *Fucus*, *Saccharomyces*, *Phytophthora infestans*, *Psalliota*, a lichen, a liverwort, a homosporous fern (e.g. *Dryopteris*), *Selaginella*.

4. General characteristics of bacteria with special reference to disease, decomposition, and the soil.

5. The properties of protoplasm. The structure and properties of the cell-wall, the cell and its contents. Mitosis. Differentiation of tissues. The behaviour of the nucleus in maturation of germ cells and in fertilization. Meiosis. Inheritance, considering not more than two pairs of genetical factors; linkage; crossing over. Structural basis of inheritance.

6. Variation. The concept of organic evolution and the evidence supporting it. Historical and modern theories of the mode of evolution.

7. General principles of plant ecology; adaptations of plants (e.g. aquatic, climbing, epiphytic, parasitic, and saprophytic plants) to different modes of life and habitats; types of vegetation (e.g. those of sea-shore, woodland, heath, moors). The use of a Flora.

Practical examination.

Candidates must be prepared to examine microscopically, to dissect, to identify, to describe, and to make simple temporary and permanent stained microscope slides, not involving the personal use of the microtome, of the material provided; to comment on material such as slides showing stages of mitosis or meiosis, material showing variation, organisms or parts of organisms commonly used in genetical studies, and to perform simple biochemical and physiological experiments.

ZOOLOGY

A 61

Four papers, I, II, III, and IV (3 hours each), are set, each marked out of 140. All candidates at Advanced Level must take Papers I, II, and III. The 'S' grading is assessed on Papers III and IV.

Paper III is a practical paper. Heads of schools who cannot provide the necessary accommodation and equipment must not enter candidates for this subject. The apparatus required is that normally to be found in a sixth-form biological laboratory, including microscopes having low power (1 in. or $\frac{3}{4}$ in.) and high power ($\frac{1}{4}$ in.) objectives and table

lamps suitable for use with them. Confidential information of any special materials required is sent to Heads of schools about six weeks before the examination. This information cannot be supplied earlier. Candidates must bring to the practical examination dissection instruments and a hand lens.

All four papers are set on the whole of the following syllabus, but for Paper IV a more advanced treatment of the subject is expected.

1. Differences between animals and plants. A mammal: general anatomy, with reference to rabbit or rat; skull, with reference to dog; physiology, mainly with reference to man.
2. Anatomy, physiology, life history, mode of life, and classification of the following: *Euglena*, *Paramecium*, *Amoeba*, *Monocystis*, *Obelia*, *Fasciola*, *Helix*, *Lumbricus*, *Periplaneta* or *Blatta*, *Branchiostoma* (*Amphioxus*), *Scyliorhinus*, *Rana* (excluding skeleton), *Oryctolagus* or *Rattus* (excluding skull).
3. Microanatomy of the following mammalian organs: stomach, duodenum, ileum, liver, pancreas, kidney, thyroid, ovary, testis. Structure of skin and teeth in dogfish, frog, and rabbit. General characteristics and histology of the following vertebrate tissues: epithelial, glandular, nervous, connective, skeletal, muscular, blood.
4. Microstructure of an animal cell: functions of its components. Properties of protoplasm; chemistry of its main constituents.
5. Mitosis; meiosis, maturation of germ cells, fertilization. Inheritance, considering not more than two pairs of genetical factors; linkage, including sex-linkage; crossing over. Structural basis of inheritance. Determination of sex.
6. Variation. The concept of organic evolution and the evidence supporting it. Historical and present theories of the mode of evolution. Principles of classification of animals.
7. The egg, cleavage, gastrulation, formation of the main organ-rudiments, and metamorphosis of *Rana*. Formation and functions of the embryonic membranes in *Gallus* and *Oryctolagus*.
8. General principles of animal ecology; adaptations of animals to their environment, illustrated by personal field study of the animals of one well-defined habitat: sea-shore, stream, pond, marsh, chalk down, wood, soil, &c. It is expected that in these field studies candidates will acquire knowledge of a wider range of animal types than those enumerated above.

Practical examination

Candidates must be prepared to:

- (a) examine microscopically, dissect, identify, describe, and prepare simple temporary and permanent stained slides, not involving the personal use of the microtome, of the animals or parts of animals specified for detailed study in Sections 1, 2, 3, and 7;
- (b) comment on material used to illustrate the subject matter of Sections 4, 5, 6, and 8;
- (c) perform simple biochemical and physiological observations and experiments.

BIOLOGY

A 62

This subject may not be taken if either Botany or Zoology is taken at either Level at the same examination, unless, in exceptional circumstances, special permission is obtained from Oxford.

Four papers, I, II, III, and IV (3 hours each) are set, each marked out of 140. All candidates at Advanced Level must take Papers I, II, and III. The 'S' grading is assessed on Papers III and IV.

Paper III is a practical paper. Heads of schools who cannot provide the necessary accommodation and equipment must not enter candidates for this subject. The apparatus required is that normally to be found in a sixth-form biological laboratory, including microscopes having low power (1 in. or $\frac{3}{4}$ in.) and high power ($\frac{1}{2}$ in.) objectives and table lamps suitable for use with them. Confidential information of any special materials required is sent to Heads of schools about six weeks before the examination. This information cannot be supplied earlier. Candidates must bring to the practical examination dissection instruments, a razor, and a hand lens.

All four papers are set on the whole of the following syllabus, but for Paper IV a more advanced treatment of the subject is expected.

