THE UNIVERSITY OF MELBOURNE

FACULTY OF ENGINEERING

HANDBOOK, 1962

PUBLISHED BY THE UNIVERSITY
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The University of Melbourne

ADMINISTRATIVE OFFICERS OF THE UNIVERSITY

Chancellor, THE HON. SIR ARTHUR DEAN.
Vice-Chancellor, PROFESSOR SIR GEORGE PATON.
Registrar, F. H. JOHNSTON.
Dean of Graduate Studies, DR. J. S. ROGERS.
Accountant, R. A. CUMMING.
Assistant Registrar, A. J. G. WILLIAMS.
Academic Secretary, S. H. SHEFFIELD.
Officer-in-Charge, Scientific, Medical and Technical Branch and Secretary, Medical Branch, F. G. ELFORD.
Secretary, Schools Board, J. E. WARFE.
Buildings Officer, L. R. D. PYKE.

Administrative Assistants

Registrar’s Assistants, R. B. OSBORN, I. R. BARRAH.
Matriculation Officer, H. G. HELMS.
Publications Officer, F. G. KELLY.
Secretary, Scientific Branch (Science and Applied Science), A. SANDERSON.
Secretary, Technical Branch (Engineering, Architecture and Town and Regional Planning), P. F. DORIAN.
Assistant Secretary, Scientific and Medical Branches (Agricultural Science and Medicine), I. L. MILNE.

Students’ Records

Clerk of Students’ Records, E. FINN.
Fee Clerk, R. H. SHUREY.
Records Administrative Assistant, R. SHEFFIELD.

Student Counsellors

Student Counsellor, R. R. PRIESTLEY.
Assistant Student Counsellors, MARJORIE ROSS, G. A. CALLY.

Appointments Board

Secretary, H. F. DOWNES.
Assistant Secretary, K. GRAVELL.
Administrative Assistant, S. J. OERTEL.

University Union

Warden of the Union, J. B. WEBB.
Secretary of the Union, D. B. CARSWELL.

Sports Union

Secretary, W. K. TICKNER.

Registrar’s Office

Counter Clerk, G. K. GUYMER.

Library

Librarian, K. A. LODEWYCKS.
Deputy Librarian, G. J. L. MACFARLAN.
Reference Librarian, MARY LUGTON.
Engineering Librarian, J. S. GREIG.
FACULTY OF ENGINEERING

Dean: Professor Moorhouse
The Vice-Chancellor

Council Member:
Mr. R. R. Blackwood

Professors:
Professor Belz
Professor Cherry
Professor Davies
Professor Forster
Professor Francis
Professor Goldberg
Professor Greenwood

Professor Henderson
Professor Hills
Professor Lewis
Professor Oser
Associate Professor Mohr
Professor Moorhouse
Professor Worner

Associate Professors:
Assoc. Prof. Dunkin
Assoc. Prof. Thornton-Smith

Appointed Annually by the Surveyors' Board:
Mr. F. W. Arter

Appointed by the Australasian Institute of Mining and Metallurgy:
Mr. W. J. Cuming

Appointed by the Institution of Engineers, Australia:
Mr. J. L. Kepert

Nominated Annually by Faculty:
Mr. J. C. Barton
Mr. T. Brownlee
Dr. K. J. Cannon
Mr. J. S. Carr
Mr. R. O. Cherry
Mr. S. J. Clifton
Dr. P. J. Fensham
Mr. A. E. Ferguson
Dr. G. Gregory
Mr. J. S. Hoggart
Mr. P. N. Joubert
Mr. E. A. King-Smith
Dr. F. Laszlo
Dr. J. D. Lawson
Dr. K. G. E. Moody
Mr. B. T. Murphy
Mr. H. F. C. Nevill
Mr. N. H. Olver

Dr. C. J. Osborn
Dr. J. Patterson
Dr. C. J. Pengilley
Dr. O. E. Potter
Mr. J. P. Ryan
Mr. B. B. Sharp
Dr. L. K. Stevens
Mr. N. L. Svensson
Dr. F. J. D. Syer
Mr. D. H. Trollope
Mr. A. K. Turner
Mr. G. H. Vasey
Mr. D. G. Walker
Dr. J. F. Ward
Mr. G. M. Willis
Mr. J. V. Wood
Dr. W. A. Wood

Nominated Triennially by Faculty (12):
(Present Tenure expires December, 1962)

Dr. R. S. Andrews
Sir Walter Bassett
Mr. H. B. Borwick
Mr. W. H. Connolly
Mr. L. P. Combes
Mr. L. R. East

Mr. K. P. Lewis
Dr. L. F. Loder
Mr. I. McLennan
Mr. G. B. O'Malley
Mr. O. E. Nilsson
Gp. Capt. A. G. Pither
TEACHING STAFF
(as at time of going to press)

Department of Civil Engineering

Professor of Civil Engineering:

Reader:

Senior Lecturers:
F. Laszlo, D.ing. (Darmstadt), M.C.E., Dipl.Eng. (Budapest).
D. H. Clyde, Ph.D. (Cantab.), B.Sc. (Rand), A.M.I.E.

Lecturers
I. K. Lee, M.Eng.Sc., B.C.E.
S. Aroni, B.C.E., A.M.I.E.Aust.

Senior Demonstrators:
W. L. Grigg, B.C.E.
Liu Yiu Wai, B.C.E.
E. J. Fish, B.E.
J. Holden, B.E.

Part-time Teaching Officers:
Lecturer in Soil Mechanics:

Department of Mechanical Engineering

Professor of Mechanical Engineering:

Senior Lecturers:
J. Patterson, B.Sc. (Belfast), D.G.S., Ph.D. (Birm.), A.M.I.Mech.E.
P. N. Joubert, B.E. (Aero.) (Syd.), A.F.R.Ae.S.
S. J. Clifton, B.E. (Syd.).

Lecturers:

Assistant Lecturers:
E. E. Milkins, B.Mech.E.
E. J. Armarego, B.Sc. (Eng.) (Lond.).
A. Rotenberg, Grad.Eng. (Tashkent).
Senior Demonstrator:
I. D. Ingram, B.Mech.E.

Drawing Office Supervisor:

Demonstrator in Machine Tools:
D. W. Campbell.

Department of Electrical Engineering

Professor of Electrical Engineering:

Reader:

Senior Lecturers:
T. Brownlee, B.Sc. (Elec. Eng.) (Glasgow), M.E.E., A.M.I.E.E.

Lecturers:
D. F. Hewitt, B.Sc.

Lecturer (Half-time):
D. Pendril Davies, M.Sc. (Rangoon), M.I.E.E.

Demonstrators:
R. R. Babb.
E. Jones.
G. R. Rosengrave.

Part-time Teaching Officers:
Lecturer in English: H. Dow, A.B. (Harvard).
Lecturer in Illumination and Photometry: J. C. Lowson, B.E. (Q'land), A.M.I.E.E.

Department of Metallurgy

Professor of Metallurgy:

Reader in Chemical Metallurgy:

Reader in Metal Physics:

Senior Lecturer in Metallurgical Engineering:

Senior Lecturer in Mechanical Metallurgy:
J. S. Hoggart, B.Met.E.

Senior Lecturer in Physical Metallurgy:
Vacant.

Senior Lecturer in Engineering Materials:
C. J. Osborn, Ph.D. (Lehigh), B.Met.E.

Senior Lecturer in Metallurgical Analysis:

Lecturer in Metallography:
D. W. Borland, B.Met.E.
Assistant Lecturer:

Senior Demonstrator:
  Sophia Maj, Grad. I.E.Aust.

Part-time Teaching Officers:
  Lecturer in Physical Metallurgy:
    R. C. Gifkins, D.Sc., F.I.M.
  Lecturer in Fuels:
    E. H. Hanson, Ph.D. (Leyden).

Department of Surveying

Associate Professor of Surveying:

Senior Lecturer:
  B. T. Murphy, M.Surv., L.S., M.I.S. (Aust.).
  Lecturer:
    S. G. Bervoets, Ir. Geod. (Delft), Assoc. M.A.I.C.

Part-time Teaching Officers:
  Lecturer in Hydrology:
  Lecturer in Elementary Ecology:
    R. T. Patton, M.F. (Harv.), D.I.C. (Lond.), D.Sc.

Department of Mining

Associate Professor of Mining:
  H. H. Dunkin, B.Met.E., M.Aus.I.M.M.

Senior Lecturers:

Part-time Officers:
  Lecturers:
    K. S. Blaskett, B.E. (Adel.), M.Aus.I.M.M.
  Demonstrators:
    W. J. Trahar, B.Sc.
    J. S. Henkel, B.Met.E.

Department of Agricultural Engineering

Senior Lecturer in Charge:
  G. H. Vasey, B.C.E., A.M.I.E.Aust.

Senior Lecturer:

Tractor Testing Officer:

Research Officers:
  W. T. Brown, B.Agr.E.
  D. A. Farrell, B.C.E.

First Year Chemistry Laboratory

Senior Lecturer in Chemistry:
Senior Demonstrator:
(Mrs.) H. M. Sanders, B.Sc. (Syd.).

Engineering Mathematics

Reader:

Senior Lecturers:
J. P. Ryan, B.A., B.Sc.
J. C. Barton, B.A., M.Sc.

Lecturer:
Betty L. Cumming, M.A.

Department of Chemical Engineering

Reader in Chemical Engineering:
O. E. Potter, M.Sc.App. (Q'ld.), M.Sc. (Lond.), Ph.D. (Manc.),
A.M.I Chem.E., A.R.A.CI.

Lecturer:
J. Agnew, B.E. (Syd.), A.M.I.Chem.E.

Part-time Teaching Officers:
G. W. Benkendorff, Ph.D., A.R.A.CI.
R. S. Yost, B.Sc.App. (Tas.), A.R.A.CI.
The University of Melbourne

ENGINEERING

1962

(Note: The Statutes and Regulations of the University are set out in full in the University Calendar, which is the official and authoritative publication of the University. This may be obtained from the University Press, price 12/6; postage 2/8.)

Administration

Correspondence should be addressed to the Registrar.

Personal inquiries should be made to the Secretary, Technical branch of the branch of the Registrar's Office.

Dates

1. Dates for Enrolment
   (a) Friday, 22 December 1961
       Last day of application for admission to the First Year of courses commencing in 1962 for all visiting students from overseas countries (including those who have presented for the Melbourne Matriculation Examination in 1961.)
   (b) Friday, 19 January 1962
       Last day for lodging of applications for First Year admission for students previously enrolled.
   (c) Friday, 19 January 1962
       Last day for amendment of applications (lodged before 30 November 1961) for admission to First Year Engineering Courses.
   (d) Friday, 26 January 1962
       Last day of enrolment for all students previously enrolled, except those applying to repeat First Year.
   (e) Friday, 21 December 1962
       Last day of application for admission to First Year Engineering and Surveying courses commencing in 1963 for all visiting students from overseas countries (including those who have presented for the Melbourne Matriculation Examination, 1962).
   (f) Friday, 23 February 1962
       Last day of enrolment for new students.

2. Commencement of Courses
   (a) Monday, 26 February 1962, for all First Year courses for Bachelor of Engineering or Bachelor of Surveying. The first two weeks will be devoted to Drawing Office work with lectures in the subject Engineering Part I.
   (b) Monday, 12 March 1962, for all Engineering and Surveying courses other than First Year.

3. Term Dates
   (a) First term (10 weeks)—12 March to 19 May 1962.
   (b) Second Term (9 weeks)—11 June to 4 August 1962.
   (c) Third Term (7 weeks)—3 September to 20 October 1962.

4. Vacations
   (a) Sunday, 20 May to Sunday, 9 June, inclusive (3 weeks).
   (b) Sunday, 5 August to Sunday, 2 September, inclusive (4 weeks).

5. Annual Examinations
   (a) 26 July—Last day of entry for examinations.
   (b) 29 October—Annual Examinations commence.
6. Machine Shop Course for First Year (Provisional Dates)
   (a) 19 November—3-week course commences.
   (b) 7 December—course concludes.

Courses and Degrees*

Bachelor of Engineering:
The following courses may be undertaken:
- Civil Engineering Course.
- Mining Engineering Course.
- Mechanical Engineering Course.
- Electrical Engineering Course.
- Metallurgical Engineering Course.
- Chemical Engineering Course.
- Agricultural Engineering Course.
- Industrial Engineering Course.
- Mineral Engineering Course.

Each of these courses is of four years’ duration, specialized in the later years according to the branch of Engineering selected, and intended to qualify for the practice of the Engineering profession.

Bachelor of Surveying.
A four-year degree course. The First Year is identical with that of the Engineering courses, but the later years are devoted to subjects germane to the science of surveying in all its aspects.

Degrees of Master:
- Master of Engineering.
- Master of Surveying.

A candidate for one of these Degrees in any of the above branches of Engineering or Surveying must have held the Degree of Bachelor in some branch of Engineering or in Surveying for at least three years.

If he proposes to present for examination material appropriate to the branch in which he is already a Bachelor, he must produce satisfactory evidence of from three to five years’ practical experience (according to whether he has obtained First or Second Class Final Honours in his Bachelor’s course or not) subsequent to graduation, accompanied by a thesis, written report or original designs. (See Regulations for detailed requirements.) If he desires to present for examination material appropriate to a branch of Engineering other than that in which he took the Bachelor's Degree, the period of experience required will be determined by the Faculty.

Master of Engineering Science.
This degree may be obtained on the completion of not less than one years' advanced studies and research in the Engineering and/or Metallurgical laboratories of the University subsequent to the completion of the course for the Degree of Bachelor of Engineering. Candidates must be Bachelors of at least one year's standing before they may be admitted to the Master's Degree.

Degrees of Doctor:
Doctor of Philosophy.
This is a degree for full-time research workers. A candidate must be a graduate of this or some other University recognized for the purpose, must be of such standing as may be required by the Professorial Board for graduates in his Faculty, and must be accepted as such by the Professorial Board on the recommendation of the head of the department concerned. He must pursue for at least two years a course of advanced study and research under a supervisor or supervisors appointed by the Board, and on its completion must present a satisfactory

*For Regulations see p. 49.
For details of Courses and Subjects see p. 84.
thesis embodying the results of his research. The only part-time candidates who are accepted by the Professorial Board are permanent members of staff. (See Regulation 3.60 in University Calendar, 1961.)

**DOCTOR OF ENGINEERING.**

This degree is granted on published and unpublished work in Engineering. Candidates must be Bachelors of at least five years' standing or Masters of at least two years' standing in some branch of Engineering.

**Degrees at other Universities:**

**AERONAUTICAL ENGINEERING.**

The degree course in Aeronautical Engineering is a four year course taken at the University of Sydney. Students who have completed the first two years of the Civil, Mechanical, or Electrical Engineering courses at this University may make application to transfer to the third year of the above course in Sydney.

**Admission to First Year Engineering and Surveying Courses 1962**

1. **Limitation of Admission**

The number of students who may be admitted to First Year course in Engineering and Surveying in 1962 has been limited by the University Council to a total of 200.

2. **Selection for Admission**

Selection is made by the Professorial Board from applicants who have qualified to matriculate and is based primarily upon academic merit judged by reference to the results of Matriculation Examinations. An order-of-merit list is prepared by a Selection Committee in accordance with principles adopted by the Professorial Board, and is submitted to the Board for approval.

3. **Method of Selection**

In preparing the order-of-merit list the following factors are first taken into account:

(a) The number of attempts required by each candidate to pass the Matriculation Examination.

(b) Honours obtained at the Matriculation Examination.

(c) Passes obtained at the Matriculation Examination.

(d) Failures suffered in the Matriculation Examination.

(e) The effects on examination results of:
   (i) the age of an applicant when examined
   (ii) any interruption to studies, or any other handicap suffered as a result of war service or other circumstance.

(f) The results of any subsequent examinations attempted.

The Matriculation Examination performance is carefully scrutinized and in addition to the factors above, attention is given to any improvement or deterioration in a student's second or subsequent attempts at the examination as a whole and at individual subjects. Comparisons are finally made on the basis of marks scored (totals, averages, and even marks in individual subjects).

To determine the allocation of the later places on the order-of-merit list any other evidence which may be discovered as to the applicants' aptitudes for Engineering studies and Engineering practice may be considered in addition to examination results.

The order-of-merit list, prepared in this way, is carefully re-checked, particular attention being given to the relative positions allotted to students who qualified to matriculate by one or other of the concessional methods permitted, and to those in the groups immediately above and below the 200th position on the list.

Those students grouped about the dividing line are interviewed by the Selection Committee before the final order-of-merit is established. The list is then submitted to the full Professorial Board for review and adoption if approved.

Visiting students from overseas countries who have passed the Melbourne Matriculation Examination or who have been provisionally granted the necessary
status under one of the concessional methods of Matriculation, are considered for selection together with, and on the same basis as all other applicants. However, the maximum number of visiting students from overseas countries who may be admitted may be limited.

4. Procedure to be followed by Applicants

All persons wishing to be considered for admission to First Year Engineering and Surveying courses in 1962, including those who have previously attempted First Year, are required to proceed as follows:

(a) Inquiries: Applicants may make personal inquiries at interviews arranged by making an appointment at the office of the Technical Branch (340484, Ext. 445 and 781) during the first three weeks of January.

(b) Lodgement of Application: Special application forms will be available at the Technical Branch of the Registrar’s Office (First Floor of Accounts Building, near Wilson Hall) from 1 November 1961. Each applicant must lodge a completed form in the manner set out below:

(i) All visiting students from overseas countries, (including any such who have presented for the Melbourne Matriculation Examination) and all applicants whose qualification to matriculate is not by way of the Melbourne Matriculation Examination, must lodge their applications with the Secretary, Technical Branch, on or before Friday, 22 December 1961.

(ii) All other applicants should lodge their applications with the Secretary, Technical Branch, on or before Friday, 19 January 1962.

(c) Enrolment: All students selected for admission to first year Engineering in 1961 must complete enrolment and payment of fees in accordance with the procedure set out under “Enrolment” below, not later than Friday, 23 February 1962.

(d) Late Enrolments: Late enrolments cannot be considered. Applicants for scholarships or other awards whose entry in 1962 is conditional upon the award of any type of scholarship, the award of which is not announced before Friday, 19 January, must NOT await the announcement of such award before lodging an application for admission. If necessary, an application may be withdrawn at a later date by letter addressed to the Registrar.

5. Interviews by Selection Committee

Those applicants whom the Selection Committee wishes to interview will be advised of the time and place of interview by letter to the address indicated by the applicant on the “Application for Admission” form. It is anticipated that any such interviews will take place during the second or third week in February, and applicants are advised to be within reasonable reach of Melbourne during that period. It is expected that only a small number of applicants will be called for interview, and those not called should, therefore, await notification of the result of their application before taking any further action.

6. Results of Applications and Subsequent Procedure

(a) Notification of Applicants

During the latter part of February, before the course commences, each applicant will be individually informed by letter of the result of his application.

(b) Acceptance of Offered Places

An applicant who wishes to accept an offered place in the course must forward a written acceptance to reach the Secretary, Technical Branch, by a date specified in the offer.

If the offer of a place is not accepted in writing by the due date, it will be automatically withdrawn and the application be cancelled. The place may then be offered to the next applicant on the waiting list.

Matriculation

All first year students must matriculate—i.e. make the prescribed declaration and sign the matriculation roll—at the Registrar’s Office during the first term. The dates fixed for matriculation in 1962 are 5 and 11 April and 13 June.
Unless this is done no subjects passed can count towards a degree. Students should satisfy themselves that they are qualified to matriculate before applying for admission.

Attention is drawn to the following points relevant to the obtaining of the matriculation qualifications:

In order to become qualified to matriculate, candidates must—

(a) obtain the School Leaving Certificate and be credited therein with five subjects including

(i) English,
(ii) a branch of Mathematics or of Science,
(iii) one other subject chosen from the languages other than English, Greek and Roman History, Modern History, British History, Economics, Social Studies;

(b) pass the Matriculation Examination by obtaining credit for four subjects, including English Expression;

(c) attain the age of seventeen years by March 31st in the year concerned.

Concessional Matriculation

The Professorial Board has discretionary powers concerning matriculation, and certain matriculation concessions may be made to candidates in the following categories:

(a) Persons who in their first University year turn 17 years of age after 31st March but before the start of the Annual Examinations may be admitted to matriculation if they have fulfilled one of the following conditions:

(a) passed the Matriculation Examination twice,
(b) passed the Matriculation Examination with a minimum of three honours,
(c) passed the Matriculation Examination with fewer than three honours but with good passes in a broad range of subjects.

In each case the Professorial Board will satisfy itself about the maturity of the candidate.

(b) Adult candidates (i.e., persons who are at least twenty years of age and also have left school four full years on 31st March). Such candidates are normally required to pass a reduced number of matriculation subjects and pass either a special test in English or matriculation English Expression or English Literature.

(c) Special cases (i.e., persons whose studies have been hampered by illness or by changes in requirements, or whose qualifications are deficient only in a very minor respect). Individual determinations are made in these cases.

(d) Persons in employment. Candidates who are in full-time employment and have passed the necessary School Leaving subjects may qualify to matriculate by passing, while in full-time employment, in four Matriculation subjects including English Expression at any three sittings.

(e) Technical College students. Candidates with approved technical college diplomas are qualified to matriculate if they have passed at the Matriculation Examination in English Expression.

(f) Ad eundem statum applicants. Candidates who have qualified to matriculate in another recognized University may be admitted to matriculation. All candidates for special forms of matriculation should consult the Matriculation Officer in the Registrar’s Office, who will advise them as to the form of application required.

Faculty Pre-requisites

In addition to matriculating, candidates must also have passed the pre-requisite subjects (if any) for their course (see below). For the Bachelors’ course in Engineering and Surveying no pre-requisite subjects at matriculation are prescribed. However, those wishing to enter Engineering courses are advised that the teaching of the First Year subjects is of a University standard and assumes that Mathematics I, Mathematics II, Physics and Chemistry have been taken at least to the Leaving Level.
The First Year Mathematical subject, Engineering Mathematics Part I, is predominantly a Pure Mathematics subject. Where students have definitely decided on the course they wish to undertake the following recommendations are made:

Metallurgical Engineering and Chemical Engineering Courses
Chemistry should be taken to the Matriculation level.

Electrical Engineering Course
Pure Mathematics and Physics should be taken to the Matriculation level.

Photographic Record of Students
All students admitted to the First Year of the Engineering course in 1961 may be required to be photographed for the purpose of records. Directions for having photographs taken at the Visual Aids Department (free of charge) will be given to students during the first week of the course.

Enrolment
All students must enrol as detailed below.

(a) Continuing Students
Except for those applying for admission to First Year, 1962, students enrolled in a previous year must lodge their enrolments and pay their fees by 26 January, 1962. These enrolments will be accepted at the Students' Records Office from the time of publication of the results of the Annual Examinations, 1961.

(b) Students from Recognized Technical Colleges
A suitably qualified student from a recognized Technical College, who wishes to apply for admission in 1962 to the Second or Third Year of a course for the degree of Bachelor of Engineering should, during January, 1962, lodge with the Principal of the relevant Technical College an "Application for Block Exemption". No further action concerning enrolment should be taken by such applicant until he receives a letter from the University informing him of the result of his application and the further action required. (An applicant for entry to Third Year is required to produce, during First Term, evidence of at least five weeks continuous employment appropriate to his course, performed during the long vacation preceding his admission. In the case of Civil Engineering students, these five weeks must be spent gaining practical experience in surveying.)

(c) Students applying for admission to First Year B.E. or B.Surv., 1962.

(i) "Application for Admission" forms must be lodged with the Secretary, Technical Branch, on or before 19 January 1962, as detailed in the section of the Handbook entitled "Admission to First Year Engineering and Surveying Courses, 1962.

(ii) After selection has been notified enrolment and payment of fees must be made not later than Friday, 19 January.

The forms to be submitted for enrolment are as follows:

(a) Enrolment card for lectures
This document, which is submitted each year, must indicate clearly (amongst other things) the year and course for which the student wishes to enter and the subjects comprising that year's work. Applicants for admission to First Year B.E. should indicate clearly their intention of studying either Chemistry (Engineering Course) [for those who do not wish to proceed with Chemical Engineering] or Chemistry Part I [for those who may wish to proceed with Chemical or Metallurgical Engineering].