1. Inorganic and organic substances and simple experiments to demonstrate their properties: crystalloids, colloids; carbohydrates, fats, proteins; enzymes. Diffusion, osmosis, and plasmolysis. Absorption of raw material; photosynthesis; assimilation; transportation of food material; digestion. Waste substances and excretion. Respiration; energy relations. Transpiration. The reception of stimuli and responses to them. Nervous systems. Growth. Tropisms; tactic movements. Co-ordination of function. Simple bio-chemical and physiological experiments.

2. Differences between animals and plants. The properties of protoplasm. The structure and properties of the cell wall, the cell, and its contents. Differentiation of tissues. Mitosis; meiosis, maturation of germ cells, fertilization.

3. Sexual and asexual reproduction. Variation. Inheritance, considering not more than two pairs of genetical factors; linkage, crossing over. The concept of organic evolution and the evidence supporting it. Historical and modern theories of the mode of evolution.

4. The interrelations of animals and plants in respect of manufacture and assimilation of food substances; the circulation in nature of the elements of major biological importance; the part played by bacteria in decay and putrefaction, and in the soil. Bacteria and disease.

5. The structure, physiology, life-history, mode of life, and classification of *Euglena*, *Spirogyra*, *Fucus*, *Mucor*, *Pellia*, a fern (excluding the microscopical anatomy of the vegetative organs), *Cuscuta* or *Orobanche*.

6. The external morphology and main anatomical features of Monocotyledons and Dicotyledons. The anatomy and histology of roots, stems, and leaves in relation to their functions. Primary and secondary growth; the differences between herbaceous and arborescent plants.

7. Floral structure as illustrated by *Ranunculus*, pea, *Helianthus*, and a grass. Pollination; fertilization. Structure and development of seeds and fruits, their dispersal; germination. Organs of perennation and vegetative reproduction.

8. The external features, anatomical structure, physiology, life-history, mode of life, and classification of the following: *Amoeba*, *Obelia*, *Fasciola*, *Lumbricus*, *Apis* (excluding internal organs), *Scyllorhinus*, *Rana* (excluding skeleton), *Oryctolagus* or *Rattus* (omitting skull, but with reference also to the physiology of man and including simple experiments, e.g. reflex action, salivary digestion, vision, &c.).

9. The general characters and histology of the following vertebrate tissues: blood, epithelial, connective, skeletal, glandular, muscular, and nervous. The microanatomy of the following mammalian organs: kidney, liver, testis, ovary, stomach, pancreas, thyroid. Structure of skin and teeth in dogfish, frog, and rabbit.

10. The external features of development of *Rana* from fertilization to metamorphosis, studied on the living organism.

11. The general principles of ecology and the adaptations of organisms to their environment, as illustrated by the study of the organisms of any one well-defined habitat (e.g. sea-shore, freshwater ponds, streams, marshy ground, chalk downs, woodland, heath, moors, &c.). It is expected that in this connexion candidates will acquire knowledge of a wider range of types than would be the case if these studies were restricted to those enumerated in the preceding sections for detailed study.

Practical examination

Candidates must be prepared to examine microscopically, to dissect, to identify, to describe, and to make simple temporary and permanent stained microscope slides, not involving the personal use of the microtome, of the organisms specified for study: to comment on material such as slides showing stages of mitosis or meiosis, material showing variation, organisms or parts of organisms commonly used in genetical studies, and to perform simple biochemical and physiological experiments.

GEOLOGY

A 64

Four papers (3 hours each) are set, each marked out of 100. Papers I, II, and IV are theoretical papers and Paper III is a practical paper. All candidates at Advanced Level must take Papers I, II, and III. The 'S' grading is assessed on Papers III and IV. Heads of schools who cannot provide adequate accommodation and equipment for the practical examination must not enter candidates for this subject. Special instructions concerning the practical examination are sent to schools about a month before the examination.

All four papers are set on the whole of the following syllabus, but for Paper IV a more advanced treatment of the subject is expected.

Physical Geology

The earth as a planet; origin and the general characteristics of its main surface features.

Physical conditions of the earth's crust and interior: earthquakes; earth movements, character and causes of folding and faulting; volcanic activity, classification of intrusive and extrusive volcanic phenomena, and the significance of its distribution.

Work of geological agents; weathering in different climates and the character of resulting deposits, soil formation and classification; origin and occurrence of underground water, geology of water-supply, geomorphology of limestone regions; river action and valley development, the cycle of erosion and the isostatic response; glaciation, classification of ice masses, their surface features and movement, geomorphology of glaciated regions; Ice Ages, their distribution and possible causes; wind action and desert deposits; marine denudation and deposition, shore lines and coastal defence; life as a rock builder, marine deposits, coral reefs, and atolls; life as a fuel maker, coal and oil.

Mineralogy and Petrology

Crystallography; characteristics of crystals, crystallographic notation and projection, fundamental laws of crystallography, crystal systems. The simpler optical properties of minerals.

Physical character, chemical composition, and modes of origin and occurrence of common rock and vein-forming minerals: quartz, calcite, dolomite, rock salt, fluorspar, barytes, gypsum, galena, copper pyrites, malachite, zinc blende, calamine, cassiterite, wolfram, iron pyrites, haematite, limonite, orthoclase and plagioclase feldspars, muscovite, biotite, hornblende, augite, olivine.

Characteristics and relationships of chief types of igneous, sedimentary, and metamorphic rocks.

Stratigraphy and Palaeontology

Stratification of rocks; law of superposition; unconformity.

Relative ages of rocks.

Fossils, their preservation and distribution.

Nature and distribution of the geological systems in Great Britain. Knowledge of detailed stratigraphical sequences is not required.

Practical Work

Candidates are required to send in their practical notebooks, which must include records of all field work that it has been possible to carry out.