N.B. Students wishing to proceed with any variation from a prescribed course must lodge with the Secretary, Technical Branch, at the time of enrolling, a written application for approval of the proposed variation.

(b) Application to sign the Matriculation Roll
This document is to be completed by all intending students for B.E. or B.Surv. who have not previously signed the Matriculation Roll.
(c) Roll cards for each subject

A roll card for each subject of the course must be submitted, and students taking Physics Part I and Chemistry Part IA, or Chemistry Part I (Engineering course), must also submit special roll cards for practical work.

(d) Bank slip for the correct fees

After completing the documents in (a), (b), and (c) above, the student must present his enrolment card for an assessment of fees to be made.

The enrolment documents will be accepted when they are accompanied by a bank slip indicating that the assessed fees have been paid. Special arrangements are made for those students whose fees are paid under the provision of a Commonwealth Scholarship or other approved agreement.

Late Entries

These may in special circumstances be accepted on payment of an additional fee, but no candidate will be admitted to the Annual Examination in any subject, except with the special permission of the Professorial Board, who has not enrolled for that subject within one month after the beginning of first term. Normally, late entries cannot be accepted for First Year of the Engineering Courses.

Terminal Re-enrolment

In order to increase the accuracy of the University's records, every student will be required to fill in a special re-enrolment slip at the end of the first term, showing the subjects which he proposes to study for the remainder of the year.

A student who does not wish to proceed with his course must notify Students Records in writing immediately.

Fees

Bachelor and Master of Engineering, Bachelor and Master of Surveying, Master of Engineering Science and Doctor of Philosophy.

When enrolling students must consult the Fees Section of Students' Records before payment of fees.

Lecture fees are paid yearly in advance, or in three terminal instalments, the first being paid on enrolment and the second and third on or before the 19th May and 27th July respectively.

All fees must be paid into the University's account at a branch of the National Bank of Australia. Branches of the bank will be found next to the Bookroom and in Union House.

Examination Fees for Higher Degrees

<table>
<thead>
<tr>
<th>Degree</th>
<th>Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master of Engineering</td>
<td>£13 13 0</td>
</tr>
<tr>
<td>Master of Surveying</td>
<td>13 13 0</td>
</tr>
<tr>
<td>Doctor of Philosophy</td>
<td>13 13 0</td>
</tr>
<tr>
<td>Doctor of Engineering</td>
<td>21 0 0</td>
</tr>
</tbody>
</table>

Special Laboratory and Apparatus Fees

These fees are paid to the University Branch of the National Bank using a specially stamped bank slip obtained from the department concerned; they must be paid and evidence of payment must be produced to the department or lecturer before practical classes begin.

Laboratory Fees for Engineering Subjects

<table>
<thead>
<tr>
<th>Subject</th>
<th>Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Engineering I</td>
<td>4 0 0</td>
</tr>
<tr>
<td>Chemical Engineering II (new course)</td>
<td>4 0 0</td>
</tr>
<tr>
<td>Process Chemistry</td>
<td>2 0 0</td>
</tr>
<tr>
<td>Chemical Engineering Lab.</td>
<td>5 0 0</td>
</tr>
<tr>
<td>Chemical Engineering III (new course)</td>
<td>8 0 0</td>
</tr>
<tr>
<td>Earth Science</td>
<td>2 0 0</td>
</tr>
<tr>
<td>Electrical Engineering Part I (E)</td>
<td>3 0 0</td>
</tr>
<tr>
<td>Electrical Engineering Part II (E)</td>
<td>5 0 0</td>
</tr>
<tr>
<td>Electrical Engineering (M) and (C)</td>
<td>3 0 0</td>
</tr>
<tr>
<td>Electrical Engineering (G)</td>
<td>3 0 0</td>
</tr>
<tr>
<td>Electrical Engineering Part III (E)</td>
<td>5 0 0</td>
</tr>
<tr>
<td>Electronics</td>
<td>3 0 0</td>
</tr>
<tr>
<td>Engineering Part I</td>
<td>1 0 0</td>
</tr>
</tbody>
</table>
Laboratory Fees for Chemistry Subjects
These fees are paid to the University Branch of the National Bank using a specially stamped bank slip obtained from the Chemistry Laboratory of the North Building or from the Chemistry Department. For particulars see respective subjects in Details of Subjects.

Lectures and Time-table of Lectures
The syllabus for each course of lectures and for practical work is shown in details of courses and subjects (see page 84 et seq.)

The rooms assigned to classes will be published on the Engineering School Notice Board before the beginning of First Term.

The time-table of lectures in the various courses is printed on page 56.

Evening Lectures
Subject to sufficient enrolments being received, evening lectures will be delivered in 1962 in the following subjects:
- Applied Mathematics Parts I and III.
- Physics Part I (with laboratory work).
- Pure Mathematics Part I and II.

These lectures are for pass candidates only.

Vacation Work
Students are required to obtain suitable vacation work experience each year during the vacation which follows the Annual Examinations (see Regulations and details).

Technical College students applying for admission to the Third Year of an Engineering course are required to have completed, during the immediately preceding vacation, a minimum of five weeks appropriate vacation work, as specified for all other students entering Third Year.

It is a requirement of the Faculty that students present to the Secretary, Technical Branch, by the end of First Term, a certificate from their employer setting out briefly details of the period and type of employment.

The University Appointments Board is usually able to assist students in finding suitable employment.

Vacation Reading:
Students are advised that they are expected to use a considerable part of the summer and spring vacations for reading purposes. In some cases specific

*£1 may be refunded.
‡£2 may be refunded.
references are made in the following details; in others a list of suitable books will be posted on the appropriate notice boards; in all cases the lecturers concerned should be consulted.

University Survey Camp:

A University Survey Camp, of three weeks' duration, followed by plotting and computations in the Drawing Office, may be arranged in the summer at a site selected by the Head of the Department of Surveying to enable students to conform with vacation experience requirements. Students who have not obtained the requisite experience in Surveying under a competent surveyor must attend at least one University Survey Camp and do the consequent Office work.

If a Survey Camp is held, students will defray their own travelling and camp expenses. The University provides the instruments and a limited number of tents. A meeting of intending members is called during the second term of the Second Year to elect a camp committee, which is responsible to the Head of the Department for details of arrangements. Each member must be approved by the Head of the Department before admission and must pay to the committee, at least seven days before the end of the third term, a contribution for transport and camp expenses, and also an amount to cover the cost of transport of instruments and repairs and renewal of equipment. Students from other Universities and recognized Technical Colleges may be admitted by the Head of the Department.

University Library

The Library facing the open area south of the Arts Building, with branches in several of the Departments, is open to all students. Most books recommended for study or for reference are available for use in the Library, which also provides fully for the requirements of wider reading. Students may borrow from the Library, under various conditions. The Library Rules are displayed in the Library and are also distributed in leaflet form.

The Branch library at the Engineering School is open throughout the academic year from 8.45 a.m. to 9.30 p.m., Monday to Friday and on Saturday morning from 8.45 a.m. to 12 noon except during the first term vacation. It is closed for the fortnight following Christmas and during the long vacation closes at 5 p.m. and is not open on Saturday.

The staff is in constant attendance to help students avail themselves of its resources.

Students seeking information should know that, apart from the Card Catalogue (which should always be first consulted), the Engineering Library contains certain general Indexes and Abstracts of Technical Literature, which they should find of great assistance, especially in the later part of their courses. These are, chiefly:

- The Engineering Index.
- Metallurgical Abstracts. (Inst. of Metals, Lond.)
- A.S.M. Review of Metal Literature (American Society for Metals.)
- Electrical Engineering Abstracts. (Science abstracts B.)
- Nuclear Science Abstracts.

There is also a guide to current periodicals which include Abstracts and Indexes of Technical Literature of a more specialized nature.

Examinations

Annual Examination. All candidates for the Annual Examination, whether enrolled as attending lectures or for external studies, must lodge an examination entry with the Registrar not later than 26 July. The entry must specify whether the candidate intends presenting for pass or honours in each subject, no candidate being permitted to enter for both pass and honours in the same subject. Candidates who take the honours papers in any subject but fail to reach honours standard are eligible to be granted a pass.

A time-table of the Annual Examination will be available at the Registrar's Office some weeks before the examination. No additional examination fee is payable by those who have paid full lecture fees in the subjects for which they present themselves. Candidates sitting at country centres must pay, in addition, a supervision fee of £1/10/- per subject. Examination numbers for candidates pre-
Exclusion and Limitation for Unsatisfactory Progress

1. Where a student fails in or is absent from any annual examination (including any supplementary or special examination) and the appropriate faculty or board of studies is of the opinion, after investigating the circumstances and giving the student concerned an opportunity to be heard, that—

(i) his attempt at the examination was so unsatisfactory, or
(ii) his absence was so inexcusable

the subjects for which he may enrol in any subsequent year should be specified it shall notify the student accordingly and thereupon the subjects for which he may enrol shall be as specified.

2. Where a student fails in or is absent from any annual examination (including any supplementary or special examination) and the appropriate faculty or board of studies is of the opinion, after investigating the circumstances and giving the student concerned an opportunity to be heard, that—

(i) his attempt at the examination was so unsatisfactory, or
(ii) his absence was so inexcusable

he should be excluded from the course or subject concerned, it shall report its opinion to the Professorial Board.

*Less the examination fee.
3. (a) In considering a report pursuant to section 2, after giving an opportunity to the student to be heard, the Professorial Board may determine that the student shall—

(i) be excluded from all courses or such course or courses as it shall specify, or
(ii) be excluded from all subjects or such subject or subjects as it shall specify, or
(iii) be limited in any year to such subject or subjects as it shall specify, or
(iv) be permitted to continue his course subject to such conditions as the Board may determine and the determination of the Board shall be effective from the date thereof.

(b) When acting under this section the Board may act by a committee of which at least five members shall be present and vote at any hearing.

4. Any student excluded from any course or courses or from any subject or subjects under section 3 may apply for admission to any such course or subject. If the Professorial Board is satisfied that the condition or circumstances of any such student have so changed that there is a reasonable probability that he will make satisfactory progress in any such course or subject, it may, after the expiration of one calendar year from the date of the determination for exclusion, authorize the admission of that student to any such course or subject, and may impose such conditions as it may determine.

5. No student who has entered a course for a degree or diploma and who has been excluded from that course shall be permitted to enter for any other course for a degree or diploma without the permission of the faculty or board of studies controlling that other course: Provided that a student who has been refused such permission may appeal to the Professorial Board.

Student Counselling Office

The Student Counsellors' office is located at 268 Elgin Street, Carlton. The student counsellors (Mr. R. Priestley, Miss M. Ross, and Mr. G. A. Cally) are available to help students and intending students with problems such as choice of course or career, difficulties in settling down to study, adjustment to University life and financial and personal difficulties. They are available in the usual University hours, preferably with, but if necessary without, an appointment. Matriculation students and others not yet enrolled at the University should arrange an appointment.

Appointments Board

The Appointments Board provides the following free services:

1. Advice on Careers: (Mr. H. F. Downes)

Long experience in matters related to the employment and professional advancement of university men and women enables the officers of the Appointments Board to give reliable advice on professional careers. Careers Handbooks may be obtained from the Appointments Board which also offers to students the use of a Careers Library. This advisory service is carried on in close liaison with the Student Counsellor.

2. Employment Service:

(a) Vacation Work, Part-time Work and Odd Jobs. (Miss Margaret Campbell.)

Some faculties prescribe compulsory vacation experience, but vacation work is recommended to all students as a means of gaining knowledge of the environment in
which they may later exercise their professional skills. Employers and students also have the opportunity of becoming acquainted, and vacation work thus often leads to permanent employment after graduation.

Undergraduates requiring vacation work should register early to give the Board time to make the necessary arrangements; those wishing to work during the Long Vacation should register before the end of August.

(b) Professional Employment.

The acute shortage of graduates of all faculties makes it all the more important that graduates should accept employment where their services can be most effectively used. The Appointments Board maintains a comprehensive register of professional vacancies which the Secretary and Assistant Secretaries are glad at all times to discuss with graduates. This assistance is available also to those students who, for one reason or another, fail to complete their courses, and in these cases special effort is made to enable undergraduates to use their university training in employment.

Students in their final year are advised to register with the Board early in the year and to call occasionally during the year to keep themselves informed on current employment trends. Those who wish to gain experience overseas should pay particular attention to this point.

Registration is advised even in those cases where arrangements have already been made independently for employment after graduation. The Board’s responsibility to graduates continues throughout their working lives; and there are very few graduates whom the Appointments Board is not in a position to help at some stage or other during their working lives. All men and women currently registered and available for employment are kept advised of suitable vacancies coming to the notice of the Board. They receive, also, each year, a copy of the Appointments Board Report containing up-to-date information on employment trends, opportunities for graduates, and current salary rates.

The Union

The Union is an organization designed to provide a common centre for the many important activities of University life outside the lecture room and the laboratory. In addition to providing a common meeting ground and social centre for students of all faculties, the Union in various ways, e.g., through its Theatre, Library and Music Room, seeks to promote broader cultural interests and in general to emphasize the importance, in a real University course, of a wide variety of activities not directly connected with examinations, and to encourage in every student reasonable participation in the non-academic side of University life.

Student Housing

Accommodation can be found for students, either in hostels, private homes, flats or guest houses, through the Housing Officer. This service is free but as suitable accommodation is limited, students can contribute considerably to its effectiveness and administration by informing the Housing Officer when their needs are met. The Housing Officer, Mrs. N. Sharp, is situated in an office opening off the Foyer of Union House.

Shopping Centre

(a) Text-books. The Union accepts books for sale to other students at two-thirds, or less, of the new price according to condition. The seller collects the proceeds less a small handling charge.

(b) Services. Dry cleaning, boot repairs, laundry and such like services are handled at special rates through the Union.

(c) Clothing and a large range of useful articles are available to members in a modern shopping area.

(d) Discount service. The Union has arranged with certain city firms for discounts to be given to its members. Information (and a member’s privilege card) may be obtained at the Union Office.

The Shopping Centre is located on the south side of the Cafeteria, Union House.

Catering

Midday and evening meals are provided in term in the Cafeteria. Catering services include an espresso lounge, a milk bar and an Asian food bar. A sandwich
bar is located on the north side of Union House. A small cafeteria is also operated
in the Baillieu Library.
Facilities for private entertaining are available to members.

Other Facilities
The Union Theatre, the Ewing Art Gallery (entrance from first floor),
the Rowden White Library (upstairs in the south-east corner) are major features
of Union House.
Lounges, a Music Room and a Billiard Room are available for the use of
members. A barber's shop adjoins the Billiard Room.

"Union Night"
Every Saturday night in the first and second terms a social evening known
as "Union Night" is held in the Union House. This usually takes the form of films
followed by supper, after which there is informal dancing until 11.30 p.m. This is
free and all Union members are welcome.

Union Administrative Officers
Warden: Mr. J. B. Webb.
Secretary: Mr. D. B. Carswell.
Theatre Manager: Mr. R. Field.

Student Facilities

Student Health Service. The service, which was inaugurated in 1961, is now
under the supervision of a Director; Dr H. D. G. Hetherington. A free examina-
tion and diagnostic service is provided for students.

Free Eye Examination. Students who wish to have a free eye examination
may make appointments at the Australian College of Optometry (Telephone:
34 2287).

Blood Donors. Blood donors are urgently needed. The Mobile Blood Bank
makes periodic calls at the University; details may be obtained from the S.R.C.

Student Housing and Union Exchange. See under The Union.

Air Force and Army Training Units
The attention of students is drawn to University units for the training of
Air Force and Army personnel. Information concerning the Melbourne University
Regiment may be obtained from the M.U.R. Training Depot, University Grounds;
details of the Melbourne University Air Force Squadron may be obtained from
Squadron-Leader J. Lynch, A.F.C., McCormick Place, off Little Lonsdale Street,
C.1.

The Colleges of the University
There are seven residential colleges connected with the University, each of
which provides additional teaching, mainly of a tutorial character.

The resident colleges for men are:
Trinity College (Church of England)
Warden: Mr. R. W. T. Cowan
Address: Parkville, N.2

Queen's College (Methodist)
Master: Dr. R. C. Johnson
Address: Parkville, N.2

The resident colleges for women are:
Janet Clarke Hall (Church of England)
Principal: Miss M. A. Dewey
Address: Parkville, N.2

St. Mary's Hall (Roman Catholic)
Principal: The Rev. Mother
Address: The Avenue, Parkville, N.2

University Women's College (Unde-
nominational)
Principal: Dr. Angela Milne
Address: Parkville, N.2

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College teaching is available for non-resident as well as resident students. All the Colleges have liberal provision for resident scholarships and non-resident exhibitions. The University fees mentioned above do not include College fees, which are payable to the Colleges themselves.

For further information regarding the Colleges, students are referred to the sections printed in the University Calendar and to the Heads of Colleges.

University Halls of Residence

There are two University Halls of Residence, International House and Medley Hall. International House provides additional teaching, mainly of a tutorial character.

<table>
<thead>
<tr>
<th>International House</th>
<th>Medley Hall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address: 241 Royal Parade, Parkville, N.2</td>
<td>Address: 48 Drummond Street, Carlton, N.3</td>
</tr>
</tbody>
</table>

Residence is available for both Australian and overseas students. Tutorials are provided at International House for non-resident as well as resident students. International House makes provision for associate membership which enables students who reside in the vicinity to take meals and tutorials at the House and to take an active part in the other activities of the House. The University fees mentioned above do not include fees for the Halls of Residence. For further information regarding Halls of Residence students are referred to the appropriate section of the University Calendar, and to the Wardens of these institutions.

Diary

The Melbourne University Press publishes a pocket diary each year. In addition to general information about the University, the diary contains information about the dates of examinations and lecture terms, of application for scholarships and of sporting fixtures; it also contains an indexed map of the University.

The diary is on sale at the University Book Room.

Recognition of Work done at Technical Colleges

Matriculation of Technical College Students

See under Matriculation and Pre-requisites (page 15).

Credits on Entry into Course

There are now two methods of obtaining credits in the Engineering Course for candidates who have completed the subjects for a diploma at a Technical College recognized by the Technical Colleges Board for the purpose.

In general, candidates under 18 years of age on entry to the University will not receive any exemption, and candidates under 19 years of age will not receive exemptions amounting to more than one year of the course.

Applications for exemptions must be made on the prescribed form, which is obtainable at the Registrar's Office. The Technical Colleges Board may determine that exemptions given are for the purpose of a specified course at the University and in such cases candidates transferring to another course may not be given exemptions in another course without the permission of the Board.

A certificate from the Principal stating what stage the applicant has reached in his Diploma course must be submitted with the application, and this certificate must specify the subjects passed in the course.

Exemption from Single Subjects

This is the method that has been in force in previous years and may be continued for candidates other than those specifically recommended for the two-year exemption described below.

Exemption is given from subjects the necessary equivalents for which have been passed during the Diploma course and this exemption usually amounts to about one year of the course.
Table I sets out the Technical Colleges recognized for this purpose and Table II the approved equivalents for the University subjects.

The Technical Colleges Board may in special cases approve applications from Technical Colleges other than those in Table I.

Exemption from Years

Exemption equivalent to two years of the following courses* for the degree of Bachelor of Engineering:

- Civil Engineering Course.
- Electrical Engineering Course.
- Mechanical Engineering Course.
- Metallurgical Engineering Course.

may be given to candidates who have completed the subjects for an approved Diploma taken in an appropriate course at a school recognized by the Technical Colleges Board for the purpose.

Exemption equivalent to two years of the course for the degree of Bachelor of Engineering in Chemical Engineering may be given to candidates who have completed the Fellowship Diploma of Chemical Engineering at Royal Melbourne Institute of Technology. Students who have completed the full-time Associateship Diploma of Chemical Engineering at Royal Melbourne Institute of Technology may be granted credit for one year of the Chemical Engineering degree course.

Exemption equivalent to two years of the course for the degree of Bachelor of Surveying may be given to candidates who have completed the course for an Associateship Diploma in Surveying at the Royal Melbourne Institute of Technology, and, in addition, passed the subject Mathematics Gr. IV (Technical College), and the subjects Pure Mathematics Part II and Geophysics Part I (University).

Exemption equivalent to two years in the course for the degree of Bachelor of Engineering, in Mining, may be granted to candidates who have completed the subjects for an approved Diploma in Civil or Mining Engineering, taken in an approved course at a school recognized by the Technical Colleges Board for the purpose, provided that:

(i) A candidate who has completed the subjects for a Civil Engineering Diploma has also qualified for single subject exemption in Geology Part I, and

(ii) A candidate who has completed the subjects for a Mining Engineering Diploma has also qualified for single subject exemption in Geology Part I, Engineering Mathematics Part I and Physics Part I.

Such candidates will be considered on their merits as individual cases, and, if the exemption be granted, a special third year of University study will be prescribed in each case.

To be considered for the two year exemption in any of the above courses, a candidate must be specifically recommended by the Principal of the recognized Technical school at which the approved Diploma course was completed. In addition the Faculty of Engineering may stipulate that credits must be obtained in certain subjects of the Diploma course as a pre-requisite for admission to the third year of the degree course.

Table III sets out the Technical Colleges recognized by the Technical Colleges Board for this purpose and the Diplomas approved.

The following subjects or their equivalents must have been completed during the Diploma course:

Elect. Course Metallurgy IIC and Electronics (Education Department Diplomas)
Met. Course Mathematics III, Engineering Drawing IIA, Electrical Engineering Drawing and Design IIIA or IIIB or IIIC, Practical Metallography, Applied Mechanics IIB.
Mech. Course Metallurgy IIC

"Block Exemption" Courses

For entrants in 1962 the course will normally be completed by passing the following third and fourth years prescribed by the Faculty. The passing by years regulations will apply to these years.

*At the time of going to press the Faculty has under consideration a block exemption course in Industrial Engineering. Details of the new course (if approved) will be obtainable from the Secretary, Technical Branch, Registrar's office, in January, 1962.
Civil Course

Third Year

Engineering Mathematics Part II
Physics Part II (Eng. Course)
Earth Science
Engineering Design A
Engineering Mathematics Part IIIA
Fluid Mechanics A
Electrical Engineering C

Fourth Year

Civil Engineering
Town Planning
together with one of the following subjects:
Geology Part II (Mining Course)
Industrial Administration

Elect. Course

Third Year

Engineering Mathematics Part II
Physics Part IIC
Engineering Practices and Engineering Mathematics Part IIIA or Engineering Mathematics Part III†
Electrical Engineering Design
Fluid Mechanics C
Electrical Engineering Part IIE (Electronics only)
Statistics for Engineers

Fourth Year

Discussion Sessions
Electrical Engineering Part III
Candidates for Pass will be required to take either
(a) Industrial Administration or
(b) Management B.
Candidates for Pass who take Management B may be permitted to take the following subjects:
Two Units of Physics Part III.
Candidates for Honours will be required to take:
(a) Management B
with one of the following:
Four Units of Physics Part III.
Two additional Units of Electrical Engineering Part III.
or
(b) Engineering Mathematics Part IV
or
(c) Industrial Administration
with one of the following:
Two Units of Physics Part III.
One additional Unit of Electrical Engineering Part III.

Mech. Course

Third Year

Engineering Mathematics Part II
Industrial Electronics and Control
Engineering Design Part II (Mech.)
Fluid Mechanics Part I
Strength of Materials Part III
Engineering Mathematics Part IIIA
Dynamics of Machines Part III
Applied Thermodynamics Part II
Properties of Metals

Fourth Year

Engineering Design Part III (Mech.)
Mechanical Engineering Lab.
Mechanical Engineering Project Management B
together with § of the following:
Applied Thermodynamics Part III
Automatic Control.
Dynamics of Machines Part IV
Engineering Mathematics Part IV
Fluid Mechanics Part II
Industrial Engineering M
Strength of Materials Part IV

Met. Course

Third Year

Fluid Mechanics C
Metallurgy Part II (E) †
Metallurgical Chemistry
Metallurgical Engineering Part I
(part only)
Metallurgical Engineering Part II
Physics Part II (Eng. Course)

Fourth Year

Metallurgy Part III
Metallurgical Engineering Part III†
Chemical Engineering Part III (g)
Management B
or
Mineral Industry Management

* Students are required to take only Section C of Earth Science, but are advised to attend lectures of Section B.
† Subject to approval of previous mathematical performance.
‡ The selection must be approved by the Professor of Mechanical Engineering.
§ Exemption from part of the work may be given in these subjects. This applies particularly to candidates from Royal Melbourne Institute of Technology. 27
The above exemptions cover the first and second academic years. Candidates for direct entry to the third year must have completed the five weeks' vacation experience which precedes that year except Royal Melbourne Institute of Technology candidates for admission to the Metallurgical Engineering course. In the case of Civil Engineering students, experience in Surveying is required; other students require experience appropriate to their course. The Faculty will be prepared to give special consideration to candidates with exceptional previous experience.

The University Appointments Board will assist students to find suitable employment.

Table I.—Technical Colleges recognized for Single Subject Exemptions

<table>
<thead>
<tr>
<th>Name of College</th>
<th>Subjects in which recognition will be granted are indicated by a cross in the appropriate column</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ballarat School of Mines</td>
<td>x</td>
</tr>
<tr>
<td>Bendigo School of Mines</td>
<td>x</td>
</tr>
<tr>
<td>Castlemaine Technical School</td>
<td>x</td>
</tr>
<tr>
<td>Caulfield Technical School</td>
<td>x</td>
</tr>
<tr>
<td>Footscray Technical School</td>
<td>x</td>
</tr>
<tr>
<td>Gordon Institute of Technology, Geelong</td>
<td>x</td>
</tr>
<tr>
<td>Maryborough Technical School</td>
<td>x</td>
</tr>
<tr>
<td>Royal Melbourne Institute of Technology</td>
<td>x</td>
</tr>
<tr>
<td>Swinburne Technical College</td>
<td>x</td>
</tr>
<tr>
<td>Yallourn Technical School</td>
<td>x</td>
</tr>
<tr>
<td>Warrnambool Technical College</td>
<td>x</td>
</tr>
</tbody>
</table>

Table II.—Approved Technical College Equivalents

<table>
<thead>
<tr>
<th>No.</th>
<th>University Subject</th>
<th>Technical College Equivalents</th>
</tr>
</thead>
</table>
| 1   | APPLIED MATHEMATICS PART I                             | Mathematics IA  
|     |                                                        | " " IB 
|     |                                                        | " " IC 
|     |                                                        | " " II A 
|     |                                                        | " " II B 
|     |                                                        | " " IV 
| 2   | **CHEMISTRY PART I (ENGINEERING COURSE)                | Theoretical Chemistry (Inorganic) I  
|     |                                                        | Practical Chemistry I 
|     |                                                        | Theoretical Chemistry (Inorganic) II  
|     |                                                        | (a) Practical Chemistry II (Quantitative) 
|     |                                                        | or 
|     |                                                        | (b) Assaying II |

* Credit for Surveying is subject to the performance of the required vacation work in Surveying (see p. 81).

§The list of subjects in which recognition will be granted and which are approved equivalents, are correct at the time of going to press. Alterations to the lists may be made subsequently on the recommendation of the Technical Colleges Board.

** Students must be qualified for Pure Mathematics Part I before they enter for Physics Part II, or Physics Part II (Engineering Course), Chemistry Part II or Metallurgy Part I.

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<table>
<thead>
<tr>
<th>No.</th>
<th>University Subject</th>
<th>Technical College Equivalents</th>
</tr>
</thead>
</table>
| 3   | **CHEMISTRY PART IB** | Theoretical Chemistry (Inorganic) I  
|     |                   | Practical Chemistry I  
|     |                   | Theoretical Chemistry (Inorganic) II  
|     |                   | (a) Practical Chemistry II (Quantitative)  
|     |                   | (b) Assaying II  
|     |                   | Organic Chemistry IA |
| 4   | ENGINEERING MATHEMATICS PART I | Mathematics IA  
|     |                   | IB  
|     |                   | IC  
|     |                   | IIA  
|     |                   | IIB  
|     |                   | III  
|     |                   | IV or IVD |
| 5   | ENGINEERING PART I and ELEMENTS OF DESIGN and DESIGN PRACTICES | Graphics  
|     |                   | (a) Engineering Drawing IIA  
|     |                   | or  
|     |                   | (b) Engineering Drawing IIB  
|     |                   | (a) Engineering Drawing and Design IIIA  
|     |                   | or  
|     |                   | (b) Engineering Drawing and Design IIB  
|     |                   | or  
|     |                   | (c) Engineering Drawing and Design IIC |
| 6   | GEOLOGY PART I | Geology I  
|     |                   | Geology IIE  
|     |                   | (a) Geology IIA  
|     |                   | or  
|     |                   | (b) Geology IIB |
| 7   | PROPERTIES OF ENGINEERING MATERIALS | Applied Mechanics II  
|     |                   | Metallurgy IIC  
|     |                   | (a) Applied Mechanics IIIA  
|     |                   | or  
|     |                   | (b) Metallurgy IIC |
| 8   | MECHANICAL ENGINEERING PART I | (a) Applied Mechanics IIIIB  
|     |                   | or  
|     |                   | (b) Applied Mechanics (Machines), Special Course  
|     |                   | or  
|     |                   | (c) Theory of Machines I  
|     |                   | Heat Engines II  
|     |                   | Heat Engines III |
| 9   | *METALLURGY PART I | The Royal Melbourne Institute of Technology Fellowship Diploma in Metallurgy  
|     |                   | or  
|     |                   | Metallurgical Engineering  
|     |                   | or  
|     |                   | The Associate Diploma in Secondary Metallurgy |
| 10  | **PHYSICS PART I** | Physics II (old)  
|     |                   | or  
|     |                   | (a) Physics III (new)  
|     |                   | or  
|     |                   | (b) Physics IV (new)  
|     |                   | or  
|     |                   | Physics IA  
|     |                   | Physics IB  
|     |                   | Physics IC  
|     |                   | Electrical Engineering I  
|     |                   | Electrical Engineering II  
|     |                   | or  
|     |                   | Physics I (new)  
|     |                   | Physics II (new)  
|     |                   | 1 Electrical Engineering I  
|     |                   | 1 Electrical Engineering II |

† Students taking this exemption are advised to do additional preparation before proceeding to Chemistry Part II.
* Students must have passed or received credit for Pure Mathematics Part I, Physics Part I and Chemistry Part I before credit in Metallurgy Part I can be granted.
** Students must be qualified for Pure Mathematics Part I before they enter for Physics Part IIC, or Physics Part II (Engineering Course), Chemistry Part II or Metallurgy Part I.
†† Students who have passed one of Electrical Technology II, Electrical Engineering (Special A.C. and D.C. course) or Electrical Technology (Special course of A.C. and D.C.) or Electrical Engineering I (old syllabus) may apply for permission to substitute one of these subjects for Electrical Engineering Grade II (new syllabus) when applying for credit for Physics Part I.
1 Students satisfying these requirements are advised to do additional preparation before proceeding to Physics Part II.
Table III.—Technical Colleges Recognized and Diplomas Approved for Two Years’ Exemption

(A cross indicates an approved diploma course at a recognized college.)

<table>
<thead>
<tr>
<th>Diploma Course</th>
<th>Civil</th>
<th>Elec</th>
<th>Mech</th>
<th>Met</th>
</tr>
</thead>
<tbody>
<tr>
<td>Royal Melbourne Institute of Technology</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Ballarat School of Mines</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Bendigo Technical College</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Castlemaine Technical College</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Caulfield Technical College</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Footscray Technical College</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Gordon Institute of Technology</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Maryborough Technical College</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Swinburne Technical College</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Warrnambool Technical College</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Yallourn Technical College</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

PRACTICAL WORK IN TECHNICAL COLLEGES

The required practical work in the following University subjects may be carried out at the Technical Colleges named, provided that application is made to the Registrar for the permission of the Faculty at the beginning of the Academic Year.

CHEMISTRY PART I.—Ballarat and Bendigo Schools of Mines; Gordon Institute of Technology, Geelong; Yallourn Technical College.

GEOLoGY PART I.—Ballarat School of Mines.

PHYSICS PART I.—Ballarat and Bendigo Schools of Mines; Gordon Institute of Technology, Geelong; Maryborough Technical College.

Candidates who secure this permission must sit for the University Examinations in the subject, and will be required to pay an examination fee of £1/11/6 per subject to the University. Candidates will be required to submit an enrolment card for external studies, but will not be required to pay other than examination fees to the University. A certificate of the completion of the practical work must be submitted with the entry for examination, and the candidates’ note-books must be made available for inspection to the head of the University department concerned.

Recognition of Work Done at Service Colleges

Any person who satisfactorily completes the Passing Out Examination of the Royal Australian Naval College or the first year of the course at either the Royal Military College of Australia or the Royal Australian Air Force College may, on production of appropriate evidence, be admitted to matriculation without further examination.

Any person who completes satisfactorily a course of at least three years’ duration at the Royal Military College of Australia and who is specially recommended by the Commandant may be admitted to the third year of the Engineering course.

Any person who completes satisfactorily a course of at least two years’ duration at the Royal Australian Air Force College and who is specially recommended by the Commandant may be admitted to the second year of the Engineering course.

† Subject to the performance of the required vacation work in Surveying.
‡ If passed at the Royal Melbourne Institute of Technology.
§ Fellowship and Day Associate Diplomas.
Scholarships, Bursaries, Prizes and Financial Assistance
The Commonwealth Scholarship Scheme

**Scholarships**

The Commonwealth Scholarship Scheme provides for the award of up to 4,000 scholarships each year. Victoria's share in 1962 will be about 1,400.

Most of these scholarships are open for competition among persons under 25 years of age who wish to commence tertiary courses at universities and other approved institutions in Australia. These are known as Open Entrance scholarships. Scholarships may also be awarded to students who have completed one or more years of an approved course. These are known as Later Year scholarships. A small quota, known as Mature Age scholarships, is reserved for persons between the ages of 25 and 30 years.

**Approved Courses**

The courses approved under the Scheme comprise all first degree courses at universities, certain undergraduate diploma courses at universities, certain diploma courses at technical schools, and certain other professional courses. Scholars may be granted benefits for certain combined courses.

A Commonwealth scholar may apply his scholarship to one of the approved courses in any State where the course is available.

**Eligibility**

(a) **Age**

An applicant for an Open Entrance or Later Year scholarship is required to be under the age of twenty-five years on 1 January in the year in which he commences his scholarship.

An applicant for a Mature Age scholarship is required to be not less than twenty-five years of age on 1 January in the year in which he desires the award of a scholarship and not more than thirty years of age on 1 January in the year in which he commenced (or commences) his course.

(b) **Residential Qualifications**

In general, an applicant for an Open Entrance or Later Year scholarship and his parents must be permanently resident (or domiciled) in Australia at the time he is initially awarded a scholarship.

An applicant for a Mature Age scholarship is required to show that he has resided continuously in Australia for a period of two years immediately preceding 1 January in the year in which he desires a scholarship and that he intends to remain in Australia.

(c) **Bonded Students**

An applicant who has signed an agreement to serve with an individual or an organization which has contributed or will contribute to the cost of his education must make satisfactory arrangements to discharge his obligations under that agreement before he can become eligible to accept a Commonwealth Scholarship.

(d) **Previous Study**

In general, a student who has already completed an approved course, or who has completed more than two years of an approved course different from the course to which he desires to apply a Commonwealth Scholarship, is not eligible for selection under the Scheme.

**Selection**

Commonwealth Scholarships are awarded entirely on merit without regard to the means of applicants' parents. Selection is based on the results obtained by the applicant at the examination qualifying for matriculation at one of the Australian universities. However, for certain Technical College courses selection may be made also on the results or exemptions obtained in Technical College examinations.

It is important to note that, regardless of the basis of selection for a Commonwealth Scholarship, a student must meet the requirements for admission to his course, i.e., matriculation, pre-requisite subjects, etc., as prescribed by the institution concerned.
Selection for Later Year scholarships is made on results obtained in approved courses. An applicant for a scholarship in the second or third year of an approved course is required to have completed the first year of his course at the first attempt with or without deferred examinations. If he is entering the fourth or a later year of an approved course, he is required to have made satisfactory progress which does not necessarily involve passing first year at first attempt.

A Mature Age applicant is selected on the basis of his whole academic record. An applicant must show that he has made some continuous endeavour to improve his educational qualifications and that his previous studies have been directed towards the course for which he desires the scholarship.

Benefits

(a) Students awarded Commonwealth Scholarships are entitled to the following benefits, without any means test, for tuition fees, examination fees, matriculation fees, graduation fees and other compulsory fees such as union and sports fees, student's club fees, and non-refundable laboratory fees.

(b) Living Allowances

A scholar undertaking an approved full-time course on a full-time basis may apply for a living allowance which is payable subject to a means test. The maximum living allowance is £234 per annum in the case of a scholar living with his parents and £364 per annum in the case of a scholar living away from his parents. It should be noted that these rates are those current in 1961.

Applications for living allowances must be lodged not later than 31 March. Applications received after that date will be paid only from the date of lodgment.

Progress

A Commonwealth scholar is expected to complete his course in the minimum time without failure. When a scholar fails for the first time in his course, his scholarship is suspended. If he repeats the year successfully at his own expense, his scholarship is restored. If he fails again in any year his scholarship is withdrawn. A scholar who has been awarded a scholarship to commence a course may, in certain circumstances, be granted a deferment. Where there are good grounds, a scholar who has completed part of his course may be allowed to interrupt his scholarship. In special circumstances, transfer from one course to another after commencement of training may be permitted. Only one transfer is allowed. This provision does not refer to change of course before commencement of training.

Employment

Scholars taking full-time courses are required to devote their maximum time to their studies. Employment during term is discouraged. No restriction is placed on employment during vacations but scholars are advised to use the shorter vacations for study purposes. Scholars in receipt of living allowances must not engage in employment without the permission of the Commonwealth Scholarship Branch. Approval may be given where it appears that this employment will not prejudice a scholar’s prospects of success in his course. However, employment in excess of six hours per week will NOT be approved.

Guidance

The knowledge and experience of the officers of the Commonwealth Scholarships Branch are available to assist students and parents in any matters relating to scholarships. Students should not hesitate to seek the help of the Branch when necessary. The consequences of any action taken by a student without advice are his responsibility.

Enquiries concerning admission requirements, enrolment, approval of course and examination entries should be directed to the institution concerned.

All applications and individual enquiries regarding the Scheme should be addressed to—

The Officer-in-Charge,
Commonwealth Scholarships Branch,
University Grounds,
PARKVILLE, N.2.
Applications for Commonwealth Scholarships close on 30 November. Information booklets and application forms can be obtained from:

State Secondary Schools; State Technical Schools; Registered Secondary Schools; Commonwealth Scholarships Branch, University Grounds, Parkville, N.2.

DAFYDD LEWIS TRUST. Under the terms of The Dafydd Lewis Trust, scholarships for University of Melbourne courses other than Theology, Music, Arts and Education are available to boys who have been educated in Victoria at State Elementary, State Secondary or Technical Schools for at least five years before the award of the scholarship. The age limit, reckoned at January 1st, is for Technical School candidates 20 years, and for others 18 years. The parents of the the applicant must not be in receipt of a joint weekly income of more than an amount equivalent to the purchasing power of £6 at the time of the benefactor's death (17/8/41). For the purpose of the 1961 awards the figure was £23/0/5 per week. No holder of one of these scholarships shall be entitled to hold also a Government Senior Scholarship or to reside at any of the University colleges. Renewal of the award annually depends upon satisfactory progress in work. The scholarships provide for payment of University fees and for maintenance of students during the tenure of the scholarships. There is also provision for post-graduate work and study abroad for any student who shows exceptional talent and fitness for the career he proposes to follow. Applications must be lodged by 1st December each year with the Secretary, The Dafydd Lewis Trust, c/o The Trustees, Executors & Agency Co. Ltd., 401 Collins Street, Melbourne, from whom further details may be obtained.

GOWRIE SCHOLARSHIP TRUST FUND. In addition to post-graduate research travelling scholarships and secondary school scholarships, four or five University entrance scholarships, of the value £75 p.a. and tenable for the normal period of a University course, are awarded by the Trustees. Applications for all Scholarships are due on 30th November each year. Further particulars may be obtained from the Secretary, The Gowrie Scholarship Trust Fund, G.P.O., Box 2069, Sydney, N.S.W.

STUDENTS' LOAN FUND. Loans of up to £150 may be made in any one year to matriculated students who are pursuing or intend to pursue a University course, and who cannot proceed without such assistance. Applications for loans must be lodged with the Registrar on the appropriate form not later than 10 February. Applications must be accompanied by evidence of the student's ability and full particulars of his financial position. The borrower must also provide a guarantor who is able and willing to guarantee the repayment of the loan. Provided that the borrower's work is satisfactory, the loan is free of interest during his course. Thereafter interest is chargeable at the rate of 4½ per cent. for five years, and at 5 per cent. on any balance unpaid after that period.

Post-graduate Studies and Graduate Schools

GRANTS FROM RESEARCH FUNDS

Allocation

Grants from the General Research Fund are made by the Professorial Board on the advice of its Standing Research Committee and the Heads of the Departments concerned.

Research Awards

A limited number of research awards is made annually to candidates who are proceeding to higher degrees and who show promise of aptitude for research. Scholars are expected to devote their whole time to research except for such tutoring and demonstrating work as is approved by the Head of the appropriate Department. Awards are made for one year, but may be renewed for additional yearly periods.

Research grants are awarded to selected graduates of Bachelor standing.
Research scholarships are awarded to selected candidates of Master standing who have shown marked ability for research and who are undertaking further research training, as Ph.D. candidates. Research scholarships may be renewed annually for a period not exceeding three years.

**Emoluments of Awards**

For students proceeding to the Degree of Master of Science or Master of Music the value of a research grant is £500 for the first year, and £600 for the second year plus annual compulsory fees. For students proceeding to the Degree of Master of Arts, Master of Agricultural Science, Master of Commerce and Master of Laws, the value of a research grant is £600 plus annual compulsory fees. For students proceeding to the Degree of Master of Engineering Science the value of a research grant is £600 plus annual compulsory fees. The value of research scholarships varies from £700 to £775 per annum, plus fees.

Grants for travel within Australia may be made to research scholars in appropriate cases.

**Research Fellowships**

The University of Melbourne has established five research fellowships not more than two of which may be Senior Fellowships. The Senior Fellowships have the status and salary (£2,480-2,950) of a Senior Lecturer and the Junior Fellowship the status and salary (£1,660-2,360) of a Lecturer. Fellowships may be held for one, two but not more than three years. Travelling allowance is made for a fellow appointed from overseas.

Fellowships will be advertised as they become vacant.

**Travelling Research Scholarships**

Two Travelling Research Scholarships* are offered each year to enable a graduate who shows first-rate capacity for research to undertake approved work at an overseas university, or other suitable institution. The value of the scholarship which is normally awarded for two years, is £900 per annum.

**Research Report**

All persons conducting research in the University, whether under research awards or otherwise, are required to submit, by the end of February in each year, reports on their research during the preceding twelve months to the Heads of their Departments, together with a list of their research publications during that period. Heads of Departments also submit departmental research reports, which are published in the annual *Report of Research and Investigation*.

**Mode of Application**

Applications for research awards and grants must be made on a form designed for the purpose (and available at the Registrar's Office). Applications must be lodged with the Dean of Graduate Studies on or about 8 December. In general, research awards are made as from 1 March.

Further information may be obtained from the Dean of Graduate Studies.

Graduate School in Civil Engineering Full-Time One Year Courses leading to Degree of Master of Engineering Science

Full-time graduate courses leading to the degree of Master of Engineering Science are available in the Department of Civil Engineering. The courses extend over a period of twelve months, approximately half a normal academic year being devoted to formal teaching (advanced lectures, laboratory, and design work) and the remainder of the time to an individual research project. The courses will begin on 12 March 1962.

In 1962 two courses will be offered, one in Structural Engineering and one in Soil Engineering. (A course in Hydraulic Engineering is likely to be offered also. Details of this course will be available on application to Dr. D. H. Trollope, Department of Civil Engineering.) In each course the principle adopted is that of major and minor subjects together with electives. The formal teaching is given in two thirteen-week semesters, with breaks for the normal University vacations. The arrangement of the courses is shown below. In later years courses in Transportation Engineering and Civil Engineering Construction and Management will be added.

* The Aitchison Travelling Scholarship, one year, and the Myer Scholarship, one year, which are worth £900, are also available for research abroad. Together they form a two-year scholarship.
Structural Engineering

First Semester
- Structural Engineering I
- Structural Engineering IA
- Soil Engineering I
- Soil Engineering IA

Second Semester
- Structural Engineering II

Elective
- To be chosen from an appropriate University subject

Soil Engineering

First Semester
- Soil Engineering I
- Soil Engineering IA
- Structural Engineering I
- Structural Engineering IA

Second Semester
- Soil Engineering II

Elective
- as for Structural Engineering course

In the courses in Structural Engineering topics such as the following are included:
- Safety, use of computers, cable structures, prestressing, elasticity, stability.
- Inelastic behaviour of steel structures, including multi-storey and triangulated frames. Concrete structures, including determinate and indeterminate prestressing, shells, pavements and concrete technology. Timber structures.

The courses in Soil Engineering deal with topics such as the following:
- Shear strength and consolidation theory, foundation analysis, stability of earth masses, water flow through soils, pavement, earth dam, foundation and bulkhead design.

The laboratory, tutorial and design work in each subject are appropriate to and supplement the general topics dealt with in the lectures. Formal teaching is concentrated in the earlier part of the course.

Individual Research Projects
Each student carries through an individual research project, the subject of which will be decided early in the course in consultation with the Staff. Students are encouraged to bring forward problems arising from their professional experience.

Standard and Conditions of Entry
The courses are intended primarily for graduates of Honours standard in Civil Engineering of a recognized University. Some experience after graduation is advantageous, but not essential.

It may be possible to arrange in individual cases for completion of the courses to be spread over a period of 2 years on a part-time basis.

Application for Admission
Application for admission should be addressed to the Registrar, The University of Melbourne, Parkville, N.2, Victoria. The following particulars should be included:
1. Name, address and phone number.
2. Age.
3. Formal academic qualifications.
4. Brief review of professional experience and membership of professional institutions (if any).
5. Present position.
6. Which course it is desired to take.
7. Suggestions for research project.

The last date for receipt of applications is FRIDAY, 15 JANUARY 1962.
Fees
The fee for each course is £120. In addition, Registration, Sports, and Union fees amount to about £12.

Examinations
Examinations will be held on the formal work of the course, and each candidate will also be required to submit for examination a thesis on his research project. Successful candidates will be awarded the degree of Master of Engineering Science.
The following table gives a summary of awards other than those described above which are available to Engineering students at entrance, undergraduate, final examination and post-graduate levels. More precise information concerning these awards may be obtained from Appendix 3 in the Calendar or from the person indicated in the table.

In some cases Engineering students compete for awards with students of other faculties. This fact is indicated by an asterisk being placed against the number of scholarships available.

N.B.—Values of awards, as shown below, are approximate only.