Interpretation of geological maps; the drawing of sections; methods of obtaining thickness, dip, and strike of beds, their underground extensions and the completing of outcrops.

Recognition and description of the commoner rocks and rock-forming minerals. Identification and description of crystal forms and the projection of crystals.

The broad biological grouping of fossils and their relation to geological periods.

WOODWORK AND METALWORK

[The Delegates are prepared to consider proposals for the examination of candidates in other suitable crafts, e.g. pottery, but the extent to which such examinations would be possible would depend on the availability of visiting examiners. Applications should be made in accordance with the rules for papers on specially-approved syllabuses set out in § 6, p. 7.]

No Special paper is set in these subjects. Heads of schools must not enter candidates for these subjects unless adequate accommodation and equipment are available. Confidential information about any special material required may be obtained by Heads of schools from Oxford in March.

Candidates may take either Woodwork or Metalwork or both. In each subject three papers, each marked out of 100, must be taken, as follows:

Paper I. Theory (3 hours).

Paper II. Drawing and Design (3 hours).

Paper III. Practical (4 hours).

Woodwork**A 80***Theory*

Timber. Structure of wood; geographical distribution of timber trees; conversion, seasoning, market forms, and methods of preservation. Chief forms, characteristics, and use of plywood, laminated boards, and veneers.

Tools. Evolution, construction, and manipulation of the common hand woodworking tools. Hand tools for special purposes excluding power-driven hand-tools. Upkeep of workshop equipment.

Construction and Processes. Construction of frames and carcasses. Surface decoration, e.g. inlaying, tooled decoration, veneering, and finishing processes.

History and Design. Historical development of the common articles of furniture. The principal styles of English furniture to the present time.

Drawing and Design

The examination consists of questions requiring candidates to design and prepare working drawings of a small piece of furniture or a fitment for a specific purpose such as could be made in the school workshop.

Practical

The examination is framed to test the candidate's skill and ability in making a piece of woodwork according to working drawings provided.

Metalwork

A 81

Theory

Metals. The natural sources of common metals; processes by which they are rendered suitable for use; properties of metals and alloys commonly used in the school workshop.

Tools. Evolution, construction, operation, and upkeep of the common metalworking tools including lathe and drilling machine (manual or power). Abrasives, lubricants, and coolants.

Construction and Processes. Uses of scribing block and surface plate. The principles underlying the operations of fitting, turning, and forging. Sheet and decorative metalwork. Simple moulding and casting. Hardening and tempering of carbon steel. Hard and soft soldering, brazing, and riveting. Protective and decorative finishes.

History and Design. The work of the blacksmith and silversmith. Metal fitments for furniture, doors, and gates.

Drawing and Design

Questions are set requiring candidates to design and prepare working drawings of a piece of work for a specific purpose involving one or more of the following:

- Wrought iron work.
- Sheet metalwork.
- Simple silversmithing.
- Machine work.

Practical

The examination is framed to test the candidate's skill and ability in executing a piece of metalwork according to working drawings provided.

ENGINEERING DRAWING

A 84

No Special paper is set in this subject. One three-hour paper is set on practical plane and solid geometry, and one four-hour paper on drawing of machine parts, each paper being marked out of 100. Both papers must be taken. About one-quarter of the second paper is allotted to answers by sketching. The recommendations made by the British Standards Institution in *Engineering Drawing Practice, B.S. No. 308*, should be followed in the preparation and dimensioning of drawings.

Practical Plane and Solid Geometry

Orthographic, isometric, and oblique projection.

Construction of ellipse, parabola, and hyperbola; properties of these conic sections; tangents and normals to these conic sections.

Loci, Cycloids, epicycloids, hypocycloids, trochoids, superior and inferior trochoids.

Archimedean spirals.

Construction of cam profiles.

Sectional views of triangular, square, pentagonal, hexagonal, and octagonal prisms and of similar pyramids; development of these solids and of the cone and cylinder; prisms, pyramids, &c., cut by oblique planes.

Auxiliary elevations and plans.

Interpenetration of solids, e.g. square pyramid and triangular prisms, cone and cylinder, two cylinders, &c. Curves of intersection; application of these curves in pattern making.

True lengths of lines, traces of lines and planes.

Lines piercing planes; distance between parallel planes; dihedral angle between two planes.

Oblique planes; conversion of oblique planes into auxiliary inclined planes; angles of inclination of oblique planes to the planes of reference.

Auxiliary plans and elevations of solids with faces and edges at certain given angles to the planes of reference.

Intersection of two triangles.

The helix; square section springs; single start, double start, and triple start square threads.

Graphic statics; Bow's notation; frame diagrams; force diagrams for simple framed structure, e.g. Warren girders and roof trusses; funicular polygon for parallel forces.

Drawing of Machine Parts

Various types of threads, e.g. Whitworth, B.A., and Buttress; nuts, bolts, studs, set screws, washers, &c.

Locking arrangements; keys and keyways; splines; jib and cottered joints.

Couplings; flange, split-muff, claw, compression, and universal couplings.

Bearings; plain, ball, and roller bearings; 'A' standards and plummer blocks, ring oil bearing, journal and thrust bearings, footstep bearing.

Running gear; connecting rods and pistons; any type of car, steam engine, and diesel engine connecting rod and piston; crosshead and eccentric.

Glands and packing: slide valve glands and packing; labyrinth packing; hydraulic packing; hat, cup, and U-leather packing; hydraulic pistons.

Valves: hydraulic stop valve; poppet valves (motor-car); screw down stop valves; double beat valve; slide valve.

Lubricators: needle, siphon, tell-tale, and pressure lubricators.

Pulleys: fast and loose pulleys; stepped cone pulleys.

Spur gears; use of the terms addendum, dedendum, circular pitch, pressure angle, base circle, &c.; construction of involute teeth.

Helical gears; spiral angle.

Bevel gears; pitch cone and pitch cone angle; back cone.

Assembly drawings from drawings of separate parts, in full plan and elevation and in sectional plan and elevation.

PRINCIPLES OF ACCOUNTS

A 87

No Special paper is set in this subject. Two three-hour papers are set, each marked out of 100.

Candidates are expected to have a sound knowledge of the principles of accounting and the interpretation of accounts. The papers are set on the syllabus for Principles of Accounts at Ordinary Level (see page 48) as augmented by the following:

Work sheet and self-balancing ledger. Application of double entry book-keeping to different types of accounts and to different types of businesses.

The preparation and analysis of partnership accounts, including the admission of new partners, dissolution of partnership, the valuation and treatment of goodwill.

Capital; provisions and reserves, sinking funds; appropriations; valuation of assets; methods of depreciation; interpretation of balance sheets. Elementary company accounts (excluding income tax and consolidated or group accounts).

The requirements of the Companies Act, 1948, with regard to published accounts.

Elements of cost accounts.

The preparation of accounts from incomplete records.

DOMESTIC SUBJECTS

No Special paper is set in these subjects. A special application form (E/DS) must reach Oxford by 1 February. Entry for Domestic Subjects must also be made on the normal broadsheet entry form. The practical examination in Cookery is conducted by visiting examiners. The practical examination in Needlework is conducted by the school in accordance with instructions issued from Oxford. Forms are supplied from Oxford on which Heads of schools are invited to submit assessments of the Needlework course work. This course work must be available when required for inspection by a visiting examiner. At least ten days' notice of such an inspection will be given.

If three or more candidates are entered by a school for Domestic Subjects practical examinations conducted by visiting examiners (irrespective of which subject or at which

Level any particular candidate enters), no special fee is charged. If the number of candidates so entered is two or one a special fee of £2 is charged. These fees are in addition to the normal subject entry fee. In all cases the expenses of the examiner visiting the school are paid by the Delegates.

Suitable equipment and all the materials needed must be provided by the school.

Candidates may take either or both of the subjects Cookery and Needlework. Success in each subject is recorded separately on certificates. In each subject three papers are set, each marked out of 100. Papers I and II are three-hour theoretical papers. In Paper I the questions are general in character and the candidate has to answer four. In Paper II the questions are more specifically related to practical problems and five have to be answered. Paper III (in Cookery three hours, in Needlework four hours) is the practical test.

COOKERY

A 90

A study of the chemical nature of proteins, fats, and carbohydrates. The effect on these of enzymes, acids, alkalis, moist and dry heat.

The necessary constituents of a sound diet. Their chemical changes in the processes of digestion and assimilation, their physiological effects on the human body and their calorific values. The importance in the diet of vitamins, mineral constituents, water, and roughage.

The production and distribution of the staple foods. Food hygiene.

Buying, storage, and preservation of food in the home.

Planning meals for the family, including meals for invalids and convalescents, vegetarians, old and young persons, sedentary and manual workers and meals for special occasions. Preparation, cooking, and serving of meals. Pressure cooking. The use of foods packed or preserved by modern methods.

Economy in the use of food, fuel, time, and labour.

Modern developments in kitchen fittings and equipment; their choice, cost, and care.

Kitchen hygiene.

Safety precautions in the kitchen.

In the practical examination the candidates are expected to show a high standard of skill in preparing meals for all occasions in the home.

NEEDLEWORK

A 91

The selection of styles, fabrics, and colours in relation to the individual and the occasion.

The use and adaptation of commercial patterns.

Origin, preparation (manufacturing details not required), and properties of the main fabrics in use for clothing and household purposes, including their reaction to agents encountered in laundering and dry cleaning, and their safety in use.

The use and care of sewing equipment, including the sewing machine and its main attachments.

Processes and stitches used in the construction and decoration of clothes and household linen (not tailoring processes).

The care and maintenance of clothes.

As course work, each candidate must make a selection of clothes of good design. It is sufficient to make **one** pair from list (a) below to fit herself, and **one** item from list (b).

- (a) **Either** a suit and blouse,
or a dress and jacket,
or an undergarment and a housecoat,
or nightwear and a dressing gown

together with (b) **either** a child's garment
or an item of household linen.

MUSIC

A 93

Four written papers are set, each marked out of 100, except Paper I, which is marked out of 50. Papers I, II, and III are the normal Advanced Level papers. Paper IV is the Special paper. All candidates must also take a practical examination.

Practical examination. This must be a practical examination of the Associated Board of the Royal Schools of Music, and must be of at least Grade VI (the practical examination in general musicianship of Grade VI or a higher grade is accepted in this connexion).

Heads of schools must give full details of the practical examinations on the special form E/M/A which must be obtained from and returned to Oxford not later than 18 March.

Candidates must enter for their Associated Board examination in the normal way, in accordance with the regulations of that Board, paying the normal fee required. The practical examination must be taken not later than the end of the term before that in which the written examination is taken. If more than three terms, including the term in which the written examination is taken, have elapsed since the practical examination was taken, the candidate's teacher must certify on form E/M/A that practical study has been continued in the meantime.

(The address of the Associated Board is 14 Bedford Square, London, W.C. 1.)

Paper I (Aural Tests) (50 minutes). These are conducted at each centre in accordance with instructions sent from Oxford. They are designed to occupy about 50 minutes and consist of the following six tests, all of which must be worked by each candidate:

1. Candidates are required to name intervals which are diatonic in a major or minor key, the keynote being sounded on the pianoforte by the examiner before the playing of each pair of notes constituting an interval. The test consists of the naming of two such intervals.