### ENTRANCE

<table>
<thead>
<tr>
<th>Field</th>
<th>Title</th>
<th>No.</th>
<th>Value</th>
<th>Tenure</th>
<th>Qualifications</th>
<th>Date for Applications</th>
<th>Enquiries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>Senior Government Scholarships</td>
<td>*50</td>
<td>£40 p.a.</td>
<td>Duration of course.</td>
<td>Matriculation. Not more than 18(\frac{1}{2}) years on 1st January of year in which scholarship to be awarded.</td>
<td>25th Nov.</td>
<td>The Secretary, Education Dept., Treasury Place, East Melbourne.</td>
</tr>
<tr>
<td></td>
<td>Free Places</td>
<td>*80</td>
<td>Tuition fees.</td>
<td>Duration of course.</td>
<td>Matriculation. Students eligible to commence or continue university courses.</td>
<td>25th Nov.</td>
<td>The Secretary, Education Dept., Treasury Place, East Melbourne.</td>
</tr>
<tr>
<td></td>
<td>N.U.A.U.S. Aboriginal Scholarships</td>
<td>?</td>
<td></td>
<td>To be determined by Selection Committee</td>
<td>Qualified to enter degree course.</td>
<td>—</td>
<td>Accounts Department</td>
</tr>
<tr>
<td></td>
<td>John Balfour Memorial Scholarship</td>
<td>1</td>
<td>£70</td>
<td>Duration of course.</td>
<td>Ex-naval personnel or their sons.</td>
<td>—</td>
<td>Accounts Department</td>
</tr>
<tr>
<td></td>
<td>Dick Bursaries</td>
<td>*17</td>
<td>£40 p.a.</td>
<td>Duration of course.</td>
<td>Qualified to enter degree course and needing financial assistance.</td>
<td>14th Feb.</td>
<td>Accounts Department</td>
</tr>
<tr>
<td>Engineering</td>
<td>Moran Bursaries</td>
<td>*2</td>
<td>£70 p.a.</td>
<td>Duration of course.</td>
<td>Nomination by Wesley College and Methodist Ladies' College respectively.</td>
<td>14th Feb.</td>
<td>Accounts Department</td>
</tr>
<tr>
<td></td>
<td>Moran Bursary</td>
<td>1</td>
<td>£70 p.a.</td>
<td>Duration of course.</td>
<td>Qualified to enter course and needing financial assistance.</td>
<td>14th Feb.</td>
<td>Accounts Department</td>
</tr>
<tr>
<td>Field</td>
<td>Title</td>
<td>No.</td>
<td>Value</td>
<td>Tenure</td>
<td>Qualifications</td>
<td>Date for Applications</td>
<td>Enquiries</td>
</tr>
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<td>-----------------------------</td>
</tr>
<tr>
<td>Engineering</td>
<td>Edwin Nonus Smith Scholarship</td>
<td>*1</td>
<td>£50</td>
<td>Duration of course.</td>
<td>Qualified to enter course, of good character and needing financial assistance.</td>
<td>14th Feb.</td>
<td>Accounts Department</td>
</tr>
<tr>
<td></td>
<td>Thompson Scholarship</td>
<td>1</td>
<td>£20 p.a.</td>
<td>Duration of course.</td>
<td>Qualified to enter course and in need of financial assistance. Preference to sons of residents of Castlemaine.</td>
<td>14th Feb.</td>
<td>Accounts Department</td>
</tr>
<tr>
<td></td>
<td>War Bursaries *6</td>
<td></td>
<td>Tuition fees.</td>
<td>Duration of course.</td>
<td>Child of person killed or disabled in wars of 1914-18 or 1939-45.</td>
<td>14th Feb.</td>
<td>Accounts Department</td>
</tr>
<tr>
<td><strong>UNDERGRADUATE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unrestricted</td>
<td>Aitchison Scholarships *2</td>
<td></td>
<td>£70 each.</td>
<td>One year, with a possible extension to three years.</td>
<td>Male undergraduate, not more than 22 years old, with at least one year of degree course completed and in need of assistance.</td>
<td>22nd Jan.</td>
<td>Accounts Department</td>
</tr>
<tr>
<td>Applied Mathematics</td>
<td>Exhibition *1</td>
<td></td>
<td>£15</td>
<td>—</td>
<td>Awarded on work of year.</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Part I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cement and Concrete</td>
<td>Gibson Prize</td>
<td>1</td>
<td>£11</td>
<td>—</td>
<td>Engineering student showing ability in problems associated with the manufacture of Portland cement and concrete.</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>Australian Atomic Energy</td>
<td>10</td>
<td>£300 (plus £25 annual increase) plus allowance for books and living away from</td>
<td>Duration of course</td>
<td>Male undergraduate enrolled in approved course leading to degree in Engineering or Science.</td>
<td>—</td>
<td>Secretary, Aust. Atomic Energy Commission, Box 5343, G.P.O., Sydney</td>
</tr>
<tr>
<td>Field</td>
<td>Title</td>
<td>No.</td>
<td>Value</td>
<td>Tenure</td>
<td>Qualifications</td>
<td>Date for Applications</td>
<td>Enquiries</td>
</tr>
<tr>
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</tr>
<tr>
<td>Chemistry Part I</td>
<td>Exhibition</td>
<td>1</td>
<td>£15</td>
<td></td>
<td>Awarded at Honour Examination.</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>(Engineering course)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemistry Part IA</td>
<td>Dwight Prize</td>
<td>*1</td>
<td>£25</td>
<td></td>
<td>Awarded at Honour Examination in first year B.Sc.</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>Cable Makers’ Association Pr</td>
<td>1</td>
<td>£10/10/-</td>
<td></td>
<td>Best essay on an approved electrical subject by a Fourth Year student.</td>
<td>30 Sept.</td>
<td>Department of Electrical Engineering</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>I.R.E. Fisk Scholarship Award</td>
<td>1</td>
<td>£10</td>
<td></td>
<td>Awarded to a student in the fourth year of the Electrical Engineering Degree course.</td>
<td>—</td>
<td>Department of Electrical Engineering</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>McDonald Memorial Prize</td>
<td>1</td>
<td>£52</td>
<td></td>
<td>Awarded to a full-time student in the third year of the course for B.E.E.</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Electrical Engineering I(E)</td>
<td>Dixson Scholarship</td>
<td></td>
<td>£20</td>
<td></td>
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<td>John Monash Exhibition</td>
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<td>Engineering</td>
<td>John Balfour Memorial</td>
<td>1</td>
<td>£85</td>
<td>Duration of course.</td>
<td>Ex-naval personnel or their sons.</td>
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<td></td>
<td>Guy Bradshaw Scholarship</td>
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<td></td>
<td>Oscar Weigel Trust</td>
<td>2</td>
<td>up to £200 p.a.</td>
<td>Up to five years.</td>
<td>Students qualified to enter second or later years of Engineering course and not more than 25 years of age.</td>
<td>26 Jan.†</td>
<td>Secretary, Technical Branch</td>
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*Students from a Technical School whose final results are not available by this date must enclose a certificate/s covering the first three years of their course, together with a record of subjects taken in the final year.
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<th>Field</th>
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<th>Tenure</th>
<th>Qualifications</th>
<th>Date for Applications</th>
<th>Enquiries</th>
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<td>Engineering Part I</td>
<td>Howard Smith Exhibition</td>
<td>*1</td>
<td>£20</td>
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<td>Awarded at Honour Examination.</td>
<td>—</td>
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<td>Engineering Design</td>
<td>A. T. Danks Exhibition</td>
<td>1</td>
<td>£20</td>
<td>—</td>
<td>Student taking course for Bachelor of Civil Engineering.</td>
<td>—</td>
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<tr>
<td>Engineering Mathematics</td>
<td>Exhibition</td>
<td>1</td>
<td>£15</td>
<td>—</td>
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<td>Fluid Mechanics A</td>
<td>W. M. McPherson Exhibition</td>
<td>1</td>
<td>£20</td>
<td>—</td>
<td>Awarded at Honour Examination.</td>
<td>—</td>
<td>—</td>
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<tr>
<td>Geology Part I</td>
<td>Argus Exhibition</td>
<td>*1</td>
<td>£15</td>
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<td>Geology Part II</td>
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<td>Human Relations</td>
<td>Professor Julian King Prize</td>
<td>1</td>
<td>£15 approx.</td>
<td>—</td>
<td>Awarded for an essay or thesis on human relations by student enrolled for Fourth Year in Engineering. Subjects to be approved and submissions examined by Professor in charge of Industrial Engineering.</td>
<td>31st Aug. Secretary, Technical Branch, Registrar’s Office.</td>
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<tr>
<td>Industrial Chemistry</td>
<td>Grimwade Prize</td>
<td>*1</td>
<td>£100 approx.</td>
<td>—</td>
<td>Undergraduate of Melbourne University; non-matriculated student who has done three terms’ laboratory work.</td>
<td>20th Feb. Secretary, Faculty of Science.</td>
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<td>1</td>
<td>Books (£2/7/-)</td>
<td>—</td>
<td>Candidate placed first in the subject.</td>
<td>—</td>
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<td>Amount</td>
<td>Duration / Conditions</td>
<td>Application Date</td>
<td>Department/Person</td>
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<tr>
<td>Mathematics</td>
<td>Wyseleskie Scholarship *1</td>
<td>£170 p.a.</td>
<td>To last day of March in the fifth year after the year in which the scholar matriculated.</td>
<td>28th July</td>
<td>Professor of Mathematics.</td>
<td></td>
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</tr>
<tr>
<td>Mechanical Engineering</td>
<td>Michell Prize</td>
<td>1 Books (£6)</td>
<td>Student pursuing the fourth year of a course in Engineering.</td>
<td>29th Oct.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mechanical Engineering</td>
<td>Wright Prize</td>
<td>£17/6/8</td>
<td>Awarded at Honour Examination in the subject.</td>
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<tr>
<td>Mechanical Engineering</td>
<td>Dixson Scholarship Part I</td>
<td>£15</td>
<td>Awarded at Honour Examination in the subject.</td>
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<tr>
<td></td>
<td>Australian Atomic Energy Commission</td>
<td>10 £300 (plus £25 annual increase) plus allowance for books and living away from home</td>
<td>Duration of course</td>
<td>Male undergraduate enrolled in approved course leading to degree in Engineering or Science.</td>
<td>Secretary, Aust. Atomic Energy Commission, Box 5343, G.P.O., Sydney</td>
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<tr>
<td>Metallurgy</td>
<td>Balfour Memorial Scholarship</td>
<td>£85 p.a.</td>
<td>Duration of course. Ex-naval personnel or their sons.</td>
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<td>Accounts Department</td>
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<td></td>
<td>Mining and Metallurgical Bursaries ?</td>
<td>£50 p.a.</td>
<td>From third year of the course. British students who have completed or received credit for the first two years of the B.E. course in Mining, Metallurgy or Chemistry.</td>
<td>31st Dec.</td>
<td>Professor of Metallurgy.</td>
<td></td>
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<tr>
<td>Metallurgy</td>
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<td>£15</td>
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<td>Field</td>
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<tr>
<td>Engineering Part I</td>
<td>Howard Smith Exhibition</td>
<td>*1</td>
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<tr>
<td></td>
<td>Wright Prize</td>
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<td>£20</td>
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<tr>
<td>Geology Part I</td>
<td>Argus Exhibition</td>
<td>*1</td>
<td>£15</td>
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<tr>
<td>Geology Part II</td>
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<td>£20</td>
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<td>Michell Prize</td>
<td>Books (£6)</td>
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<td>Student pursuing the fourth year of a course in Engineering.</td>
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<td>Mechanical Engineering Part I</td>
<td>Wright Prize</td>
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<tr>
<td>Mechanical Engineering Part II</td>
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<td>£15</td>
<td></td>
<td>Awarded at Honour Examination in the subject.</td>
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<td></td>
<td>Australian Atomic Energy Commission Scholarships</td>
<td>£300 (plus £25 annual increase) plus allowance for books and living away from home</td>
<td>Duration of course.</td>
<td>Male undergraduate enrolled in approved course leading to degree in Engineering or Science.</td>
<td>Secretary, Aust. Atomic Energy Commission, Box 5343, G.P.O., Sydney</td>
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<td>Metallurgy</td>
<td>Mining and Metallurgical Bursaries</td>
<td>£50 p.a.</td>
<td>From third year of the course.</td>
<td>British students who have completed or received credit for the first two years of the B.E. course in Mining, Metallurgy or Chemistry.</td>
<td>31st Dec.</td>
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<td>Metallurgy Part I</td>
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<td>£50 p.a.</td>
<td>From third year of the course.</td>
<td>British students who have completed or received credit for the first two years of the B.E. course in Mining, Metallurgy or Chemistry.</td>
<td>31st Dec.</td>
<td>Head of Mining Department.</td>
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<td>Mining Part I</td>
<td>George Lansell Exhibition</td>
<td>*1</td>
<td>£20</td>
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<td>Physics Part I</td>
<td>Dwight's Prize</td>
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<td>£25</td>
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<td>Properties of Engineering Materials</td>
<td>Exhibition</td>
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<td>£15</td>
<td></td>
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<td>Pure Mathematics Part I</td>
<td>John MacFarland Exhibition</td>
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<td>£15</td>
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<td>Awarded on the work of the year.</td>
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<td>*1</td>
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<td>Awarded on the work of the year.</td>
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<td>Strength of Materials</td>
<td>Herbert Brookes Exhibition</td>
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<td>£20</td>
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<tr>
<td>Surveying Part I</td>
<td>H. B. Howard Smith Exhibition</td>
<td>*1</td>
<td>£20</td>
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<td>Surveying Part II</td>
<td>Exhibition</td>
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<td>£20</td>
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FINAL HONOUR EXAMINATION OR FINAL EXAMINATION

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<td>Final Honours</td>
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<td></td>
<td>Final Honours of Bachelor of Engineering or three completed years of a course in Science.</td>
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<tr>
<td>Research</td>
<td>One year</td>
<td></td>
<td>Four completed years of a course in Engineering or three completed years of a course in Science.</td>
</tr>
<tr>
<td>Scholarship</td>
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<td>Four completed years of a course in Engineering or three completed years of a course in Science.</td>
</tr>
<tr>
<td>Argus Scholarship</td>
<td></td>
<td>£1</td>
<td>Four completed years of a course in Engineering or three completed years of a course in Science.</td>
</tr>
<tr>
<td>Disson Scholarship</td>
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<td>Stephen Prize</td>
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<tr>
<td>Base Memorial</td>
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<td>Four completed years of a course in Engineering or three completed years of a course in Science.</td>
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<tr>
<td>Dixon Scholarship</td>
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<td>Four completed years of a course in Engineering or three completed years of a course in Science.</td>
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<tr>
<td>Melvin Memorial</td>
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<td>Stawell Scholarship</td>
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<td>Four completed years of a course in Engineering or three completed years of a course in Science.</td>
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</table>

Date for Applications: 26 Jan.

Enquiries: Professor of Civil Engineering.

Secretary, Faculty of Engineering.

Technical Branch of Registrar's Office.
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<th>Field</th>
<th>Title</th>
<th>No.</th>
<th>Value</th>
<th>Tenure</th>
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<th>Date for Applications</th>
<th>Enquiries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical Engineering</td>
<td>Dixson Scholarship</td>
<td>1</td>
<td>£20</td>
<td>—</td>
<td>Awarded at the Final Honour Examination of the course for the degree of Bachelor of Mechanical Engineering.</td>
<td>—</td>
<td>Professor of Mechanical Engineering.</td>
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<tr>
<td></td>
<td>Rennie Memorial Prize</td>
<td>1</td>
<td></td>
<td>—</td>
<td>Awarded at Final Hon. Examination in Mechanical Engineering.</td>
<td>—</td>
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</tr>
<tr>
<td>Metallurgical Engineering</td>
<td>Dixson Scholarship</td>
<td>1</td>
<td>£20</td>
<td>—</td>
<td>Awarded at the Final Honour Examination of the course for the degree of Bachelor of Metallurgical Engineering.</td>
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<td>Professor of Metallurgy.</td>
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<td>Mining Engineering</td>
<td>Lansell Scholarship</td>
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<td>£30</td>
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<td>Head of Department.</td>
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<tr>
<td>Unrestricted</td>
<td>Aitchison Traveling Scholarship</td>
<td>*1</td>
<td>£700</td>
<td>One year, with a possible extension to two years.</td>
<td>Male graduate of not more than three years’ standing.</td>
<td>15th Jan.</td>
<td>Dean of Graduate Studies.</td>
</tr>
<tr>
<td></td>
<td>Bartlett Research Scholarships</td>
<td>*5</td>
<td>£100 each.</td>
<td>One year, with a possible extension to five years.</td>
<td>Graduates trained in research.</td>
<td>30th Nov.</td>
<td>Dean of Graduate Studies.</td>
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<tr>
<td></td>
<td>British Council Scholarships</td>
<td>*?</td>
<td>Maintenance and study.</td>
<td>One or two years.</td>
<td>Successful completion of a degree-course or an equivalent professional qualification.</td>
<td>-</td>
<td>Mr. S. Sheffield, Registrar’s Office.</td>
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<tr>
<td></td>
<td>British Council Travel Grants</td>
<td>*?</td>
<td>Tourist return sea passage.</td>
<td>-</td>
<td>(a) University teachers or officers; (b) Distinguished scholars or scientists; (c) Post-graduate research workers receiving research grants.</td>
<td>-</td>
<td>Mr. S. Sheffield, Registrar’s Office.</td>
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<td>£500 stg.</td>
<td>-</td>
<td>Graduate.</td>
<td>30th Nov.</td>
<td>The Trustees, Gowrie Scholarship Trust Fund, Box 2069, G.P.O., Sydney, N.S.W.</td>
</tr>
<tr>
<td></td>
<td>Rhodes Scholarship</td>
<td>*1</td>
<td>£600 stg. p.a.</td>
<td>Two years, but may be extended for a further year.</td>
<td>Unmarried British subjects between 19 and 25 with at least five years’ domicile in Australia or New Zealand who have completed at least two years’ study at an Australian or New Zealand university.</td>
<td>1st Sept.</td>
<td>Mr. S. Sheffield, Registrar’s Office.</td>
</tr>
<tr>
<td></td>
<td>Services Canteens Trust Fund Scholarships (for study abroad)</td>
<td>*?</td>
<td>Maximum £800 p.a.</td>
<td>Depends on the proposed course of study.</td>
<td>Children of persons who, between 1939 and 1947, served in the armed forces or women’s services.</td>
<td>2nd Nov.</td>
<td>General Secretary, Services Canteens Trust Fund, Victoria Barracks, Melbourne.</td>
</tr>
<tr>
<td>Field</td>
<td>Title</td>
<td>Tenure</td>
<td>Qualifications</td>
<td>Value</td>
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<tr>
<td>Engineering</td>
<td>Sir Arthur Sims Travelling Scholarship</td>
<td>Two years</td>
<td>Graduate of Australian university or whose parents have been resident in Australia for seven years.</td>
<td>£670 p.a.</td>
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<tr>
<td></td>
<td>Taft Interchange Scholarship</td>
<td>One year</td>
<td>Graduate desiring to study at University of Melbourne or its affiliated institutions.</td>
<td>£400 p.a.</td>
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<tr>
<td></td>
<td>Argus Research Scholarship</td>
<td>One year</td>
<td>(a) Final Honours in Engineering at University of Melbourne; (b) Honours at University of Melbourne; (c) Graduates of other universities with at least second class honours.</td>
<td>£50 p.a.</td>
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<tr>
<td></td>
<td>Discus Research Scholarship</td>
<td>One year</td>
<td>(a) Final Honours in Engineering at University of Melbourne; (b) Honours at University of Melbourne; (c) Graduates of other universities with at least second class honours.</td>
<td>£170 p.a.</td>
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<tr>
<td></td>
<td>I.C.I. Fellowships</td>
<td>Two years</td>
<td>British Commonwealth subjects who have qualified for Master's degree with at least second class honours.</td>
<td>£750 p.a. approx.</td>
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</table>

<table>
<thead>
<tr>
<th>Field</th>
<th>Title</th>
<th>Tenure</th>
<th>Qualifications</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>General Secretary, Services Canteens and Victoria Barracks, Melbourne</td>
<td>Available in 1960</td>
<td>Dean of Graduate Studies, Faculty of Engineering.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dean of Graduate Studies</td>
<td>19th Feb.</td>
<td>Secretary, Faculty of Engineering.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dean of Graduate Studies</td>
<td>26th Jan.</td>
<td>Secretary, Faculty of Engineering.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dean of Graduate Studies</td>
<td>30th Nov.</td>
<td>Secretary, Faculty of Engineering.</td>
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<thead>
<tr>
<th>Field</th>
<th>Title</th>
<th>Tenure</th>
<th>Qualifications</th>
<th>Value</th>
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<tbody>
<tr>
<td>Engineering</td>
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</table>

46
<table>
<thead>
<tr>
<th>Field</th>
<th>Title</th>
<th>No.</th>
<th>Value</th>
<th>Tenure</th>
<th>Qualifications</th>
<th>Date for Applications</th>
<th>Enquiries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>Melvin Memorial Scholarship</td>
<td>*1</td>
<td>£70</td>
<td>One year, but may be extended.</td>
<td>(a) Final Honours in Engineering at University of Melbourne; (b) Honours in</td>
<td>26 Jan.</td>
<td>Secretary, Faculty of Engineering.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Third Year Science at University of Melbourne; (c) Graduates of Engineering or</td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>Science at University of Melbourne of not less than one year's standing; (d)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Graduates in Engineering or Science of some other university.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shell Scholarship</td>
<td></td>
<td>*2</td>
<td>£750 stg. p.a.</td>
<td>Two years.</td>
<td>Male British subject under 25 who has been domiciled in Australia for at least</td>
<td>31st Oct.</td>
<td>The Office Manager, Shell Co. of Aust. Ltd., Melbourne.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>five years. Honours in Science or Engineering degree, and preferably completed</td>
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<td></td>
<td></td>
<td></td>
<td>one year of post-graduate research.</td>
<td></td>
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</tr>
<tr>
<td>Stawell Scholarship</td>
<td></td>
<td>*1</td>
<td>£75</td>
<td>One year.</td>
<td>(a) Final Honours in Engineering at University of Melbourne; (b) Honours in</td>
<td>26 Jan.</td>
<td>Secretary, Faculty of Engineering.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Third Year Science at University of Melbourne; (c) Graduates of Engineering or</td>
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<td></td>
<td></td>
<td></td>
<td>Science at University of Melbourne of not less than one year's standing; (d)</td>
<td></td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Graduates in Engineering or Science of some other university.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Chemistry</td>
<td>Grimwade Prize</td>
<td>*1</td>
<td>£100 approx.</td>
<td>—</td>
<td>Graduate of any university in the British Empire.</td>
<td>19th Feb.</td>
<td>Secretary, Faculty of Science.</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>Vacuum Oil Company Research Scholarship</td>
<td>*1</td>
<td>£750</td>
<td>One year, but may be extended for a further two years.</td>
<td>Graduate in Engineering or Science of an Australian university with a good scholastic record and aptitude for research.</td>
<td>30th Nov.</td>
<td>Dean of Graduate Studies.</td>
</tr>
<tr>
<td>Field</td>
<td>Title</td>
<td>No.</td>
<td>Value</td>
<td>Tenure</td>
<td>Qualifications</td>
<td>Date for Applications</td>
<td>Enquiries</td>
</tr>
<tr>
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</tr>
<tr>
<td>Metallurgy</td>
<td>I.C.I. Fellowship</td>
<td>*2</td>
<td>£750 p.a. approx.</td>
<td>Two years</td>
<td>British Commonwealth subjects who have qualified for Master's degree with at least second class honours.</td>
<td>30th Nov.</td>
<td>Dean of Graduate Studies.</td>
</tr>
<tr>
<td></td>
<td>Scholarship</td>
<td>*1</td>
<td>£40</td>
<td>—</td>
<td>Awarded at M.Sc. examination to a candidate of not more than 3½ years' standing since the completion of the B.Sc. course.</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Consolidated Zinc Proprietary Ltd.</td>
<td>1</td>
<td>£500 p.a.</td>
<td>Up to three years</td>
<td>Graduates in Metallurgy.</td>
<td>30th Nov.</td>
<td>Professor of Metallurgy.</td>
</tr>
<tr>
<td>Mining</td>
<td>I.C.I. Fellowships</td>
<td>*2</td>
<td>£750 p.a. approx.</td>
<td>Two years</td>
<td>British Commonwealth subjects who have qualified for Master's degree with at least second class honours.</td>
<td>30th Nov.</td>
<td>Dean of Graduate Studies.</td>
</tr>
<tr>
<td></td>
<td>George Lansell Research Scholarship</td>
<td>*1</td>
<td>£50</td>
<td>One year.</td>
<td>Graduate in Engineering or Science with aptitude for research.</td>
<td>27th Jan.</td>
<td>Dean of Graduate Studies</td>
</tr>
<tr>
<td></td>
<td>Vacuum Oil Company Research Scholarship</td>
<td>*1</td>
<td>£750</td>
<td>One year, but may be extended for a further two years.</td>
<td>Graduate in Engineering or Science of an Australian university with a good scholastic record and aptitude for research.</td>
<td>30th Nov.</td>
<td>Dean of Graduate Studies</td>
</tr>
<tr>
<td>Radio Science</td>
<td>Ormsby Hamilton Prize</td>
<td>1</td>
<td>£10</td>
<td>—</td>
<td>Candidates who are pursuing the fourth year of a course for B.E. in Electrical Engineering or B.Sc. (Hons.) or B.App.Sc. or candidates for M.Sc., M.E. or M.Eng.Sc. Prize awarded for best thesis in this subject.</td>
<td>1st Oct.</td>
<td>Secretary, Faculty of Engineering.</td>
</tr>
</tbody>
</table>
REGULATION 3.44—DEGREE OF MASTER OF ENGINEERING SCIENCE

[Note.—Pursuant to its wartime powers the Professorial Board on the recommendation of the faculty of Engineering has resolved that holders of the bachelor of Engineering Science degree conferred under the special wartime provisions of Chap. III, Reg. XLII, will not be permitted to proceed with the master of Engineering Science degree without the special permission of the faculty.]

1. Candidates for the degree of master of Engineering Science shall subsequently to the completion of the course for the degree of bachelor of Engineering pursue for not less than one year advanced studies and research at the Engineering and/or Metallurgical Laboratories of the University¹ and shall thereafter present a thesis based on original work in some branch of Engineering Science approved by the faculty.

2. The thesis shall be examined in the manner prescribed in regulation 4.6 for the examination of theses for higher degrees. The examination shall be for pass and honours.

3. Candidates who have fulfilled the conditions prescribed and have satisfied the examiners and are bachelors of at least one year’s standing of some branch of Engineering or of Engineering Science may be admitted to the degree of master of Engineering Science.

REGULATION 3.45—DEGREES OF BACHELOR OF ENGINEERING AND BACHELOR OF SURVEYING

1. A candidate for the degree of bachelor of Engineering or the degree of bachelor of Surveying shall, after matriculating, pursue his studies for four Years.

2. The subjects of the course for each of these degrees, and the Years to which they pertain, shall be as prescribed by the Professorial Board on the recommendation of faculty.

3. During each Year, and between Years of the course, a candidate shall perform laboratory, drawing office and field work, attend demonstrations and excursions, and undergo experience of such an extent and in such a manner as is prescribed from time to time by the Professorial Board on the recommendation of the faculty. Subject to dispensation by the faculty in special cases no candidate shall be admitted to examination in a subject in which he has not so conformed unless he satisfy the faculty that he has had appropriate training elsewhere.

4. The faculty may allow a candidate to substitute for any subject of his course another subject or subjects of a University course which in its opinion is of at least equal standard. A candidate may compete for the exhibition, scholarship or prize in any subject which he is allowed so to substitute.

5. (a) To pass a Year of a course a candidate shall comply with one of the following conditions—

¹ With the permission of the faculty part of the work may be carried out in the laboratories of some other organization providing the whole of the work is under the control of the head of the University department concerned.
(i) he shall pass at an annual examination in or obtain credit for each subject of that Year; or
(ii) he shall be passed by the faculty in the Year of the course as a whole. In awarding such pass the faculty shall take into account his performance in all subjects in accordance with principles determined by the faculty from time to time and approved by the Professorial Board. A candidate passed by the faculty in the Year as a whole who has not passed at the annual examination in or obtained credit for any particular subject shall not be recorded as having passed in that subject, but shall be allowed to proceed with subjects of a later Year of the course for which a pass in such subjects may be pre-requisite.

(b) Except where otherwise provided or where special permission is given by the faculty a student shall pass one Year of the course in accordance with the preceding sub-section before being allowed to proceed to any subject of the succeeding Year of the course. In no case shall he proceed to any subject of the Third Year unless he has passed the First Year, nor to any subject of the Fourth Year unless he has passed the Second Year. But the holder of a recognized Technical College diploma entering on the Second Year of the course may, without special permission, include with subjects of the Second Year not more than one First Year subject for which he has not obtained credit.

(c) A candidate who before the beginning of any academic year has not passed a Year of the course in accordance with sub-section (a) hereof must take or repeat in that academic year or in a subsequent year the whole of that Year of the course which he has not completed, unless special permission to do otherwise is granted by the faculty.

(d) When a candidate’s course has been varied in accordance with the provisions of section 4, the faculty shall define what is the content of the student’s Year for the purpose of this section.

6. A candidate who obtains honours in any subject of a Year may be awarded a prize, exhibition or scholarship in that subject only if at the examination concerned he has passed that Year in accordance with the provisions of section 5.

7. The following prizes, exhibitions and scholarships may be awarded at the honour examinations and shall be open for competition to candidates who comply with the requirements of section 6—

<table>
<thead>
<tr>
<th>Subject</th>
<th>Prize/Exhibition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry part I (Engineering course)</td>
<td>Exhibition of £15</td>
</tr>
<tr>
<td>Engineering Mathematics part I</td>
<td>Exhibition of £15</td>
</tr>
<tr>
<td>Physics part I (Engineering course)</td>
<td>Exhibition of £15</td>
</tr>
<tr>
<td>Mechanical Engineering part I</td>
<td>Wright prize of £20</td>
</tr>
<tr>
<td>Engineering Design (Mechanical Engineering course)</td>
<td>Wright prize of £20</td>
</tr>
<tr>
<td>Metallurgy part II (E.)</td>
<td>Exhibition of £20</td>
</tr>
</tbody>
</table>
Surveying part I .......................... H. B. Howard Smith exhibition of £20
Surveying part II and part IIA  
Electrical Engineering part I (E.) ...................... Dixson scholarship of £15
Mining part I .................................... George Lansell exhibition of £20
Engineering part I and part IA ...................... H. B. Howard Smith Exhibition of £20
Strength of Materials ............................. Herbert Brookes exhibition of £20
Properties of Engineering Materials .......... Exhibition of £15
Fluid Mechanics A ................................ W. M. McPherson exhibition of £20
Electrical Engineering part II (E.) ................. John Monash exhibition of £20
Engineering Design (Civil Engineering course) .......... A. T. Danks exhibition of £20
Mechanical Engineering part II .................. Dixson scholarship of £15
Engineering Mathematics part III .......... Dixson scholarship of £20

Candidates may also compete for the following prizes, exhibitions and scholarships—

Open for competition in the course for the degree of bachelor of Arts—
Pure Mathematics part I ........................ John MacFarland exhibition of £15
Applied Mathematics part I .............. Dixson scholarship of £20
Pure Mathematics part II .................... Dixson scholarship of £20

Open for competition in the course for the degree of bachelor of Science—
Physics part I .......................... Dwight's prize of £25
Physics part II .......................... Dixson scholarship of £20
Chemistry part I .......................... Dwight's prize of £25
Chemistry part II .......................... Exhibition of £20
Geology part II .......................... Exhibition of £20
Metallurgy part I .......................... Dixson scholarship of £15

8. A candidate who has passed or obtained credit for each Year of the course, and completed the work prescribed pursuant to section 3, may be admitted to the appropriate degree.

9. There shall be a final honour examination in each course. A candidate who has passed or obtained credit for the first three Years of the course and completed the work prescribed pursuant to section 3, and who has during his Fourth Year taken all the subjects required for the Fourth Year of his course and performed in each such subject the special work prescribed for final honour candidates may be examined in the final honour subjects designated for that purpose in the details of subjects.

A candidate who is awarded final honours shall thereby complete the
Fourth Year. A candidate for final honours who is not classed may, if the examiners so certify, be awarded a pass in any or all of the subjects of the final honour examination.

10. At the final honour examinations the following scholarships shall be open for competition—

- Civil Engineering ....... Argus scholarship of £25
- Mining Engineering ..... George Lansell scholarship of £30
- Mechanical Engineering ..... Dixson scholarship of £20
- Electrical Engineering ..... Dixson scholarship of £20
- Metallurgical Engineering ..... Dixson scholarship of £20

11. Notwithstanding anything to the contrary, candidates who have completed the course for and been admitted to the degree of bachelor of Engineering Science under conditions prescribed by alterations of the Engineering courses made pursuant to Special Regulation 1939-41 (National Emergency) may be admitted to the degree of bachelor of Engineering on completing such further work as the faculty may from time to time prescribe.

No candidate shall be admitted to a degree under the provisions of this section unless he shall previously have surrendered the degree of bachelor of Engineering Science.

No fee other than a certificate fee of one guinea shall be payable for admission to a degree under the provisions of this section.

12. Notwithstanding anything to the contrary hereinbefore contained, any person who is enrolled, under the regulations in force on or before the 31st May, 1958, as a candidate for one of the following degrees, namely, bachelor of Civil Engineering, bachelor of Mining Engineering, bachelor of Mechanical Engineering, bachelor of Electrical Engineering, bachelor of Metallurgical Engineering, bachelor of Chemical Engineering or bachelor of Agricultural Engineering, may, if he complies with the regulations which were in force on or before the 31st May, 1958, be admitted—

(i) on or before 31st October, 1959, to the degree for which he enrolled, or
(ii) after 31st October, 1959, to the degree of bachelor of Engineering.

[Temporary Regulation]

1. Notwithstanding anything to the contrary, a person who—

(a) qualified during the academic year 1958 for the degree of bachelor of Civil Engineering;

(b) qualifies during the academic year 1959 for the degree of bachelor of Mining Engineering in accordance with the regulations in force on the 31st May, 1958; and

(c) has been admitted to the degree of bachelor of Civil Engineering; may be admitted to the degree of bachelor of Mining Engineering.

2. This regulation shall expire on the 31st December, 1960.]
REGULATION 3.46—DEGREES OF MASTER OF ENGINEERING AND MASTER OF SURVEYING

1. A person may be a candidate\(^1\) for the degree of master of Engineering if he is—

(a) a bachelor in some branch of Engineering with standing of not less than three years or such longer standing as may be required by the faculty of Engineering, or

(b) a graduate in Engineering Science or in some other faculty in either case with standing of not less than seven years or such longer standing as may be required by the faculty of Engineering and he has produced evidence satisfactory to the faculty of Engineering that he has had adequate training and experience in Engineering.

2. A person may be a candidate\(^1\) for the degree of master of Surveying if he is a bachelor of Surveying with standing of not less than three years.

3. (1) A candidate may be admitted to the degree of master of Engineering who—

(a) has produced evidence satisfactory to the faculty that, since graduating in the manner required by section 1, he has spent the minimum period hereinafter defined in acquiring proficiency in that branch of Engineering in which he is presenting material for examination; and

(b) has presented:

(i) a thesis or a written report, or

(ii) original designs of engineering work with which he has been connected in a responsible capacity, such designs being accompanied by all necessary calculations and specifications, or

(iii) published work in Engineering or such unpublished work in Engineering as he deems appropriate or both.

(2) The minimum period referred to in sub-section 3(1)(a) hereof shall be—

(a) where the candidate presents for examination material appro-

1 When candidates are graduates of other universities, the faculty has resolved that—

(a) The status of bachelor of Engineering or bachelor of Surveying may be granted for the purpose of proceeding to the degrees of master of Engineering or master of Surveying respectively. Applications for such status will not be considered until the candidate has resided in Victoria for at least five years.

(b) The status of bachelor, when granted, will become effective as from the date of the candidate's commencing residence in Victoria, or obtaining the equivalent of a bachelor's degree in Engineering or Surveying, as appropriate, whichever is the later.

(c) Sections 3 1(a) and 4 1(a) of the regulation will, in such cases, be interpreted as requiring the candidate to have produced evidence satisfactory to the faculty that since the date from which the status of bachelor became effective he has spent not less than five years on approved engineering work or surveying work, as appropriate, in Victoria, or on work associated closely with some Victorian engineering firm or authority.

(d) During the period of five years prescribed in section (c) above the candidate will be expected to take steps to associate himself with this University, by research work or other work done at the University, or in some other manner approved by the faculty,
priate to the branch of Engineering in which he was admitted to
the degree of bachelor, and has obtained first or second class
final honours in the course for that degree, three years;
(b) where the candidate presents for examination material appro-
priate to the branch of Engineering in which he was admitted to
the degree of bachelor, and has not obtained first or second class
final honours in the course for that degree, five years;
(c) otherwise such period as may be determined by the faculty of
Engineering.

(3) All or part of any time spent in advanced studies or research or
both, may, if the work is completed to the satisfaction of the faculty and
is approved by the faculty as being appropriate to the field in which the
candidate presents material for examination, be deemed by the faculty to
be time spent for the purposes of sub-section 3(1)(a) hereof.
(4) Together with material of the type described in sub-section 3(1)(b) hereof a candidate may present material pertaining to advanced
studies or research or both approved by the faculty as appropriate to the
topic presented for examination.
(5) The material presented must be acceptable to the faculty as
appropriate to Engineering, and must be satisfactory to the examiners
ominated by the faculty.
(6) No thesis, report, design, published or unpublished work shall
be considered satisfactory unless it shows evidence of capacity for the
development or application of scientific principles and methods, acquaint-
ance with the work of others in similar fields and ability in the presenta-
tion of ideas.

4. (1) A candidate who is a bachelor of Surveying may be admitted
to the degree of master of Surveying if he—
(a) has produced evidence satisfactory to the faculty that since
obtaining his degree of bachelor he has spent not less than five
years in acquiring proficiency in Surveying provided that a
candidate who has obtained first or second class honours in
Surveying part III and Photogrammetry in his Surveying course
the minimum period shall be three years; and
(b) has presented:
(i) a thesis or a written report on his practical experience (with
necessary plans), or
(ii) published work in Surveying or such unpublished work in
Surveying as he deems appropriate or both.
(2) The material presented must be appropriate to Surveying, must
be accepted by the faculty and must be satisfactory to examiners nom-
inated by the faculty.
(3) No thesis, report, published or unpublished work shall be con-
sidered satisfactory unless it shows evidence of capacity for the develop-
ment or application of scientific principles and methods, acquaintance
with the work of others in similar fields and ability in the presentation
of ideas.

5. A candidate may not submit for examination work in respect of
which he has already qualified for a degree in any university, or, without
the permission of the faculty, work which he has previously submitted for any such degree.

6. The written report or original designs of Engineering or Surveying work submitted by any candidate under this regulation shall be examined in the manner prescribed in regulation 4.6 for the examination of theses for higher degrees.

7. Notwithstanding anything to the contrary, any person who is accepted, under the regulations in force on or before the 31st May, 1958, as a candidate for one of the following degrees, namely, master of Civil Engineering, master of Mining Engineering, master of Metallurgical Engineering, master of Electrical Engineering, master of Mechanical Engineering or master of Chemical Engineering, may, if he complies with the regulations which were in force on the date of his being so accepted, be admitted—

(a) on or before 31st December, 1959, to the degree for which his candidature was accepted or the degree of master of Engineering, whichever he may elect, or
(b) after 31st December, 1959, to the degree of master of Engineering.

REGULATION 3.47—DEGREE OF DOCTOR OF ENGINEERING

1. The faculty may admit as a candidate for the degree of doctor of Engineering a bachelor of Engineering who is of at least five years' standing, or a graduate in some other faculty who is of at least five years' standing and who satisfies the faculty that he possesses adequate experience of Engineering.

2. The faculty shall not admit any person as a candidate for the degree unless in the opinion of the faculty he has already made substantial published contributions to Engineering.

3. A candidate shall submit a record of his published work, and the prescribed number of copies of all the work, whether published or unpublished, which he wishes to submit for examination. A candidate may not submit for examination work in respect of which he has already qualified for a degree in any university or, without the permission of the faculty, work which he has previously presented for any such degree. The faculty, if it approve the subject or subjects of the work submitted for examination, shall nominate examiners.

4. A candidate, in submitting his published work and such unpublished work as he may think appropriate, shall state generally in a preface and specifically in notes the sources from which his information is derived, the extent to which he has availed himself of the work of others, and in general terms the portions of his work which he claims as original. When a candidate submits work carried out in collaboration with another person, he shall indicate his own share in the work.

5. Subject to the statutes and regulations of the University, the faculty shall give directions for the conduct of the examination.

6. A candidate whose work as submitted gives evidence of research and ability satisfactory to the examiners and in their opinion constitutes a definite contribution to Engineering and who has fulfilled the prescribed conditions may be admitted to the degree of doctor of Engineering.

1 Three copies must be submitted (see regulation 4.6).
FACULTY OF ENGINEERING

TIME-TABLE for 1962

FIRST YEAR OF ALL ENGINEERING COURSES
(Except Chem. Eng. and Met. Eng. Courses.)

Preliminary Course commences 9 a.m. Monday, 26 February 1962, in the Engineering School. All new First Year students are required to attend.

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>M.</th>
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<th>S.</th>
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FIRST YEAR OF CHEMICAL ENG. AND MET. ENG. COURSES

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*Alternative times for Practical Classes. Students will be informed as to which class they will attend.
†Alternative times for Lecture Classes. Students will be informed as to which class they will attend.
‡Together with Tutorial Practice Classes at times to be arranged.
§Practical or Drawing Office Class.
*All students enrolling for Physics Part I should fill in a Practical Roll Card when enrolling at Students' Records Office.
‡Preliminary classes in Engineering Part I commence on Monday, 26 February 1962 at 9 a.m.

Note: Time-Tables for Applied Mathematics Part I and Pure Mathematics Part I will be found in the Arts Faculty Handbook.
**SECOND YEAR - MINERAL ENGINEERING COURSE**  
Starting Date: 12 March 1962

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$^1$Practical work, Tutorial, Drawing Office or Laboratory Class.  
$^2$During the year each student will attend 12 Laboratory Sessions in Engineering Materials.  
$^3$All students enrolling for any course of Physics Part II are required to fill in a Practical Roll Card when enrolling at Students' Records Office whether their course involves Practical work or not.

**SECOND YEAR - CIVIL ENGINEERING COURSE — AGRICULTURAL ENGINEERING COURSE**  
Starting Date: 12 March 1962

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$^1$Practical work, Tutorial, Drawing Office, or Laboratory Class.  
$^2$During the year each student will attend 12 Laboratory Sessions in Engineering Materials.  
$^3$During the year each student will attend 9 Laboratory Sessions in Strength of Materials.  
$^4$All students enrolling for any course of Physics Part II are required to fill in a Practical Roll Card when enrolling at Students' Records Office whether their course involves Practical work or not.

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SECOND YEAR - MINING ENGINEERING COURSE
Starting Date: 12 March 1962

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1Practical Work. Tutorials and Drawing Office, or Laboratory Class.
2Throughout the year each student will attend 12 Laboratory Sessions in Engineering Materials.
3Together with a Tutorial Class at a time to be arranged.
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1 Practical Work. Tutorial, Drawing Office, or Laboratory Class.
2 During the year each student will attend 12 Laboratory Sessions in Engineering Materials.
3 Together with a Tutorial Class at a time to be arranged.
4 During the year each student will attend 9 Laboratory Sessions in Strength of Materials Part II.
5 All students enrolling for any course of Physics Part II are required to fill in a Practical Roll Card when enrolling at Students' Records Office, whether their course involves Practical work or not.
SECOND YEAR - ELECTRICAL ENGINEERING COURSE  
Starting Date: 12 March 1962

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*Alternative Times. Students will be advised as to which class they will attend.
*Practical work. Tutorial, Drawing Office, or Laboratory Class.
+Together with a Tutorial Class at a time to be arranged.
*Throughout the year each student will attend 9 Laboratory Sessions in Strength of Materials Part IIA.
+All students enrolling for any course of Physics Part II are required to fill in a Practical Roll Card when enrolling at Students' Records Office, whether their course involves Practical work or not.

SECOND YEAR - METALLURGICAL ENGINEERING COURSE  
Starting Date: 12 March 1962

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*Practical Work. Tutorial, Drawing Office or Laboratory Class.
*Throughout the year each student will attend 12 Laboratory Sessions in Metallurgical Engineering Part I.
*Together with a Tutorial Class at a time to be arranged.
*Throughout the year each student will attend 9 Laboratory Sessions in Strength of Materials Part IIA.
+All students enrolling for any course of Physics Part II are required to fill in a Practical Roll Card when enrolling at Students' Records Office, whether their course involves Practical work or not.
### SECOND YEAR - CHEMICAL ENGINEERING COURSE
Starting Date: 12 March 1962

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Practical Work, Tutorial, Drawing Office, or Laboratory Class. Together with a Tutorial Class at a time to be arranged.

### SECOND YEAR - SURVEYING COURSE
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Practical work, Field, Laboratory, or Drawing Office Class.

Alternative times.
**THIRD YEAR - CIVIL ENGINEERING COURSE**

Starting Date: 12 March 1962

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*Subject Notes*
- Tutorial Class.
- Practical Work. Drawing Office or Laboratory Class.
- Practice Class on alternate weeks.
- Includes Field Excursions.
- Alternative groups with Eng. Design A (Mon. 3.15—5.15).

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**THIRD YEAR - CIVIL ENGINEERING (Block Exemption) COURSE**

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*Subject Notes*
- Tutorial Class.
- Practical Work. Drawing Office or Laboratory Class.
- Practice Class on alternate weeks.
- Includes Field Excursions.
- Alternative groups with Eng. Design A (Mon. 3.15—5.15).
- All students enrolling for any course of Physics Part II are required to fill in a practical Roll Card when enrolling at Students' Records Office, whether their course involves practical work or not.
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*Practical Work, Laboratory or Drawing Office Class.
*For twelve periods.
*Some Tutorials and Practice Classes included.
*Tutorial.
*Alternative times.
*Practical Class on alternate weeks.

**THIRD YEAR-MINING ENGINEERING COURSE**

*Starting Date: 12 March 1962*

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*Tutorial Class.
*Practical Work, Drawing Office or Laboratory Class.
*Practical Classes on alternate weeks.
*Practical Class in Properties of Metals, in two weeks out of three. Practical Class in Dynamics of Machines Part III one week out of three.

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\(^1\)Tutorial Class.
\(^2\)Practical Work, Drawing Office or Laboratory Class.
\(^3\)Practical Classes on alternate weeks.
# THIRD YEAR - ELECTRICAL ENGINEERING COURSE

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\(^a\)Practice Class or Tutorial.
\(^b\)Practical work, Laboratory or Drawing Office Class.
\(^1\)Practical Class on Alternate weeks.
\(^2\)Practice Class on alternate weeks.
## THIRD YEAR - ELECTRICAL ENGINEERING COURSE
Starting Date: 12 March 1962

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¹Practical Class or Tutorial.
²Practical Work, Drawing Office or Laboratory Class.
³Practice Class on alternative weeks.
⁴All students enrolling for any course of Physics Part II are required to fill in a Practical Roll Card when enrolling at Students' Records Office, whether their course involves Practical work or not.
⁵Alternative times.

## THIRD YEAR - METALLURGICAL ENGINEERING COURSE
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¹Practical Class.
²Tutorial Class.
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¹Laboratory Class.
²Tutorial or Practice Class.

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¹Tutorial Class.
²Practical Work. Drawing Office or Laboratory Class.
³Alternative Times.
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\(^a\)Tutorial.

\(^i\)Practical work. Drawing Office or Laboratory Class.
## THIRD YEAR - INDUSTRIAL ENGINEERING
(Block Exemption) COURSE
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1^Practice Class or Tutorial.  
2^Practical work. Drawing Office or Laboratory Class.

## THIRD YEAR - SURVEYING COURSE
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1^Practical work. Field or Laboratory Class.  
2^Together with occasional Field Excursions.  
3^Together with a total of 2 hours per week. Practice Class at times to be arranged.
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1. Tutorial or Practice Class.
2. Laboratory or Drawing Office Class.
3. Classes in these subjects will be held at Royal Melbourne Institute of Technology.
## FOURTH YEAR - INDUSTRIAL ENGINEERING COURSE
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## FOURTH YEAR - ELECTRICAL ENGINEERING COURSE
Starting Date: 12 March 1962

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1. Tutorial or Practice Class.
2. Laboratory or Drawing Office Class.
3. Additional Practice Class may be arranged by the lecturer in charge.
4. See details of Electrical Course for alternative combinations of subjects available to Pass and Honours students.
5. Unit Scheme. Some of the lecture times shown are alternative.
FOURTH YEAR - METALLURGICAL ENGINEERING COURSE
Starting Date: 12 March 1962

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>M.</th>
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*Alternative times.
*Practical class.
*For Ore Dressing major option only.
(Note: Candidates taking Ore Dressing as a minor option will carry out less than nine hours practical work per week.)
*Together with practical work at times to be arranged.