2. A rhythmical passage (not necessarily beginning on the first beat of a bar) is played on the pianoforte by the examiner. Candidates are then required to write the passage on a monotone, prefixing the necessary time-signature.

3. Candidates are required to write from dictation a short melody (not necessarily beginning on the first beat of a bar) in either a major or a minor key. The key is named, and the keynote and tonic chord sounded.

4. Candidates are required to recognize major and minor common chords and their inversions as played by the examiner in a continuous musical phrase in a definite key. Candidates are expected to recognize each chord in its relation to the key (e.g. submediant) and also to state whether it is in root position or in first or second inversion.

5. Candidates are required to recognize and name changes of key in a harmonized passage played by the examiner. Modulations are limited to the nearly related keys of the given tonic.

6. Candidates are required to write down from dictation a short and easy two-part passage in the treble clef (for treble and alto voices).

Paper II (Harmony and Analysis) (3 hours).

1. Questions designed to test ability to write a unison melody, and to show a knowledge of the use of all the triads of major and minor keys, chords of the seventh on the various degrees of the diatonic scale, and the chord of the dominant ninth (with all the available inversions of these chords); also of the use of unaccented and accented passing-notes and auxiliary-notes, and suspensions. The exercises set may involve diatonic chords, the more usual chromatic chords, unessential notes of any kind, suspensions, and modulations.

2. An unprepared piece (not exceeding in complexity a movement of a string quartet) for analysis and criticism. A copy of the piece for each candidate is supplied with the question paper.

Paper III (History of Music, 1550 to the present day) (3 hours).

(i) Outlines. Alternative subjects for an essay are set, and topics on which brief comments are required.

(ii) Questions on prescribed subjects. A number of set works are specifically prescribed for study, but candidates are encouraged to study works in addition to those named.

The prescriptions are:

Either Ode and Cantata, 1600-1750, with specific reference to
Purcell, *Come, ye sons of art*, Edition Schott, No. 10302
Bach, **either** *Jesu, priceless treasure* (Novello)
or Cantata No. 11, *Praise our God who reigns in Heaven* (Novello)

or †The Concerto, from 1828 to the present day, with specific reference to
Schumann, Concerto in A minor for Piano and Orchestra, op. 54 (Eulenburg)
Berg, Concerto for Violin and Orchestra (Universal).

In (ii) the questions include musical quotations to be referred to their contexts. In the case of orchestral works full or miniature scores should be used wherever possible and candidates should be familiar with the constitution of the orchestra in each work and with the characteristics of the instruments involved. Candidates are also expected to know something about the various instruments involved in prescriptions of chamber music.

† This section will be unchanged for 1967.

Choral works and operas are to be studied from the vocal score. Candidates are not allowed to take copies of the scores into the examination room.

Paper IV (3 hours) is set on the syllabus for Papers II and III, but a more advanced treatment is expected.

ART

A 94

Five papers are set, Paper A being marked out of 80, the others each out of 100. No Special paper is set in this subject. Candidates at Advanced Level must take Paper A together with any three of the Papers B–E listed below. Confidential instructions about any special models or objects required are sent to Heads of schools concerned about six weeks before the examination. Except where otherwise stated, any medium other than oil paint may be used; but a candidate cannot obtain a pass in this subject if he works exclusively in pencil or exclusively in black and white in all the papers which he chooses to take. Candidates must supply their own materials and drawing-paper. The type and colour of the paper used are left to the discretion of the candidates or their teachers, except that the paper must be *not less than 11" × 15" nor larger than 30" × 22"* in size. Candidates are not allowed to use instruments of any kind, or means for ruling, except in History of Art and Design for a Craft.

Paper A. History of Art (3 hours): one paper is set, in two sections. Candidates must answer five questions in all. They may confine their answers to either section or answer questions from both sections.

The paper consists of:

First Section. *Architecture.*

(i) Six questions on the development of English medieval architecture from 1066 to the middle of the sixteenth century, of which one gives opportunity for candidates to show local knowledge.

(ii) Six questions on the general development of, and important influences on, architecture in England from the middle of the sixteenth century to the present day, of which one gives opportunity for candidates to show local knowledge.

Second Section. *Painting.*

(i) A question calling for comment on the work of a great master, of which a reproduction is supplied.

(ii) Five questions on Italian Painting during the fourteenth, fifteenth, and sixteenth centuries, excluding the School of Venice.

(iii) Five questions on Dutch, Flemish, French, and Spanish Painting of the seventeenth century.

(iv) Two questions on the general development of European painting after 1350.

Paper B. Life Drawing (3 hours): candidates may submit **either** one two-hour drawing, and two half-hour sketches, **or** one three-hour drawing or painting, from a living model in games clothes. This paper cannot be taken unless the candidate or his teacher undertakes to be responsible for supplying a model.

Paper C. Either (i) Flower Painting (3 hours)

or (ii) Still Life Drawing or Painting (3 hours).

Paper D. Imaginative Composition (3 hours): a choice of subjects is given.

Paper E. Design for a Craft (3 hours): a design in colour or in black and white, as appropriate, in relation to one of the following crafts—dress design, embroidery, fabric printing, lettering, lino-cutting, lithography, puppetry, stage design, wood-engraving. For all crafts except lettering, specimens of the work done by each candidate in the course of preparation for the examination sufficient to show the range of achievement must be sent to Oxford by 14 May 1966. This work will be returned. For stage design, Heads of schools must give notice to Oxford in December 1965 of about four works for the stage (plays, opera, ballet) with which the candidates will be familiar and for which they will be prepared to design sets or costumes; candidates studying stage design are expected to work in relation to a blue-print of a stage of which copies are circulated to the schools concerned about six months before the examination. Otherwise no preliminary notice is required from schools about the above crafts. Applications for permission for candidates to offer crafts not included in the above list must be made to Oxford by Heads of schools before 30 June 1964, in order that such applications may be considered before the courses are started.

TIME-TABLE FOR THE SUMMER EXAMINATION, 1966

Attention is called to § 5 (pp. 5-7).

The time-table may be varied by Heads of schools within 30 minutes of the stated times, provided that the prescribed duration of each paper is maintained, that due notice has been given to all concerned, and that no reasonable objection has been raised.

The times for working papers (including alternative papers and papers on specially-approved syllabuses—see § 6, p. 7) which are not provided for in this time-table are communicated to Heads of schools as soon as possible after the closing date for entries. These times will be during the period of the examination and Heads of schools must be prepared to arrange for the papers to be worked on any dates allocated during that period.

	<i>Papers at Advanced Level</i>	<i>Papers at Ordinary Level</i>
Wednesday, 1 June	Chemistry A 55/IV/X (alternative practical). 9-12 Principles of Accounts A 87/I. 9-12	Needlework O 91/II/X (alternative practical). 9- 11.30 Woodwork O 80/II/X (alternative practical). 9-12
Thursday, 2 June	Biology A 62/III/X (alternative practical). 2-5 Physics A 54/III/X (alternative practical). 9-12	Latin O 11/I. 9-11 Needlework O 91/II (practical). 9-11.30 Metalwork O 81/II/X (alternative practical). 9-12
Friday, 3 June	Zoology A 61/III/X (alternative practical). 2-5 German A 21/I. 9-12 Botany A 60/III/X (alternative practical). 9-12 Needlework A 91/III (practical). 9-1 Principles of Accounts A 87/II. 2-5	Latin O 11/II. 9-11 Chemistry O 55/III/X (alternative practical). 9.30-12
Monday, 6 June	Ancient History A 12/I. 9-12 Spanish A 22/I. 9-12 Economic History A 31/I. 9-12 Physics A 54/I. 9-12 English Literature A 3/I. 2-5 Higher Mathematics A 53/I. 2-5 Zoology A 61/I. 2-5	Greek History O* 12. 9-12 Principles of Accounts O 87. 9-12 Technical Drawing (Building) O 83/I. 2-4.30 Engineering Drawing O 84/I. 2-4.30 English Literature (Selected) O* 3. 2-5

TIME-TABLE FOR THE SUMMER EXAMINATION, 1966 (continued)

	<i>Papers at Advanced Level</i>	<i>Papers at Ordinary Level</i>
Tuesday, 7 June	Latin A 11/I. 9-12 Economic History A 31/II. 9-12 Applied Mathematics A 52/I. 9-12 Pure-and-Applied Mathematics A 50/I. 9-12	History of Painting O 94 H. 9-11.15 Technical Drawing (Building) O 83/II. 9-12 Engineering Drawing O 84/II. 9-12 Music O 93/I (aural). 12-12.45
	Chemistry A 55/I. 2-4	Zoology O* 61/I. 2-4 Metalwork O 81/II (practical). 2-5 Engineering Workshop Theory and Practice O 82/I. 2-5
Wednesday, 8 June	Greek A 10/I. 9-12 French A 20/I. 9-12 Botany A 60/I. 9-12 Biology A 62/I. 9-12 Engineering Drawing A 84/I. 9-12 Needlework A 91/I. 9-12	Needlework O 91/I. 9-10.45 Greek O 10/I. 9-11 Geology O* 64/I. 9-11 Woodwork O 80/I. 9-12
	History A 30/I. 2-5 Chemistry A 55/II. 2-4	Imaginative Picture-making O 94 A. 2-4.30
Thursday, 9 June	Greek A 10/II. 9-11.30 Geography A 45/IA. 9-11.30 Geography A 45/IB. 12-1	Greek O 10/II. 9-11 Geography O* 46. 9-12 Commerce O 86. 9-11.30
	Latin A 11/II. 2-4.30 Pure Mathematics A 51/I. 2-5 Cookery A 90/I. 2-5	Cookery O 90/I. 2-3.45 Metalwork O 81/I. 2-5 Engineering Workshop Theory and Practice O 82/II (practical). 2-5
Friday, 10 June	Chemistry A 55/III. 9-11 Economics A 40/I. 9-12	Life Drawing O 94 B. 9-11.15 Agricultural Science O 73/I. 11.30-1
	English Literature A 3/II. 2-5 Zoology A 61/II. 2-5	Housecraft O 92/I. 2-3.45 Zoology O* 61/II (practical). 2-4 Woodwork O 80/II (practical). 2-5

TIME-TABLE FOR THE SUMMER EXAMINATION, 1966 (*continued*)