FOURTH YEAR - CIVIL ENGINEERING COURSE
Starting Date: 12 March 1962

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*Tutorial or Practice Class.
*Drawing Office or Laboratory Class.
*Additional practice class may be arranged by the lecturer in charge.
*The following subjects are alternatives:—
(a) Engineering Mathematics Part IV
(b) Geology Part II (Mining Course)
(c) Industrial Administration.
<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>M.</th>
<th>Tu.</th>
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<td>Properties of Metals ...</td>
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</table>

*1Tutorial or Practice Class.
*2Practical work. Drawing Office or Laboratory Class.
*3Additional Practice Class may be arranged by the lecturer in charge.
<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>M.</th>
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</table>

*Practice class on alternative weeks.
Practical work. Drawing Office or Laboratory.*

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<table>
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<th>SUBJECT</th>
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*Practical work. Drawing Office or Laboratory Class.
Six weeks of First Term only.
*Except for seven weeks during Second Term.
Seven weeks of Second Term only.*

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<th>SUBJECT</th>
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</table>

*Practical Class in Laboratory, Drawing Office, or Field.*

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4
ENGINEERING

DETAILS OF COURSES AND SUBJECTS FOR THE DEGREES OF:

BACHELOR OF ENGINEERING

and

BACHELOR OF SURVEYING

LIST OF SUBJECTS (Regulation, Section 2)

The following list shows the subjects which have been prescribed for the several years of the courses for 1962. Variations of courses which may be approved will be found on page 82.

When enrolling, students must quote the Number as well as the name of the subject as listed in "Details of Subjects".

A.—Courses for the Degree of Bachelor of Engineering.

Civil Engineering Course

First Year

Chemistry (Engineering Course)
Engineering Part I
Engineering Mathematics Part I
Physics Part I

Second Year

1Engineering Design Part I
2Engineering Mathematics Part II
3Applied Thermodynamics Part I
4Dynamics of Machines Part II
5Physics Part II (Engineering Course)
6Engineering Materials
7Statistics for Engineers
8Strength of Materials Part II
9Electrical Engineering (C)

Third Year

Earth Science
Engineering Design A
1Engineering Mathematics Part IIIA
Fluid Mechanics A
4Surveying Part I
6Electrical Engineering (C)

Fourth Year

Civil Engineering
1Town Planning
together with any one of the following subjects—
Geology Part II (Mining Course)
2Engineering Mathematics Part IV
Industrial Administration

Mining Engineering Course

First Year

Chemistry (Engineering Course)
Engineering Part I
Engineering Mathematics Part I
Physics Part I

Second Year

1Engineering Design Part I
2Applied Thermodynamics Part I
3Dynamics of Machines Part II
4Physics Part II (Engineering Course)
5Engineering Materials

1The Examinations in these subjects will be for Pass only.
2Subject to approval of previous mathematical performance. Students who wish to take Engineering Mathematics Part IV must have taken Engineering Mathematics Part III in their Third Year.
3For 1962 only.
4This subject not to be taken by students entering Third Year of the course in 1962 after passing Second Year.

75
Statistics for Engineers
Strength of Materials Part IIA
Surveying Part I
Geology Part I

Third Year
*Engineering Design (Mining Course)
*Fluid Mechanics B
Geology Part II
Mining Part I
Surveying Part II (Mining Course)

Fourth Year
*Electrical Engineering (C)
*Mining Part II
*Mining Design
*Mining Geology
*Ore Dressing
*Mineral Industry Management

First Year
Chemistry (Engineering Course)
Engineering Part I
Engineering Mathematics Part I
Physics Part I

Second Year
Applied Thermodynamics Part I
Dynamics of Machines Part II
Electrical Engineering (M)
*Engineering Design Part I
Engineering Materials
Engineering Mathematics Part II
*Physics Part II (Engineering Course)
*Statistics for Engineers
Strength of Materials Part II

Third Year
Applied Thermodynamics Part II
Dynamics of Machines Part III
Engineering Design Part II (Mechanical)
Engineering Mathematics Part III
or
*Engineering Mathematics Part IIIA
Fluid Mechanics Part I
Industrial Electronics and Control
*Properties of Metals
Strength of Materials Part III

Fourth Year
*Engineering Design Part III (Mechanical)
Mechanical Engineering Laboratory
Mechanical Engineering Project
*Management B
*Properties of Metals
together with five of the following subjects—
*Applied Thermodynamics Part III
*Automatic Control
*Dynamics of Machines Part IV
*Engineering Mathematics Part IV
*Fluid Mechanics Part II
*Industrial Engineering (M)
*Strength of Materials Part IV

*The Examinations in these subjects will be for Pass only.
*Honours are not awarded for these individual subjects, as they belong to a group of subjects for which Final Honours are awarded.
*The selection must be approved by the Professor of Mechanical Engineering.
*For 1962 only.
Electrical Engineering Course

**First Year**
- Chemistry (Engineering Course)
- Engineering Part I
- Engineering Mathematics Part I
- Physics Part I

**Second Year**
- Engineering Design Part I
- Applied Thermodynamics Part I
- Dynamics of Machines Part II
- Physics Part IIIC
- Engineering Mathematics Part II
- Strength of Materials Part II A
- Electrical Engineering Part I

**Third Year**
- Electrical Engineering Part II
- Electrical Engineering Design
- Engineering Mathematics Part III
- or Engineering Mathematics Part II A and Engineering Practices
- Applied Thermodynamics Part II A
- Engineering Materials
- Statistics for Engineers
- Fluid Mechanics C

**Fourth Year**
- Discussion Sessions
- Electrical Engineering Part III

Candidates for Pass will be required to take either
- (a) Industrial Administration
- (b) Management B

Candidates for Pass who take Management B may be permitted to take
- Two units of Physics Part III

Candidates for Honours will be required to take
- (a) Management B with one of the following:
  - Four units of Physics Part III
  - Two additional units of Electrical Engineering Part III
- (b) Engineering Mathematics Part IV
- (c) Industrial Administration with one of:
  - Two units of Physics Part III
  - One additional unit of Electrical Engineering Part III

Metallurgical Engineering Course

**First Year**
- Chemistry Part I
- Engineering Part I
- Engineering Mathematics Part I
- Physics Part I

**Second Year**
- Geology Part I (Metallurgy)
- Metallurgical Chemistry
- Metallurgical Engineering Part I
- Metallurgy Part I
- Physics Part II (Engineering Course)
- Statistics for Engineers
- Strength of Materials Part II A

**Third Year**
- Metallurgy Part II E
- Engineering Design Part I

The Examinations in these subjects will be for Pass only.

For students wishing to proceed to Bachelor of Science Degree, credit is given for the practical work in Electrical Engineering Parts I and II, which for this purpose is regarded as equivalent to Two units of Physics Part II Laboratory Work.
Metallurgical Engineering Part II
Fluid Mechanics C
Electrical Engineering G

Fourth Year
Metallurgy Part III
Metallurgical Engineering Part III
Chemical Engineering Part III(g)
Management B
or Mineral Industry Management

Chemical Engineering (Old Course)
First, Second and Third Years of the Old Course not available in 1962.

Fourth Year
Chemical Engineering Part II
Chemical Engineering Laboratory
Chemical Engineering Thermodynamics
Design Project
Management B
Metallurgy for Chemical Engineers
Process Equipment Design
Statistics for Engineers

Chemical Engineering (New Course)

First Year
Chemistry Part I
Engineering Part I
Engineering Mathematics Part I
Physics Part I

Second Year
Chemistry Part IIC
Engineering Design Part I
Engineering Mathematics Part II
Engineering Materials
Strength of Materials Part IIA
Chemical Engineering Part I

Third Year
Physical Chemistry
Fluid Mechanics C
Electrical Engineering (G)
Engineering Mathematics Part IIIA
Process Chemistry
Chemical Engineering Part II

Fourth Year
Chemical Engineering Part III
Design Project
Management B
Metallurgy for Chemical Engineers
Statistics for Engineers

Agricultural Engineering Course

First Year
Chemistry (Engineering Course)
Engineering Part I
Engineering Mathematics Part I
Physics Part I

Second Year
Engineering Mathematics Part II
Physics Part II (Engineering Course)
Statistics for Engineers
Applied Thermodynamics Part I
Dynamics of Machines Part II

The Examinations in these subjects will be for Pass only.
Honours are not awarded for these individual subjects, as they belong to a group of subjects for which Final Honours are awarded.
Electrical Engineering (C)
Engineering Design Part I
Engineering Materials
Strength of Materials Part II

Third Year
Agricultural Science (Engineering Course)
Earth Science
Applied Thermodynamics Part II(A)
Dynamics of Machines Part III
Engineering Design Part II(A)
Fluid Mechanics A
Engineering Mathematics Part III(B)
Strength of Materials Part III(A)

Fourth Year
Agricultural Engineering A
Agricultural Engineering B
Agricultural Engineering C
Engineering Mathematics Part III(B)
Machine Design
Agricultural Economics (Engineering Course)

First Year
Chemistry (Engineering Course)
Engineering Part I
Engineering Mathematics Part I
Physics Part I

Second Year
Engineering Design Part I
Applied Thermodynamics Part I
Dynamics of Machines Part II
Physics Part II (Engineering Course)
Electrical Engineering (M)
Engineering Materials
Engineering Mathematics Part II
Statistics for Engineers
Strength of Materials Part II

Third Year
Dynamics of Machines Part III
Engineering Design Part II(A)
Engineering Mathematics Part IIIA
Industrial Electronics and Control
Industrial Engineering Part I
Industrial Management Part I
Properties of Metals
Statistical Techniques
Strength of Materials Part III

Fourth Year
Automatic Control
Dynamics of Machines Part IV
Engineering Design Part III (Industrial Course)
Industrial Engineering Part II
Industrial Engineering Laboratory
Industrial Engineering Project
Industrial Management Part II
Operational Research
Properties of Metals

Mineral Engineering Course

First Year
Chemistry Part I
Engineering Part I

2 The Examinations in these subjects will be for Pass only.
3 Honours are not awarded for these individual subjects, as they belong to a group of subjects for which Final Honours are awarded.
4 For 1962 only.
### Engineering Mathematics Part I  
Physics Part I

#### Second Year
- Engineering Materials  
- Geology Part I  
- Metallurgical Chemistry  
- Metallurgy Part I A  
- Physics Part II (Engineering Course)  
- Pure Mathematics Part II (Min.)  
- Statistics for Engineers

#### Third Year
- Engineering Design Part I  
- Fluid Mechanics B  
- Geology Part II (Mining)  
- Mineral Engineering Part I  
- Strength of Materials Part IIA

#### Fourth Year
- Electrical Engineering G  
- Mineral Engineering Part II  
- Mineral Industry Management  
- Geochemistry  
- Mining Part I A  
- Economics (Applied Science)  
  or Social and Economic History

### B.—Course for the Degree of Bachelor of Surveying.

#### First Year
- Chemistry (Engineering Course)  
- Engineering Part I  
- Engineering Mathematics Part I  
- Physics Part I

#### Second Year
- Geology Part I  
- Geophysics Part I  
- Pure Mathematics Part II  
- Surveying Part I

#### Third Year
- Building Construction Part I (Section A only)  
- Elementary Ecology  
- Hydrology  
- Pure Mathematics Part III (Surveying Course)  
- Surveying Part II

#### Fourth Year
- First Aid  
- Law of Property in Land  
- Photogrammetry  
- Surveying Part III  
- Town Planning

**PRACTICAL WORK (Regulation, Section 3)**

The following rules apply for practical work in all subjects of the courses in the Faculty of Engineering.

(a) Students are expected to attend all practical work sessions (laboratory, drawing office and field work, practice classes, seminars, and excursions) and to complete all the practical work assignments set by the lecturer in charge. Unless excused on account of special circumstances, a candidate who fails to complete the set assignments in any subject will be liable to disqualification in that subject for that year's Annual Examination. Candidates so disqualified will usually be notified in writing by the Faculty before the written examination, but the Faculty is not bound to give such notification.

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1. The Examinations in these subjects will be for Pass only.  
2. Additional work in Final Year will be prescribed for Final Honours candidates.
Students must reach an adequate standard in practical work in order to pass the Annual Examination. It will be stated in the details of the individual subjects whether the candidate's standard is to be assessed by means of a practical examination, and/or the work submitted by him during the year. Students must not expect to be notified before the written examination whether their practical work has been judged satisfactory or not.

Assignments (e.g., drawings, designs, laboratory and other reports, exercises, field books) not submitted to the lecturer or demonstrator in charge by the due dates may fail to count as practical work done.

All assignments in the practical work in any subject must be preserved for resubmission if called for by the lecturer or examiners.

**Vacation Work (Regulation, Section 3)**

1. After the Annual Examination of each year and before entering upon the work of the following year, a candidate shall satisfy the Faculty that he has spent a period of not less than five consecutive weeks in obtaining approved practical experience, as follows:

   a. Between First and Second Years all candidates shall—
      i. attend an approved course of workshop training at a Technical College recognized for this purpose;
      or ii. attend a course of workshop training under an approved engineer.

   b. Between Second and Third Years—
      Students undertaking the Civil, Mining or Agricultural Engineering courses for B.E. or the course for B.Surv. shall obtain approved practical experience in Surveying.
      Students undertaking the Mechanical, Electrical, Metallurgical, Chemical or Mineral Engineering courses for B.E. shall obtain approved practical experience of a branch of Engineering, Metallurgy or Chemical Engineering appropriate to the course.

   c. Between Third and Fourth Years—
      All candidates shall obtain approved practical experience of a branch of Engineering, Metallurgy, Surveying or Chemical Engineering appropriate to the course.

2. In all cases the practical experience must be obtained under a competent engineer, surveyor, metallurgist, geologist, chemical engineer or agriculturalist. The Faculty may grant either partial or total exemption from these requirements to candidates who produce satisfactory evidence of suitable experience elsewhere, and in special cases may grant dispensation.

   Before the end of First Term, candidates shall produce written evidence of their practical experience during the preceding vacation. It is the student's responsibility to ensure that the necessary certificate from the employer is lodged with the Secretary of the Technical Branch. Students should preserve duplicate copies of their certificates as evidence of their having performed approved vacation work.

   Before beginning a period of practical experience, candidates may ensure that it will satisfy the Faculty by consulting the Head of the Department concerned. In doubtful cases an application should be addressed to the Dean.

3. In the subjects of Engineering Mathematics, there is prescribed vacation reading.

**First Aid (Mining and Surveying Courses)**

Candidates for the degrees of B.M.E. and B.Surv. shall before graduation present evidence satisfactory to the Faculty that they hold a St. John Ambulance First Aid certificate or equivalent qualification. Candidates for the B.M.E. degree are strongly advised to obtain this qualification before the end of the Second Year of their courses.

In order to be credited with the subject First Aid, a candidate for the degree of B.Surv. must present a certificate satisfactory to the Faculty of having acquired proficiency in First Aid to the Injured. This may be done at any stage of the course, and not only in the Fourth Year as specified in the List of Subjects.
VARIATIONS IN COURSES (Regulation, Section 4)

Candidates who wish to vary their courses must make a written application. The following variations may be approved:

All Courses

- Engineering Mathematics Part IA may be prescribed instead of Engineering Mathematics Part I for students permitted to repeat First Year.
- Applied Mathematics Part II (Honours) instead of Engineering Mathematics Part III.
- Chemistry Part I instead of Chemistry (Engineering Course).
- Pure Mathematics Part II (Honours) instead of Engineering Mathematics Part II.
- Pure Mathematics Part III (Honours) or some other approved mathematical subject instead of Engineering Mathematics Part IV.

Metallurgical Engineering Course

- Chemistry (Engineering Course) may be accepted instead of Chemistry Part I, on the recommendation of the Head of the Department of Metallurgy.
- Pure Mathematics Part II may be accepted instead of Geology Part I (Metallurgy Course) on the recommendation of the Head of the Department of Metallurgy.

Mining Engineering Course

- Geology Part II (Mining Course) may be accepted instead of Geology Part II provided additional approved Engineering Design work is done.

COMBINED COURSES

(a) Courses to qualify for B.Sc. or B.A. (Honours) after qualifying for B.E.: For students intending to qualify for a further degree, such as Bachelor of Science or Bachelor of Arts (Honours), by continuing studies immediately after completion of a course for the degree of Bachelor of Engineering, variation in a prescribed course for the latter to enable the student concerned to qualify for the further degree in a minimum time may, in special cases, be permitted. In no case may a student qualify for the degree of Bachelor in another faculty without completing at least a full academic year's work, approved by that Faculty, subsequent to completing a course for the degree of Bachelor of Engineering.

(b) Courses to qualify in an additional branch of Engineering after qualifying for B.E. in one branch:

The Faculty may prescribe a special course to enable a student to qualify in a second branch of Engineering after qualifying for the degree of Bachelor of Engineering in one branch. In no case may the qualification in an additional branch be obtained by completing less than the work of one full academic year. Successful completion of a prescribed course to qualify in an additional branch will be recognized by the issue of an appropriate certificate. As the student concerned will have qualified for the degree of Bachelor of Engineering by virtue of completion of his original course, no further Bachelor's degree in Engineering will be conferred.

PASSING BY YEARS (Regulation, Section 5)

1. General.

The requirement that a candidate shall have passed one year of the course before being allowed to proceed to any subject of the succeeding year will normally be waived only:
(1) in the case of an ex-serviceman who passes in at least three-fifths of the work of a year of the course;

(2) in exceptional cases of illness during the course, or other such circumstances beyond the control of the candidate.

The requirement that a candidate shall repeat the whole of a year not successfully completed will normally be waived only in the case of:

(1) a candidate who has completed part of the work of the Fourth Year of the course.

(2) all ex-servicemen.

The above concessions to an ex-serviceman expire at the beginning of his fourth calendar year spent in the Engineering Course subsequent to the 31st December, 1945.

In determining the courses of students allowed under the above regulations to proceed to subjects of a higher year before having completed the previous year, the Faculty will not allow the following subjects to be taken unless the corresponding pre-requisites have been passed:

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>PRE-REQUISITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Part II or IIA subject</td>
<td>Corresponding Part I</td>
</tr>
<tr>
<td>Any Part III or IIIA subject</td>
<td>Corresponding Part II</td>
</tr>
<tr>
<td>Engineering Design</td>
<td>{ Elements of Design and Design Practices and }</td>
</tr>
<tr>
<td>Machine Design</td>
<td>Strength of Materials</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>Engineering Design B</td>
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<tr>
<td></td>
<td>Engineering Design A and Earth Science</td>
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</tbody>
</table>

HONOUR WORK

Except in subjects where special details are published, the Syllabus for Honours will be the same as that for Pass, but the examination for Honours will require candidates to attain a higher standard and to show more detailed knowledge.

EXAMINATIONS

In addition to the examinations specified, other tests may be held during the year. The standards reached in examinations, tests, and practical and other work will be taken into account as specified in the details of individual subjects in determining whether a candidate has reached Pass standard.

FINAL HONOURS

Final Honours may be awarded at the conclusion of a course for the degree of Bachelor of Engineering or Bachelor of Surveying, on the following basis:

(a) In all courses except in Civil and Agricultural Engineering, the work of the Fourth Year is divided into Final Honours and Pass courses, and a candidate for Final Honours must enrol accordingly after obtaining the approval of the Head of his Department. In general, this approval is only granted to those who have passed the Second and Third Years of the course at the first attempt and obtained Honours in one or two subjects in each Year of the course.

Students who have shown ability to proceed more rapidly than the average or to cope with more difficult work may, by taking the Final Honours course, benefit accordingly. In practical work, projects and designs, they will be expected to display greater initiative and originality.

The work to be taken into account in assessing Final Honours in these courses will be as follows:

(i) Chemical Engineering—All the work of the Fourth Year.
(ii) Industrial Engineering—All the work of the Fourth Year.
(iii) Mechanical Engineering—All the work of the Fourth Year.
(iv) Surveying—All the work of the Fourth Year.
(v) Electrical Engineering—The work in the subject Electrical Engineering Part III.
(vi) Mining Engineering—The work in the following group of subjects assessed as a whole:
Mineral Industry Management
Mining Part II
Mining Design
Mining Geology
Ore Dressing
(vii) Metallurgical Engineering—The work in the following group of subjects assessed as a whole:
Metallurgy Part III
Metallurgical Engineering Part III

Final Honour Examinations may be held in the subjects tabulated above. The scope of the work and the arrangement of the papers will be found in the following pages under the heading of the individual subjects concerned.

(b) In the Civil Engineering Course there is no separate course for Final Honours, the award of Final Honours being determined on the basis of work done in the subject Civil Engineering in the Fourth Year. The general performance in earlier years of the course may also be taken into account.

(c) In the Agricultural Engineering Course there is no separate course for Final Honours, the award of Final Honours being determined mainly on the basis of work done in the subjects Agricultural Engineering A, B and C; nevertheless, general performance in other subjects of the Fourth Year and in earlier years of the course may also be taken into account.

DETAILS OF SUBJECTS AND BOOKS FOR 1962

*The books marked with an asterisk are essential and students should possess their own copies.

625. AGRICULTURAL ECONOMICS
ENGINEERING COURSE)

(Mr. A. G. Lloyd)

A course of one lecture per week throughout the year, together with some Seminar discussion, and mainly concerned with the problems of the individual farm firm.

SYLLABUS. (i) Introductory lectures on the scope and nature of economics and agricultural economics. The farm as a business, agriculture as an industry.

(ii) Farm Accounts.

(iii) Agricultural production economics and farm management.
Factor-product relationships—response curves as production functions; factor substitution—in choosing the optimum combination of farm resources; principles of enterprise combination in mixed farming; production costs in agriculture; budgeting and linear programming; farm size and economies of scale; adjustments to risk and uncertainty; credit management; labour management, farm machinery decisions, farm buildings, irrigation.

BOOKS. (a) Prescribed text-book:
Bishop, C. E., and Toussaint, W. D.—Introduction to Agricultural Economic Analysis.

(b) Recommended for reference:
Heady, E. O.—Economics of Agricultural Production and Resource Use.*
Heady, E. O., and Dillon, J. L.—Agricultural Production Functions.
Heady, E. O., and Jensen, H. R.—Farm Management Economics.*

*Strongly recommended.
Samuelson, P. A.—Economics.
Heady, E. O., Johnston, G. L., and Hardin, L. S.—Resource Productivity,
Returns to Scale and Farm Size.
U.K. Ministry of Agriculture, Fisheries and Food—The Farm as a Business.
EXAMINATION. One 3-hour written paper.

626. AGRICULTURAL ENGINEERING A
(Mr. G. H. Vasey)
A course of three lectures and three hours practice per week, in the Fourth
Year, on the general subject of Farm Power and Machinery.
SYLLABUS. Unit processes and machines in agricultural production. Require-
ments of machinery, basic design, industrial design, performance testing, costs.
Soil reactions in tillage; mechanics of traction. Interactions between mechanical
processes and plant material. Curing, drying and storing of crops. Mechanical
handling of crops and mineral materials.
Work study; mechanization and farm management.
Tractors and engines: performance, testing, traction, stability.
PRACTICE. Seminars, laboratory work and computations on the above subjects.
EXCURSIONS. May be arranged to farms, factories, field trials, the Tractor
Testing Station, the Royal Agricultural Show.
BOOKS. (a) Preliminary reading:
(b) Prescribed text-books:
(Wiley, 1955.)
*Barger, Carleton, McKibben and Baimer.—Tractors and their Power Units.
(Wiley, 1951.)
Culpin, C.—Farm Machinery. (Crosby Lockwood.)
(Wiley, 1955.)
Gregory, C. E.—Explosives for Engineers. (Q’ld. U.P., 1960.)
(c) Recommended for reference:
Bekker, M. G.—Theory of Land Locomotion. (Michigan, 1956.)
Southwell, P. H.—The Agricultural Tractor. (Temple, 1953.)
Electricity Supply Association, Aust.—Farm Electrification Handbook.
EXAMINATION. Two 3-hour papers and a satisfactory standard must be reached
in laboratory and drawing office work.

627. AGRICULTURAL ENGINEERING B
(Mr. G. H. Vasey, Mr. A. K. Turner)
A course of two lectures and three hours' practice a week in the Fourth Year,
on the subject of Farm Buildings and Structures.
SYLLABUS. Structural design, with special emphasis on buildings; building
construction, earthworks, contracts. Functional requirements of farm buildings,
work study of buildings; heating, cooling, ventilating, lighting. Building materials
and design.
PRACTICE. Design and planning and work study of buildings, and formal
structural design.
BOOKS. (a) Prescribed textbook:
*Neubauer, L. W., and Walker, H. B.—Farm Building Design. (Prentice-Hall,
1961.)
(b) Recommended for reference:
Fry, Roger—Vision and Design. (Penguin.) O.P.
85
Dunham, C. W.—Theory and Practice of Reinforced Concrete. (McGraw-Hill, 1953.)
Matheson, J. A. L. and Francis, A. J.—Hyperstatic Structures, Vols. I. and II. (Butterworth.)

EXAMINATION. Two 3-hour papers, and a satisfactory standard in drawing office work.

628. AGRICULTURAL ENGINEERING C
(Mr. A. K. Turner)
A course of three lectures and three hours practice a week in the Fourth Year on the general subject Hydrology and Water Engineering.

SYLLABUS.

Hydrology—determination of flow in relation to rainfall, infiltration, evaporation, runoff (both peak and long-term yield), and groundwater, for small and large catchments.

Irrigation—soil, water and plant relationships, methods of application, systems economics.

Drainage—surface, sub-surface and deep-well systems for agricultural lands, waste water and sewerage.

Conduits and Structures—flow theory for pipes, channels and special sections, controls, sediment transport, pumps and models.

Water Supply—water for agricultural purposes, earth dams and regulation of storages.

Erosion Control—land utilization and classification, control measures for water and wind erosion, flood reduction and river improvement.

PRACTICE. Laboratory experiments, computations and designs in the above subjects.

EXCURSIONS. Excursions to water, irrigation, drainage, soil erosion works, and research centres may be arranged.

Books. (a) Recommended for preliminary reading:
Addison, H.—Land, Water and Food. (Chapman and Hall.)
Calder, Ritchie—Men Against the Desert. (Allen & Unwin, 1950.)
Leopold, L. B., and Maddocks, T.—The Flood Control Controversy. (Ronald, 1954.)

(b) Prescribed text-books.
Frevert, Schwab, Edminster and Barnes—Soil and Water Conservation Engineering. (Wiley, 1955.)

(c) Recommended for reference:
Addison, H.—A Treatise on Applied Hydraulics. (Chapman and Hall, 1954.)
Luthin, J. N., and others—Monograph of Land Drainage. (Amer. Soc. of Agronomy, 1957.)

EXAMINATION. Two 3-hour papers, and a satisfactory standard in laboratory and drawing office work.

623. AGRICULTURAL SCIENCE
(ENGINEERING COURSE)
A course of four hours of instruction per week throughout the Third Year, including practice classes and demonstrations.

SYLLABUS. Climate and its influence on Australian farming. Crops and pastures.

Books. (a) Prescribed text-books:
Moroney, M. J.—Facts from Figures. (Pelican Books.)

(b) Recommended for reference:
Collins, H. G.—Rural Economics. (Commonwealth Inst. Valuers.)

EXAMINATION. Two 3-hour papers.

APPLIED MATHEMATICS SUBJECTS
(See under Bachelor of Arts.)

644. APPLIED THERMODYNAMICS PART I
(Dr. Patterson, Mr. Pitt)
A course of one lecture per week and 45 hours' laboratory work.


Books. (a) Prescribed text-books:
*Faires, V. M.—Thermodynamics of Heat Power. (Macmillan.) For those who are not proceeding to Applied Thermodynamics Part II.

(b) Recommended for reference:
Keenan, J. H.—Thermodynamics. (Wiley.)
Robinson and Dickson.—Applied Thermodynamics. (Wiley.)

EXAMINATION. One 3-hour paper for Pass and Honours combined. In order to pass the subject, students must reach a satisfactory standard both in the practical work and in the written paper.

645. APPLIED THERMODYNAMICS PART II
(Dr. Patterson, Mr. Pitt)
A course of about 40 lectures and 52 hours' practical work.

SYLLABUS. (i) Entropy changes for gases and other fluids. Charts of thermodynamic properties. Irreversible processes and isentropic efficiency. Air compressors, refrigeration, heat pumps, air conditioners, reciprocating internal combustion engines and gas turbines.


(iii) Thermal radiation convection and conduction under equilibrium conditions of heat transfer.

Books. (a) Prescribed text-books:
*Total Heat-Entropy Chart for Steam. (Arnold.)
(b) Recommended for reference:
Everdell, M. H.—*Fundamental Thermodynamics for Engineers.* (English Universities Press.)
Mooney, D. A.—*Mechanical Engineering Thermodynamics.* (Chapman and Hall.)
Faires, V. M.—*Thermodynamics of Heat Power.* (Macmillan.)

EXAMINATION. One 3-hour paper for Pass and Honours combined. In order to pass the subject, students must reach a satisfactory standard both in the practical work and in the written paper.

646. APPLIED THERMODYNAMICS PART II (A)
A course of one lecture a week and one hour practice/tutorial throughout the year.

SYLLABUS. Sections (a) and (c) of Applied Thermodynamics Part II, namely:
(a) Thermodynamics of internal combustion engines and gas turbines; heat pump and refrigeration.
(c) Heat transfer by radiation, conduction and convection.

BOOKS. As in Applied Thermodynamics Part II.

EXAMINATION. One 2-hour paper for Pass only.

647. APPLIED THERMODYNAMICS PART III
(Dr. Patterson, Mr. Pitt)
A course of two lectures and one tutorial per week with practical work.

SYLLABUS. The subject matter is included in the following general topics:

PRACTICAL WORK. Laboratory work totalling about thirty-six hours given in the first half of the year set under Mechanical Engineering Laboratory plus some further tutorials. A number of projects from this subject will then be set in Mechanical Engineering Project.

BOOKS. (a) Prescribed text-books:
*Total Heat Entropy Chart for Steam.* (Arnold.)

(b) Recommended for reference:
Ewing, J. A.—*Thermodynamics for Engineers.* (C.U.P.)
Schmidt, E.—*Thermodynamics.* (O.U.P.)
Keenan, J. H.—*Thermodynamics.* (Wiley.)
Kearton, W. J.—*Steam Turbine Theory and Practice.* (Pitman.)
Davies, S. J.—*Heat Pumps and Thermal Compressors.* (Constable.)
Cohen, H., and Rogers, G. F. C.—*Gas Turbine Theory.* (Longmans.)
Roxbee Cox, Sir H.—*Gas Turbine Principles and Practice.* (Newnes.)
Kay, J. M.—*Fluid Mechanics and Heat Transfer.* (C.U.P.)
Hall, W. B.—*Reactor Heat Transfer.* (Temple Press.)
Wootton, W. R.—*Steam Cycles for Nuclear Power Plant.* (Temple Press.)
EXAMINATION. One 3-hour paper for Final Pass and Honours. Some further questions on more advanced aspects of the course will be set in one of two combined papers for Final Honours in conjunction with questions from other subjects.

Final Honours candidates will also be required to submit an essay on an approved subject not later than 1st December.

In order to pass the subject, candidates must reach a satisfactory standard both in the practical work and in the written papers.

648. AUTOMATIC CONTROL

(Dr. Pengille, Mr. Clifton)

A course of two lectures per week throughout the year with laboratory and tutorial classes as arranged.

SYLLABUS. Continuation of the study of linear control systems from third year; introduction to random processes in automatic control; introduction to non-linear control systems; use of analogue and digital computers.

LABORATORY WORK. Experimental work will be conducted at appropriate times during the course.

BOOKS. (a) Prescribed text-books:
West, John C.—Analytical Techniques for Non-Linear Control Systems. (E.U.P.)

(b) Recommended for reference:
Solodovnikov, V. V.—Introduction to the Statistical Dynamics of Automatic Control Systems. (Dover.)
Young, A. J.—An Introduction to Process Control System Design. (Longmans.)

EXAMINATION. One 3-hour paper for Final Pass and Honours. Some further questions on more advanced aspects of the course will be set in one of two combined papers for Final Honours in conjunction with questions from other subjects.

Final Honours candidates will also be required to submit an essay on an approved subject not later than 1st December.

In order to pass the subject candidates must reach a satisfactory standard in both the practical work and the written papers.

614. CHEMICAL ENGINEERING PART I

(a) A course of one lecture-tutorial per week for three terms.

SYLLABUS. Industrial stoichiometry; material balance calculations on selected chemical processes. Energy balances, flow-sheets. Introduction to economic optimization.

(b) A course of one lecture per week and two hours practical work per week throughout the year.

SYLLABUS. Introduction to the unit operations of chemical engineering. Newtonian and non-Newtonian fluids; fluid flow; viscous flow; turbulent flow; measurement of flow; transportation of fluids. Elementary heat transfer; conduction; convention; radiation; mean temperature difference. Diffusion and mass transfer, e.g., gas absorption and distillation. Measurement of process variables. Conveying of solids; size separation; methods of determining particle size distribution; crushing and grinding.

BOOKS—PART I (a):

(a) Prescribed text-book:
PART 1 (b):

(a) Preliminary reading:

(b) Prescribed text-book:
Badger, W. L., and Banchero, J. T.—Introduction to Chemical Engineering. (McGraw-Hill.)

Part 1(b): One 3-hour paper for Pass and Honours.

616. CHEMICAL ENGINEERING PART II
(OLD COURSE)

A course of five lectures and three hours tutorial work per week throughout the year.

SYLLABUS. Lectures will be selected from the following subjects:

Unit chemical engineering operations and processes, including:
Size Reduction: Grinding, crushing and disintegrating; types of machines; relation between power requirements and size reduction. Emulsification.
Size Separation and Grading: Particle size analysis. Screening, elutriation, flotation, settling and magnetic separation, centrifugal separation.
Drying: Theory of drying of solids; equipment for drying solids, liquids and gases.
Humidification: Theory of air/water interaction processes; dehumidification, water cooling.
Evaporation: Principles of single and multiple effect systems. Thermo-compression evaporators.
Distillation: Theory of operation of plate and packed fractionating columns for binary and multi-component systems. Azeotropic distillates.
Mixing and Agitation: Characteristics of equipment, power consumption, efficiency.
Chemical Processes Plant: Chemical engineering aspects of typical catalytic and other processes, e.g. nitration, sulphonation, hydrogenation, halogenation.
Heat-transfer equipment: Exchangers; heaters, coolers, condensers, re-boilers, evaporators and vaporizers.
Transport of Solids, Liquids and Gases: Mechanical and pneumatic conveying elevators, pumps, blowers, air-lift pumps.

Books. (a) Prescribed text-books:
Coulson, J. M., and Richardson, J. F.—Chemical Engineering. Parts I and II. (Pergamon Press.)
Smith, J. M.—Chemical Engineering Kinetics. (McGraw-Hill.)

(b) Recommended for reference:
Treybal, R. E.—Liquid Extraction. (McGraw-Hill.)
Larian, M. G.—Fundamentals of Chemical Engineering Operations. (Prentice-Hall, 1958.)
McCabe, W. L., and Smith, J. C.—Unit Operations of Chemical Engineering. (McGraw-Hill.)
Walas, S. M.—Reaction Kinetics for Chemical Engineering. (McGraw-Hill, 1959.)

EXAMINATION. Three 3-hour papers for Pass and Honours.

613. CHEMICAL ENGINEERING PART II
(NEW COURSE)

A course of four lectures per week throughout the year and about 80 hours' practical work.

SYLLABUS. Transport properties of fluids—viscosity, thermal conductivity, mass diffusivity. Equations of continuity, motion and energy for isothermal, for non-isothermal and for multi-component systems.
Momentum, heat and mass-transfer in laminar and turbulent flow. Momentum, heat and mass-transport between two phases.
Steady-state continuous and stage-wise contacting of phases in process equipment for heat transfer and for mass-transfer; phase equilibria. Heat-transfer and mass-transfer coefficients; transfer units; mean temperature difference or concentration difference in co-current and counter-current flow. Concept of the theoretical stage or plate. Stage efficiency; co-current and counter-current operation; use of reflux, side-streams. Applications of process instrumentation and control.

Books. (a) Prescribed text-books:

(b) Recommended for reference:
Badger, W. L., and Banchero, J. T.—Introduction to Chemical Engineering. (McGraw-Hill.)
Coulson, J. M., and Richardson, F. J.—Chemical Engineering, Vol. 2. (Pergamon.)
Ceaglske, N. H.—Automatic Process Control for Chemical Engineers. (Wiley.)
Treybal, R. E.—Liquid Extraction. (McGraw-Hill.)
Larian, M. G.—Fundamentals of Chemical Engineering Operations. (Prentice-Hall, 1958.)
McCabe, W. L., and Smith, J. C.—Unit Operations of Chemical Engineering. (McGraw-Hill.)

EXAMINATION. Two 3-hour papers for Pass and Honours.

622. CHEMICAL ENGINEERING PART III
(NEW COURSE)

A course of 120-200 lectures during the year with associated tutorial and laboratory classes.

SYLLABUS. Topics chosen from the following:
(a) Fluid dynamics and heat transfer in application to Chemical plant.
(b) Distillation, gas absorption, liquid extraction, adsorption, etc.
(c) Process equipment design and economics.
(d) Advanced theory of chemical plant.
(e) Fuel technology.
(f) Safety in the chemical plant, Chemical Works Regulations, etc.
(g) Thermodynamics: A course in the generation and utilization of heat in process systems.
(h) Reaction kinetics.

EXAMINATION. Four 3-hour papers for Pass and Honours. One 2-day practical examination for Pass and Honours.

617. CHEMICAL ENGINEERING LABORATORY (OLD COURSE)

One afternoon per week during the first term, one day per week second and third terms.

SYLLABUS. A laboratory study of the unit operations of chemical engineering, including performance tests and reports on the operation of small scale equipment.

EXAMINATION. Candidates' reports will be examined.

618. CHEMICAL ENGINEERING THERMODYNAMICS (OLD COURSE)

A course of one lecture per week with tutorials throughout the year.


BOOKS. (a) Prescribed text-book:

(b) Recommended for reference:
Weber, H. C., and Meissner, H. P.—Thermodynamics for Chemical Engineers. (Wiley.)
Prigogine, I.—Introduction to Thermodynamics of Irreversible Processes. (Thomas.)
Obert, E. F.—Concepts of Thermodynamics. (McGraw-Hill.)
Hamann, S. D.—Physico-Chemical Effects of Pressure. (Butterworth.)

EXAMINATION. One 3-hour paper for Pass and Honours.

353. CHEMISTRY PART I

A course of three lectures, one tutorial per week, and laboratory work throughout the year. A preliminary standard equivalent to Matriculation Chemistry will be assumed. The following syllabus provides a general guide to the topics to be discussed.


The properties of gases; the ideal gas equation; elements of the kinetic theory, ideal gas behaviour and deviations from it; van der Waals' equation.
Solid-liquid-gas equilibria for one-component systems; vapour pressure, liquefaction of gases and critical phenomena; distribution equilibria.
Thermochemistry; heats of reaction; the first law of thermodynamics; internal energy and enthalpy; the laws of Hess and Kirchhoff.
Comparative chemistry of the elements and the periodic classification.

The preparation and reactions of the following classes of compounds: paraffins, olefins, acetylenes, benzene, alcohols, phenols, halides, ethers, aldehydes, ketones, carboxylic acid and amines.

Laboratory Work. Three and a half hours per week, throughout the year, illustrating the principles of inorganic, physical and organic chemistry together with exercises in quantitative and qualitative analysis.

The practical classes for this subject are taken in the Chemistry Building. The department supplies all the apparatus for which a fee of £5 must be paid to the University Branch of the National Bank, using a specially stamped bank slip obtained from the department. Evidence of payment must be produced to the department before practical classes begin. The full fee is retained as no charge will be made for reasonable wear and breakage.

Books. (a) Recommended for preliminary reading:
Pauling, L.—General Chemistry. (Freeman.)
Wells, A. F.—The Third Dimension in Chemistry. (O.U.P.)

(b) Prescribed text-books:
or Quagliao, J. V.—Chemistry. (Prentice-Hall.)
or Sienko, M. J., and Plane, R. A.—Chemistry. (McGraw-Hill.)
Morrison, R. T., and Boyd, R. N.—Organic Chemistry. (Allyn & Bacon.)

(c) Recommended for reference:
Glasstone, S., and Lewis D.—Elements of Physical Chemistry. (Van Nostrand.)
Daniels, F., and Alberty, R. A.—Physical Chemistry. (Wiley.)
Gilreath, E. S.—Fundamental Concepts of Inorganic Chemistry. (McGraw-Hill.)
Gould, E. S.—Inorganic Reactions and Structure. (Holt.)

Books marked † are used by students proceeding to Chemistry II and Chemistry III.

Examination. One 3-hour written paper in General Chemistry, one 1½-hour written paper in Organic Chemistry. There is no practical examination, but the work of each student is assessed continually throughout the year, and is taken into account in determining the success of candidates at the Annual Examination.

551. CHEMISTRY (ENGINEERING COURSE)
(Mr. Olver)

A course of two lectures per week, with laboratory work, throughout the year.

The following syllabus provides a general guide to the topics to be discussed.

Syllabus. (i) Physical Chemistry

Chemical Kinetics and Chemical Equilibrium. Factors influencing the rates of chemical reactions; collision theory of reaction. Catalysis—homogeneous and heterogeneous, with applications. The equilibrium law and le Chatelier's principle. Ionic equilibria in aqueous solution; the Lowry-Brönsted theory of acids and bases; pH, indicators, buffer solutions, titration curves. Precipitation equilibria.


Thermochemistry. The first law of thermodynamics; internal energy and enthalpy; heat of reaction; calorimetry; heat of formation; the laws of Hess and Kirchhoff. Combustion of fuels.


Surface Chemistry and the Colloidal State. Surface phenomena; flotation of minerals. Nature of colloids.

Theory of Chemical Analysis. The theory and procedure involved in gravimetric and volumetric analysis such as is given in the recommended text-book of practical chemistry. Conductimetric titrations; potentiometric titrations.

(ii) Descriptive Chemistry
Comparative chemistry of the elements and the periodic classification. Atomic structure and the theory of valency.

(iii) Organic Chemistry

LABORATORY WORK. Three and a half hours per week throughout the year, covering exercises in gravimetric and volumetric analysis, and general inorganic chemistry, and experiments in physical chemistry, the experiments being chosen to illustrate and amplify the theory course.

The practical classes for this subject are taken in the Chemistry Laboratory of the North Building. The department supplies all the apparatus for which a fee of £5 must be paid to the University Branch of the National Bank, using a specially stamped bank slip obtained from the Laboratory. Evidence of payment must be produced to the Laboratory before practical classes begin. The full fee is retained as no charge will be made for reasonable wear and breakage.

Pre-requisite Standard. While there is no pre-requisite, it is strongly recommended that the students beginning the course should have a background of descriptive chemistry and basic chemical theory equivalent to Matriculation Chemistry. A knowledge of the subject up to this standard will be assumed as a basis for the course.

Books. (a) Recommended for preliminary reading:
Pauling, L.—General Chemistry. (2nd ed., Freeman.)

(b) Prescribed text-books:
Glasstone, S., and Lewis, D.—Elements of Physical Chemistry. (Macmillan.)

(c) Recommended for reference:
Glasstone, S.—Textbook of Physical Chemistry. (2nd ed., Macmillan.)
Daniels, F., and Alberty, R. A.—Physical Chemistry. (2nd ed., Wiley.)
Findlay, A.—Introduction to Physical Chemistry. (3rd ed., Longmans.)
Van Vlack, L. H.—Elements of Materials Science. (Addison-Wesley.)

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EXAMINATION. One 3-hour written paper, for Pass and Honours combined. There will be no practical examination, but the standard of the student's laboratory work will be assessed continually throughout the year, and is taken into account in determining the success of the candidates at the Annual Examination.

362. CHEMISTRY PART IIIC

A course of approximately 45 lectures in physical chemistry, 25 lectures in inorganic chemistry and 25 lectures in organic chemistry, with demonstrations and practical work throughout the year. The course provides a survey of the subject for those not intending to become professional chemists, but proceeding to a degree with a physical science as major subject.

SYLLABUS. Physical chemistry and inorganic chemistry. The scope of the course is substantially as for Chemistry Part II A. (See Science Handbook.)

Organic chemistry. A study of mono-functional and poly-functional aliphatic and aromatic compounds, providing a short survey of the subject.

LABORATORY WORK. A record of efficiency in performance and understanding of experiments will be kept and short tests may be given. This information will have a bearing on the final result of the student in the subject.

The practical classes for this subject are taken in the Chemistry Building. The department supplies all the apparatus for which a fee of £10 must be paid to the University Branch of the National Bank, using a specially stamped bank slip obtained from the department. Evidence of payment must be produced to the department before practical classes begin. The full fee is retained as no charge will be made for reasonable wear and breakage.

BOOKS. (a) Recommended for preliminary reading:
Wells, A. F. — The Third Dimension in Chemistry. (O.U.P.)
Kauzmann, W. — Quantum Chemistry, Ch. 1 only. (Academic Press.)

(b) Prescribed text-books:
(i) For those not proceeding to Chemistry Part III:
Sanderson. — Chemical Periodicity.
*Moore, W. J. — Physical Chemistry. (Prentice-Hall.)
*Glasstone, S. — Elements of Physical Chemistry. (Van Nostrand.)
or *Daniels, F., and Alberty, R. A. — Physical Chemistry. (2nd ed., Wiley.)
*Morrison, R. T., and Boyd, R. N. — Organic Chemistry. (Allyn & Bacon.)

(ii) For those proceeding to Chemistry III:
*Glasstone, S. — Textbook of Physical Chemistry. (Van Nostrand.)
*Morrison, R. T., and Boyd, R. N. — Organic Chemistry. (Allyn & Bacon.)
*Cartmell, E., and Fowles, G. W. A. — Valency and Molecular Structure. (Butterworth.)

(iii) For all students:
Moeller, T. — Inorganic Chemistry. (Wiley.)
or Gould, E. S. — Inorganic Reactions and Structure. (Holt.)

(c) Recommended for general reading and reference:
Coulson, C. A. — Valence. (O.U.P.)
Wells, A. F. — Structural Inorganic Chemistry. (2nd ed., O.U.P.)
Latimer, W. M. — The Oxidation States of the Elements. (Prentice-Hall.)
Moelwyn-Hughes, E. A.—Physical Chemistry.  
Steiner, L. E.—Introduction to Chemical Thermodynamics. (2nd ed., McGraw-Hill.)  
Glasstone, S.—Introduction to Electrochemistry. (Van Nostrand.)  
Remy, H.—Treatise on Inorganic Chemistry, 2 Vols. (Elsevier.)  
Ketelaar, J. A.—Chemical Constitution. (2nd ed., Elsevier.)

EXAMINATION. For Pass and Honours—one 3-hour paper in physical chemistry, and one 3-hour paper in organic and inorganic chemistry. Students who have not maintained a satisfactory standard in the laboratory course throughout the year will be required to take a practical examination.

570. CIVIL ENGINEERING

(Professor Francis, Dr. Trollope, Dr. Laszlo, Mr. Wood, Dr. Lawson, Mr. Sharp, Mr. Lee, Dr. Stevens, Mr. Aroni and visiting lecturers.)

A course of about 8 lectures per week, with about 14 hours per week of laboratory, drawing office and practice classes throughout the year.

SYLLABUS. (i) Structural Engineering and Elasticity. Analysis and design of statically indeterminate structures such as trusses, rigid frames, arches and shells. Inelastic behaviour. Concrete mix design. Concrete quality control. Reinforced and prestressed concrete structures. Stability of structures and components. Vibrations of beams, frames and the like. Elementary plate and shell theory. Laboratory techniques—measurement of strain, methods of testing structures and statistical design of experiments.

(ii) Hydraulic Engineering. Topics such as the following:
Rainfall: Distribution, intensity, run-off, evaporation, percolation. Waterway for bridges and culverts.
Rivers: Flood prevention, improvement and regulation.
Storage Reservoirs: Determination of capacity; earthen, masonry, concrete and other dams; outlet works, waste weirs; preservation of catchments.
Conduits: Channels, flumes, pipe lines. Variable flow in channels. Waves.
Sewerage and Drainage: Sewerage and drainage of towns, separate and combined systems, sewage treatment, disposal of wastes, pumping stations.
Irrigation: Conditions suitable, duty of water, methods of application to land barrages, head-works, regulators, distribution systems.
Hydro-electric Engineering: Turbine characteristics; settings; choice of type of turbine; speed regulation; surge tanks; water power schemes.
Pumping Plants. Hydraulic models.


(v) Engineering Practices. (a) Engineering Construction. Topics such as the following: foundation methods, timbering, de-watering, under-pinning, etc. Structural steel fabrication. Methods of reinforced concrete construction, formwork, precasting. Erection methods.