	<i>Papers at Advanced Level</i>	<i>Papers at Ordinary Level</i>
Monday, 13 June	Zoology A 61/III (practical). 9-12	English Language O 1/I. 9-10 English Language O 1/II. 11-12.45
	French A 20/II. 2-4.30 Metalwork A 81/I. 2-5 Needlework A 91/II. 2-5	Geology O* 64/II. 2-4 Commerce, Arithmetic, and Accounts O 88/I. 2-4 British Constitution O* 36. 2-4.30
Tuesday, 14 June	History A 30/II. 9-12 Physics A 54/II. 9-12	Physics O 54. 9-11.30
	Latin A 11/III. 2-4 Applied Mathematics A 52/II. 2-5 Cookery A 90/II. 2-5	Design O 94 E. 2-4.30
Wednesday, 15 June	Ancient History A 12/II. 9-12 Spanish A 22/II. 9-11.30 Physics A 54/III (practical). 9-12	Commerce, Arithmetic, and Accounts O 88/II. 9-10.45 Roman History O* 13. 9-12 Object Drawing O 94 D. 11-1
	Art A 94/A. 2-5 Latin A 11/IV. 2-5 Higher Mathematics A 53/II. 2-5 Botany A 60/II. 2-5 Biology A 62/II. 2-5	English Literature (Selected) O 2. 2-4.15
Thursday, 16 June	British Constitution A 36/I. 9-12 Pure Mathematics A 51/II. 9-12 Pure-and-Applied Mathematics A 50/II. 9-12	Arithmetic O 50/I. 9-10.30 Mathematics O 51/I. 9-11 Plant Drawing O 94 F. 11.15-1
	Latin A 11/V. 2-4.15 English Literature A 3/III. 2-5 Engineering Drawing A 84/II. 2-6	Agricultural Science O 73/II. 2-3.30 English Literature (General) O 4. 2-4.30
Friday, 17 June	Ancient History A 12/III. 9-12 Geography A 45/II. 9-12	Geography O 45/I. 9-10.45 Geography O 45/II. 11.15-12.45
	History A 30/III. 2-5 Chemistry A 55/IV (practical). 2-5	Chemistry O 55/I. 2-4

TIME-TABLE FOR THE SUMMER EXAMINATION, 1966 (*continued*)

	<i>Papers at Advanced Level</i>	<i>Papers at Ordinary Level</i>
Monday, 20 June	German A 21/II. 9-11.30 Religious Knowledge A 43/I. (R.V.). 9-12 Religious Knowledge A 43/I (D.V.). 9-12	History of Architecture O 94 G. 9-11.15 Religious Knowledge O* 43/I (R.V.). 9-12 Religious Knowledge O* 44/I (D.V.). 9-12 German O 21/I. 11.30-1 Spanish O 22/I. 11.30-1 Italian O 23/I. 11.30-1
	Spanish A 22/III. 2-4 Applied Mathematics A 52/III. 2-5	Picture-making from Objects, O 94 C. 2-4.30
Tuesday, 21 June	Greek A 10/III. 9-11 French A 20/III. 9-11 Music A 93/I (aural). 12.10-1	French O 20/I. 9-10.30 French O 20/II. 11-12.30
	Chemistry A 55/V. 2-5 Art A 94/B. 2-5	Chemistry O 55/II. 2-3.30 Chemistry O 55/III (practical). 2-4.30 Chemistry-with-Physics O 70/I. 2-3.45
Wednesday, 22 June	German A 21/III. 9-11 British Constitution A 36/II. 9-12 Pure Mathematics A 51/III. 9-12	Mathematics O 51/II. 9-11 Geometry O 50/II. 9-11.15 Welsh O 25/I. 11.30-1
	Greek A 10/IV. 2-5 Spanish A 22/IV. 2-5 Botany A 60/IV. 2-5 Biology A 62/III (practical). 2-5	Botany O 60/I. 2-3.45 Biology O 62. 2-4.30
Thursday, 23 June	British Constitution A 36/III. 9-12 Art A 94/C. 9-12	History (British) O 30. 9-11.30 History (British Social and Economic) O 31. 9-11.30 General Science O 71/I. 11.45-12.45
	Greek A 10/V. 2-4.15 Geography A 45/III. 2-5	Algebra O 50/III. 2-4 Mathematics O 51/III. 2-4
Friday, 24 June	Botany A 60/III (practical). 9-12 Biology A 62/IV. 9-12	General Science O 71/II. 9-11 Botany O 60/II (practical). 11.15-1
	French A 20/IV. 2-5 Economics A 40/II. 2-5 Physics A 54/IV. 2-5	Economics O* 40. 2-4.30

TIME-TABLE FOR THE SUMMER EXAMINATION, 1966 (continued)

	<i>Papers at Advanced Level</i>	<i>Papers at Ordinary Level</i>
Monday, 27 June	German A 21/IV. 9-12 Economics A 40/III. 9-12 Art A 94/D. 9-12	Chemistry-with-Physics O 70/II. 9-10.45 Additional General Science O 72. 9-11 German O 21/II. 11.30-1 Spanish O 22/II. 11.30-1 Italian O 23/II. 11.30-1
	Religious Knowledge A 43/II (R.V.). 2-5 Religious Knowledge A 43/II (D.V.). 2-5	Elementary Aeronautics O* 74. 2-4 Religious Knowledge O* 43/II (R.V.). 2-5 Religious Knowledge O* 44/II (D.V.). 2-5
Tuesday, 28 June	Music A 93/II. 9-12 Art A 94/E. 9-12	Russian O 24/I. 9-10.30 Commerce, Arithmetic, and Accounts O 88/III. 11-12.45
	Religious Knowledge A 43/III. 2-5 Zoology A 61/IV. 2-5	Religious Knowledge O 41 (R.V.). 2-4.15 Religious Knowledge O 42 (D.V.). 2-4.15
Wednesday, 29 June	Metalwork A 81/II. 9-12	Additional Mathematics O 53/I. 9-11 Music O 93/II. 11.15-1
	Woodwork A 80/I. 2-5 Music A 93/III. 2-5	History (Foreign) O 33. 2-4.30 History (British and Foreign) O 34. 2-4.30 History O* 35. 2-5
Thursday, 30 June	Music A 93/IV. 9-12 Metalwork A 81/III (practical). 9-1	Russian O 24/II. 9-10.30
	Woodwork A 80/II. 2-5	Music O 93/III. 2-4
Friday, 1 July	Woodwork A 80/III (practical). 9-1	Additional Mathematics O 53/II. 9-11 Human Biology and Hygiene O 63. 9-11.30
		Welsh O 25/II. 2-3.30 History (British Empire and Commonwealth) O 32. 2-4.30 Greek Literature in Translation O* 14. 2-4.30

TIME-TABLE FOR THE AUTUMN EXAMINATION, 1966

Attention is called to § 5 (pp. 5-7).

The time-table may be varied by Heads of schools within 30 minutes of the stated times, provided that the prescribed duration of each paper is maintained, that due notice has been given to all concerned, and that no reasonable objection has been raised.

The times for working papers (including alternative papers and papers on specially-approved syllabuses—see § 6, p. 7) which are not provided for in this time-table are communicated to Heads of schools as soon as possible after the closing date for entries. These times will be in the period beginning November 14 and ending December 12 and Heads of schools must be prepared to arrange for the papers to be worked on any dates allocated during that period.

	<i>Morning</i>	<i>Afternoon</i>
Monday, 21 November	English Language O 1/I. 9-10 Life Drawing O 94 B. 10.30-12.45	English Language O 1/II. 2-3.45
Tuesday, 22 November	Cookery O 90/I. 9-10.45 Metalwork O 81/I. 9-12 Engineering Workshop Theory and Practice O 82/I. 9-12 Music O 93/I (aural). 12.15-1	Needlework O 91/I. 2-3.45 Metalwork O 81/II (practical). 2-5
Wednesday, 23 November	Latin O 11/I. 9-11 Music O 93/II. 11.15-1 Plant Drawing O 94. F. 11.15-1	Human Biology and Hygiene O 63. 2-4.30 Woodwork O 80/I. 2-5
Thursday, 24 November	Housecraft O 92/I. 9-10.45 Woodwork O 80/II (practical). 9-12	Religious Knowledge (R.V.) O 41. 2-4.15 Religious Knowledge (D.V.) O 42. 2-4.15
Friday, 25 November	Latin O 11/II. 11-1	Physics O 54. 2-4.30
Monday, 28 November	Chemistry-with-Physics O 70/I. 9-10.45 Chemistry O 55/I. 9-11	Chemistry O 55/II. 2-3.30 Chemistry-with-Physics O 70/II. 2-3.45 Chemistry O 55/III (practical). 2-4.30
Tuesday, 29 November	Geography O 45/I. 9-10.45 Geography O 45/II. 11.15-12.45	Arithmetic O 50/I. 2-3.30 Mathematics O 51/I. 2-4
Wednesday, 30 November	French O 20/I. 9-10.30 French O 20/II. 11-12.30	English Literature (Selected) O 2. 2-4.15 English Literature (General) O 4. 2-4.30
Thursday, 1 December	Mathematics O 51/II. 9-11 Geometry O 50/II. 9-11.15 General Science O 71/I. 11.30-12.30	History (British) O 30. 2-4.30 History (British Social and Economic) O 31. 2-4.30
Friday, 2 December	Algebra O 50/III. 9-11 Mathematics O 51/III. 9-11 Agricultural Science O 73/I. 11.15-12.45	Biology O 62. 2-4.30 Botany O 60/I. 2-3.45

[Continued overleaf

TIME-TABLE FOR THE AUTUMN EXAMINATION, 1966 (*continued*)

	<i>Morning</i>	<i>Afternoon</i>
Monday, 5 December	Welsh O 25/I. 9-10.30 Design O 94 E. 9-11.30	Botany O 60/II (practical). 2-3.45 General Science O 71/II. 2-4
Tuesday, 6 December	German O 21/I. 9-10.30 Spanish O 22/I. 9-10.30 Italian O 23/I. 9-10.30 History of Architecture O 94 G. 10.45-1 History of Painting O 94 H. 10.45-1	Additional General Science O 72. 2-4
Wednesday, 7 December	Object Drawing O 94 D. 9-11 Picture-making from Objects O 94 C. 9-11.30	History (British Empire and Commonwealth) O 32. 2-4.30 History (Foreign) O 33. 2-4.30 History (British and Foreign) O 34. 2-4.30
Thursday, 8 December	Imaginative Picture-making O 94 A. 9-11.30 Engineering Workshop Theory and Practice O 82/II (practical). 9-12	Commerce, Arithmetic, and Accounts O 88/I. 2-4 Welsh O 25/II. 2-3.30
Friday, 9 December	Commerce, Arithmetic, and Accounts O 88/II. 9-10.45 Additional Mathematics O 53/I. 9-11 German O 21/II. 11.30-1 Spanish O 22/II. 11.30-1 Italian O 23/II. 11.30-1	Technical Drawing (Building) O 83/I. 2-4.30 Engineering Drawing O 84/I. 2-4.30 Principles of Accounts O 87. 2-5 Needlework O 91/II (practical). 2-4.30
Monday, 12 December	Commerce, Arithmetic, and Accounts O 88/III. 9-10.45 Additional Mathematics O 53/II. 9-11 Agricultural Science O 73/II. 11.15-12.45	Music O 93/III. 2-4 Commerce O 86. 2-4.30 Technical Drawing (Building) O 83/II. 2-5 Engineering Drawing O 84/II. 2-5

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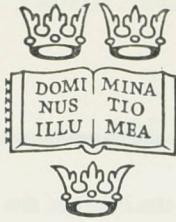
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