(b) Engineering Organization and Economics. Topics such as the following: organization of civil engineering works, contracts and specifications, financing of engineering projects, costing, legal aspects.
Laboratory, Drawing Office and Classroom Work. This will usually include the following: (i) original designs of structures in part or whole;
(ii) a scheme of water supply, irrigation, power, sewerage, etc.;
(iii) laboratory work including projects;
(iv) discussion groups, visits to works in progress and special lectures by visiting speakers;
(v) essays and reports.

No student will be admitted to the Final Examination without evidence of satisfactory laboratory and drawing office work, which will be assessed in the deciding of examination results. Records of laboratory and drawing office work must be submitted periodically as required. Additional tests may be set during the year; the results of these will be taken into account in assessing examination results.

Books. (a) Recommended for preliminary reading:
Torroja, E.—*Philosophy of Structures*. (Univ. of California Press.)

(b) Prescribed text-books:
Timoshenko, S.—*Theory of Plates and Shells*. (McGraw-Hill.)
*Ferguson, P. M.—Reinforced Concrete Fundamentals*. (Wiley.)
Lin, T. Y.—*Prestressed Concrete Structures*. (Wiley.)

(c) Recommended for reference:
(i) Structural Engineering and Elasticity.
Probst, E. H., and Conrie, J.—*Civil Engineering Reference Book*. (Butterworth.)
Beedle, L. S.—*Plastic Design of Steel Frames*. (Wiley.)
Hoff, N. J.—*The Analysis of Structures*. (Wiley.)
Cross, H., and Morgan, N. D.—*Continuous Frames of Reinforced Concrete*. (Wiley.)
Parcel, J. L., and Moorman, R. B. B.—*Analysis of Statically Indeterminate Structures*. (Wiley.)
*Mix Design and Quality Control of Concrete*. (1954 Symposium. Cement and Concrete Association.)
Stewart, D. A.—*High Quality Concrete*. (Spon.)
Guyon, Y.—*Prestressed Concrete*. (Contractors Record.)
Murdock, L. J.—*Concrete Materials and Practice*. (Arnold.)

(ii) Hydraulic Engineering.
Addison, H.—*A Text-Book of Applied Hydraulics*. (Chapman and Hall.)
Rouse, H., and Howe, J. W.—*Basic Mechanics of Fluids*. (Wiley.)
Jaeger, C.—*Engineering Fluid Mechanics*. (Blackie.)
Rouse, H., and Ince, S.—*History of Hydraulics*. (State University of Iowa, 1957.)
Allen, J.—*Scale Models in Hydraulic Engineering*. (Longmans.)
Vallentine, H. R.—*Applied Hydrodynamics*. (Butterworth.)

**Structures**

**Water Supply**

**Sewerage and Stormwater Drainage**

**Irrigation**
Etcheverry, B. A.—*Irrigation Practice and Engineering*. (McGraw-Hill.)

**Hydro-electric Engineering**

**Soil Engineering**
Terzaghi, K. V.—*Theoretical Soil Mechanics*. (Wiley.)
Bishop, A. W., and Henkel, D. J.—*The Measurement of Soil Properties in the Triaxial Test*. (Edward Arnold.)
Henry, F. D. C.—*The Design and Construction of Engineering Foundations*. (Spon.)

**Highway and Airport Engineering**
Hewes, L. I., and Oglesby, C. H.—*Highway Engineering*. (Wiley.)
Public Roads Administration, U.S.A.—*Highway Practice in the U.S.A.* (Public Roads Administration.)
Sharp, H. O., Shaw, G. R., and Dunlop, J. A.—*Airport Engineering*. (Wiley.)

**Examinations.** Five 3-hour papers.
619. DESIGN PROJECT (OLD COURSE)
A course consisting mainly of practical work, with about 10 hours' lectures and tutorials (in the first term) in chemical-engineering economics.

SYLLABUS. The economic design of a chemical plant to meet a specified production requirement; the preparation of flow-sheets; the specification of equipment; the selection of appropriate materials of construction and the methods of fabrication; the preparation of drawings of individual plant units and of the general arrangement of the plant.

*Rase, H. F., and Barrow, M. H.—Project Engineering of Process Plants. (Wiley.)
Perry, J. H.—Chemical Engineers' Handbook. (McGraw-Hill.)
Vilbrandt, F. C., and Dryden, C. E.—Chemical Engineering Plant Design. (McGraw-Hill.)

EXAMINATION. Students will be assessed for Pass and Honours on the design project to be completed during the course.

624. DESIGN PROJECT (NEW COURSE)
A course consisting mainly of practical work with a few lectures.

SYLLABUS. The economic design of a chemical plant to meet a specified production requirement; the preparation of flow-sheets, the specification of equipment, the selection of appropriate materials of construction and the methods of fabrication, the preparation of drawings of individual plant units and of the general arrangement of the plant.

EXAMINATION. Students will be assessed for Pass and Honours on the design project to be completed during the course.

DISCUSSION SESSIONS
(Various lecturers from other faculties)
A course of some three hours a week throughout the year generally on literary or historical and artistic topics in a limited field.
Some reading and essay or project work will be included and candidates will be assessed on the work performed.

649. DYNAMICS OF MACHINES II
(Mr. Vasey)
A course of one lecture per week throughout the year with 18 hours tutorial and practice classes.

SYLLABUS.† Torque speed and power characteristics of engines and other machines. Mechanical transmission of power in shafts, couplings, belts, gear trains, clutches, brakes, etc.

Books. (a) Prescribed text-book:
Bevan, T.—Theory of Machines. (Longmans.)
(b) Recommended for reference:
Green, W. G.—Theory of Machines. (Blackie.)
Church, A. H.—Mechanical Vibrations. (Wiley.)

EXAMINATION. One 3-hour paper for Pass and Honours. In order to pass the subject, students must reach a satisfactory standard both in the practical work and the written paper.
†For 1962 only.
650. DYNAMICS OF MACHINES III
(Dr. Laszlo, Dr. Pengilley)

A course of 32 lectures with approximately 36 hours tutorial and practical classes.


(b) Lubrication: Hydrodynamic and boundary lubrication of sliding pads and journal bearings.


Books. (a) Prescribed text-books:
Timoshenko, S., and Young D. H.—Vibration Problems in Engineering. (Van Nostrand.)
Hunt, K. H.—Mechanisms and Motion. (E.U.P.)

(b) Recommended for reference:
Den Hartog, J. P.—Mechanical Vibrations. (McGraw-Hill.)
Church, A. H.—Mechanical Vibrations. (Wiley.)
Inglis, C.—Applied Mechanics for Engineers. (C.U.P.)
Rosenauer, N., and Willis, A. H.—Kinematics of Mechanisms. (Associated General Publications.)
Bevan, T.—Theory of Machines. (Longmans.)
Barwell, F. T.—Lubrication of Bearings. (Butterworth.)

EXAMINATION. One 3-hour paper for Pass and Honours. In order to pass the subject, students must reach a satisfactory standard both in the practical work and the written paper.

651. DYNAMICS OF MACHINES IV
(Mr. Clifton, Dr. Pengilley)

A course of two lectures per week with laboratory and practical classes throughout the year.


Books. (a) Prescribed text-books:
Hunt, K. H.—Mechanism and Motion. (E.U.P.)
Shaw, M. C., and Macks, E. F.—Analysis and Lubrication of Bearings. (McGraw-Hill.)

(b) Recommended for reference:
Holowenko, A. R.—Dynamics of Machinery. (Wiley.)
Hartman, J. B.—Dynamics of Machinery. (McGraw-Hill.)
Tong, K. N.—Theory of Mechanical Vibration. (Wiley.)
Jacobsen, L. S., and Ayre, R. S.—Engineering Vibrations. (McGraw-Hill.)
Cole, E. B.—The Theory of Vibrations for Engineers. (Crosby Lockwood.)
Ker Wilson, W.—Practical Solution of Torsional Vibration Problems. (Chapman and Hall.)
Bishop, R. E. D. and Johnson, D. C.—The Mechanics of Vibrations. (C.U.P.)
Bowden, F. P., and Tabor, D.—Friction and Lubrication of Solids. (Oxford University Press.)
Rosenauer, N., and Willis, A. H.—Kinematics of Mechanisms. (Associated General Publications.)

EXAMINATION. One 3-hour paper for final Pass and Honours.
Some further questions on more advanced aspects of the course, together with questions from other subjects, will be set in one of two combined papers for Final Honours.
Final Honours candidates will also be required to submit an essay on an approved subject not later than 1st December.
In order to pass the subject, candidates must reach a satisfactory standard in both practical work and written papers.

564. EARTH SCIENCE
(Dr. Trollope, Mr. Lee, Dr. Briner, Dr. Beavis)

A course of approximately 85 lectures; three hours’ laboratory and practical work per week throughout the year and five field excursions.

SYLLABUS.
(a) Geology (Engineering Course)
Part 2—9 lectures on special aspects of Engineering Geology.
LABORATORY WORK. Three hours per week during first term.
FIELD WORK. Two half-day field excursions.

(b) Soil Chemistry
LABORATORY WORK. Six 3-hour periods during third term.
FIELD WORK. One half-day and two whole-day field excursions. These excursions are compulsory and will cost approximately £2.

(c) Soil Mechanics and Physics
LABORATORY WORK. Eight 3-hour periods during second and third terms.

BOOKS. Section (a)
(i) Recommended for preliminary reading: Read, H. H.—Geology. (H.U.L.)
Raistrick—Teach Yourself Geology. (E.U.P.)
(ii) Prescribed text-books: Hilla, E. S.—The Physiography of Victoria. (Whitcombe and Tombs.)
or Krynine, D. P., and Judd, W. R.—Principles of Engineering Geology and Geotechnics. (McGraw-Hill.)
Page, S. (ed.)—Application of Geology to Engineering Practice. (Geol. Soc. America.)
Trask, P. D. (ed.)—Engineering Geology Case Histories, Nos. 1-3. (Geol. Soc. America.)
Dapples, E. C.—Basic Geology for Science and Engineering. (Wiley.)

Section (b)
(i) Prescribed text-books:
* Leeper, G. W.—An Introduction to Soil Science.
(ii) Recommended for reference:
Baver, L. D.—Soil Physics. (Wiley.)

Section (c)
(i) Prescribed text-books:
* Soil Mechanics for Road Engineers. (H. M. S. O.)
(ii) Recommended for reference:

EXAMINATION.
Section (a) One 3-hour written paper at the end of second term. Laboratory work will be assessed and a practical examination may be held if this work is unsatisfactory.
Section (b) One 2-hour written paper.
Section (c) One 2-hour written paper.

567. ELECTRICAL ENGINEERING (C)
(Mr. McCuthan, Mr. King-Smith, Mr. Bonwick)
A course of two lectures per week during first and second terms with 60 hours' laboratory and practice class work.

SYLLABUS. (a) Circuit Theory, A.C. and D.C.
(b) Electrical Machines and Associated Apparatus.

LABORATORY WORK. Three hours per week during first and second terms, on experiments relating to the course of lectures. The practical work will be assessed in the deciding of examination results.

BOOKS. (a) Recommended for preliminary reading:
Pumphrey, F. H.—Electrical Engineering. (Prentice-Hall.)
(b) Prescribed text-books:
* Hughes, E.—Electrical Technology. (Longmans.)
Cotton, H.—Electrical Technology. (Pitman.)
Knight, A. R., and Fett, G. H.—Introduction to Circuit Analysis. (Harper.)

EXAMINATION. One 3-hour paper. (Pass standard only).

610. ELECTRICAL ENGINEERING (G)
(Mr. Brownlee)
A course of 35 lectures and 45 hours' practical work.

SYLLABUS.
General—
Introduction to D.C. and A.C. circuits.
Measurements (mainly D.C.).
Instruments, A.C. and D.C.
Machines—
Basic principles of electromagnetic machinery.
Construction, characteristics, and control of standard types of D.C. motors and generators.
The transformer.
3-Phase A.C. systems.
The alternator and synchronous motor (briefly).
The 3-phase and 1-phase induction motor and their control gear in some detail.

Electronics—
Characteristics of electron tubes.
Rectifiers, including grid control.
Simple types of amplifier.
The cathode Ray Tube and its applications to the Oscilloscope.

Books. (a) Prescribed text-books:
Hirst, A. W.—Applied Electricity. (Blackie.)
Fitzgerald and Higginbotham—Basic Electrical Engineering. (McGraw-Hill.)

(b) References:
Cotton, H.—Applied Electricity. (Cleaver Hume.)
Starr, A. T.—Electronics. (Pitman.)
Ryder, J. D.—Engineering Electronics. (McGraw-Hill.)

EXAMINATION. One 3-hour paper for Pass and Honours. There will be no practical examination, but the written paper may include questions on the practical work. Candidates may be required to resubmit their practical books before the Annual Examination.

582. ELECTRICAL ENGINEERING (M) (Mr. McCutchan and Mr. Bonwick)
A course of two lectures per week with laboratory work throughout the year.

SYLLABUS. (a) Circuit Theory, A.C. and D.C.
(b) Electrical Machines.

LABORATORY WORK. Three hours per week throughout the year on experiments and examples relating to the course.

No student will be admitted to the Final Examination without evidence of satisfactory laboratory work which will be assessed in the deciding of examination results. A practical examination will be held in doubtful cases. Records of laboratory work must be submitted periodically as required by demonstrators.

Books. (a) Recommended for preliminary reading:
Pumphrey, F. H.—Electrical Engineering. (Prentice-Hall.)

(b) Prescribed text-books:
or Erickson, W. H., and Bryant, N. H.—Electrical Engineering—Theory and Practice. (2nd ed., Wiley.)
or Hughes, E.—Electrical Technology. (Longmans.)

(c) Recommended for reference:
Cotton, H.—Electrical Technology. (Pitman.)
Knight, A. R., and Fett, G. H.—Introduction to Circuit Analysis. (Harper.)

EXAMINATION. One 3-hour paper for Pass and Honours.

596. ELECTRICAL ENGINEERING PART I (Fields, Circuits and Networks) (Mr. Brownlee, Mr. Ferguson, Mr. Dow)
A course of about 36 lectures, and practical work in which some emphasis will be placed on report writing.
SYLLABUS. (a) Constant two-dimensional fields, field mapping by various methods.  
(c) The writing of English with emphasis on clarity in exposition. Some standard forms of expression.

LABORATORY AND CLASS WORK. Three hours per week mainly in second and third terms on experiment and examples relating to the above course. There will be some report writing in first term.

Books. (a) Recommended for preliminary reading:  
Gowers, E. A.—The Complete Plain Words. (H.M.S.O.)  
Stebbing, L. Susan—Thinking to Some Purpose. (Penguin.)  
Vallins, G. H.—Good English. (Pan Books.)  
Vallins, G. H.—Better English. (Pan Books.)  

(b) Prescribed text-book:  
Clement, P. R. and Johnson, W. C.—Electrical Engineering Science (McGraw-Hill.)

(c) Recommended for reference:  
Guillemin, E. A.—Introductory Circuit Theory. (Wiley.)  
Carter, G. W.—The Electromagnetic Field in its Engineering Aspects. (Longmans.)  

EXAMINATION. One 3-hour paper. No student will be admitted to the Final Examination without evidence of satisfactory laboratory work which will be assessed in the deciding of examination results.

598. ELECTRICAL ENGINEERING PART II  
(Professor Moorhouse, Mr. Brownlee, Mr. Ferguson, Mr. King-Smith, Mr. Hooper.)  

(Networks, Power and Electronics)

A course of about 115 lectures with laboratory work and practice classes throughout the year.


LABORATORY AND CLASS WORK. Eight hours per week on experiments and examples relating to the above course. No student will be admitted to the Final Examination without evidence of satisfactory laboratory work which will be assessed in the deciding of examination results. A practical examination will be held in doubtful cases. Records of laboratory work must be submitted periodically as required by demonstrators.

Books. (a) Recommended for preliminary reading:  
Carter, G. W.—The Electromagnetic Field in its Engineering Aspects. (Longmans.)  
Newstead, G.—General Circuit Theory. (Methuen.)  

(b) Prescribed text-books:  
*Clement, P. R. and Johnson, W. C.—Electrical Engineering Science (McGraw-Hill.)  
Dale, J. B.—Five Figure Tables of Mathematical Functions. (Arnold.)
Joyce, M. V., and Clarke, K. K.—Transistor Circuit Analysis. (Addison-Wesley.)

(c) Recommended for reference:
Draper, A.—Electrical Machines. (Longmans.)
Kinnard, T. F.—Applied Electrical Measurements. (Wiley.)
Foecke, H. A.—Introduction to Electrical Engineering Science. (Prentice-Hall.)
Reed, M.—Alternating Current Circuit Theory. (Harper.)
Puchstein, A. F., Lloyd, T. C., and Conrad, A. G.—Alternating Current Machines. (Wiley.)
Say, M. G.—Design of Alternating Current Machines. (Pitman.)
Mueller, G. V.—Introduction to Electrical Engineering. (McGraw-Hill.)
Bradshaw, E.—Electrical Units. (Chapman and Hall.)
Angelo, E. J.—Electronic Circuits. (McGraw-Hill.)
Gulilemin, E. A.—Introductory Circuit Theory. (Wiley.)
Gray, T. S.—Applied Electronics. (Wiley.)
Seely, S.—Electron-Tube Circuits. (McGraw-Hill.)
Ryder, J. D.—Engineering Electronics. (McGraw-Hill.)
Cheng, D. K.—Analysis of Linear Systems. (Addison-Wesley.)
Wilts, C. H.—Principles of Feedback Control. (Addison-Wesley.)

EXAMINATION. Two 3-hour papers for Pass and Honours.

602. ELECTRICAL ENGINEERING PART III

(Professor Moorhouse, Mr. Ferguson, Mr. Brownlee, Mr. King-Smith, Mr. Catravas, Mr. Hooper, Mr. Hewitt, Mr. McCutchan, Mr. Bonwick and visiting lecturers)

A course of about seven lectures per week, with laboratory and drawing-office work throughout the year.

For Final Honours students there may be special advanced lectures in place of portions of the syllabus shown. A higher standard of laboratory and practice class work will be required.

Students are expected to attend all units of Group I and to select any six units of Groups II and III in addition. One extra unit may be permitted.

Group I. Compulsory

(a) Network Analysis Part I
(b) Network Analysis Part II (Honours only)
(c) Electronic Circuits Part I
(d) Electronic Circuits Part II
(e) Measurements and Analogue Computers
(f) Control Systems Part I
(g) Standard Machines and Equipment.

Group II. Power and General

(a) Commutator Machines and Rectifiers
(b) Machine Design (Electrical)
(c) Power Transmission and Distribution
(d) Power System Analysis
(e) Control Systems Part II
(f) Illumination and Photometry
(g) High Voltage Engineering
(h) Machine Design (Mechanical)
(i) Heat Transfer.
Group III. Electronics and Communications

(a) Advanced Electronic Circuits
(b) Microwave Techniques
(c) Advanced Electronic Devices
(d) Network Synthesis
(e) Modulation Theory
(f) Communication Circuits
(g) Radio Communication
(h) Acoustics
(i) Industrial Electronics
(j) Switching Circuits.

I. (a) Network Analysis I

(b) Network Analysis II
Complex Transformations. Tensor Analysis of Networks and Machines. Special Topics.

(c) Electronic Circuits I
Low and High Level Oscillators. Regenerative Pulse forming Circuits.

(d) Electronic Circuits II
Introduction to communication systems. Principles of amplitude and frequency modulation. Modulators and Demodulators.

(e) Measurements and Analogue Computers
Precision D.C. measurements. A.C. measurements over a wide range of frequencies, with particular reference to bridge methods. Analogue Computers, theory and applications.

(f) Control Systems I

(g) Standard Machines and Equipment

II. (a) Commutator Machines and Rectifiers

(b) Machine Design (Electrical)
Various topics in Transformer and Large Machine design.

(c) Power Transmission and Distribution

(d) Power System Analysis

(e) Control Systems II

(f) Illumination
Concepts and units used in illumination and measurement of quantities involved. Construction and characteristics of tungsten lamps and various discharge lamps. Various illumination problems including topics in the design of lighting installations.

(g) High Voltage Equipment

(h) Machine Design (Mechanical)
Mechanical design of rotating machines used in Power Engineering with some regard to natural vibration.
(i) **Heat Transfer**
The transfer of thermal energy by conduction, convection (free and forced) and radiation—the development and application of the usual laws, together with dimensional analysis and other techniques.

III. (a) **Advanced Electronic Circuits**
Equivalent circuit of “n” electrode valve. Design of feedback amplifiers. The frequency and time response of low pass and band pass amplifiers.

(b) **Microwave Techniques**

(c) **Advanced Electronic Devices**
Theory of special electronic devices such as high-frequency transistors, semi-conducting switching elements, magnetic switching elements, magnetrons, travelling wave tubes, masers and light amplifiers.

(d) **Network Synthesis**
Properties of driving point and transfer functions, Synthesis methods for realizing prescribed driving point and transfer functions.

(e) **Modulation Theory**
Angular and pulse modulation. Applications to communications. Noise. Information theory.

(f) **Communication Circuits**
Line transmission of communication signals. Radio frequency lines. The filter, attenuator and equaliser.

(g) **Radio Communications**
Antennae. The propagation of electromagnetic waves. The ionosphere.

(h) **Acoustics**

(i) **Industrial Electronics**
Design of industrial electronic equipment, with examples of: photo-electric relays, electronic counters, timing circuits, R.F. heating, motor control, temperature control, ultrasonics, electronic instrumentation.

(k) **Switching Circuits**
Switching Algebra. The functional and logical design of combinational and sequential switching circuits. Techniques for digital applications.

The provision of units in II and III in a particular year will depend on the demand for them and also on the staff available, but it may be possible to provide alternatives in their stead.

**LABORATORY, DRAWING OFFICE AND CLASSROOM WORK.** Approximately eighteen hours per week, including:

(a) participation in discussion sessions,
(b) the performance of experiments relating to the course,
(c) the execution of original designs and drawings,
(d) the preparation and delivery of a thesis on an aspect of electrical engineering,
(e) the performance of electrical computations,
(f) attendance at excursions.

No student will be admitted to the Final Examination without evidence of satisfactory laboratory and drawing office work, which will be assessed in the deciding of examination results. A practical examination may be held in doubtful cases. Records of laboratory and drawing office work must be submitted periodically as required.

**Books.** (a) Prescribed text-books and equipment.
Draper, A.—*Electrical Machines.* (Longmans.)
Seshu, S., and Balabanian, N.—*Linear Network Analysis.* (Wiley.)
*Murphy, G. J.—Control Engineering.* (Van Nostrand.)

Students taking Unit II(e) will also be required to procure a "Spirule" calculator, or equivalent.
(b) Recommended for reference:

**Group I**


Van Valkenburg, M. E.—*Network Analysis*. (Prentice-Hall.)


Newstead, G.—*General Circuit Theory*. (Methuen.)


Guillemin, E. A.—*Introductory Circuit Theory*. (Wiley.)

(b) Kron, G.—*Tensor Analysis of Networks*. (Wiley.)

Jaeger, J. C.—*An Introduction to the Laplace Transformation*. (Methuen.)

Adkins, B.—*The General Theory of Electrical Machines*. (Chapman and Hall.)

Gibbs, W. J.—*Conformal Transformations in Electrical Engineering*.

(c) Edson, W. A.—*Vacuum Tube Oscillators*. (Wiley.)

Parley, F. J. M.—*Elements of Pulse Techniques*. (Methuen.)


Strauss, L.—*Wave Generation and Shaping*. (McGraw-Hill.)


(d) Sedly, S.—*Radio Electronics*. (McGraw-Hill.)

Terman, F. E.—*Electronic and Radio Engineering*. (McGraw-Hill.)


Schwartz, M.—*Information Transmission Modulation and Noise*. (McGraw-Hill.)

Hancock, J. C.—*An Introduction to the Principles of Communication Theory*. (McGraw-Hill.)

(e) Stout, M. B.—*Basic Electrical Measurements*. (Prentice-Hall.)

Harris, F. K.—*Electrical Measurements*. (Wiley.)


Johnson, C. L.—*Analog Computer Techniques*. (McGraw-Hill.)

Jackson, A. S.—*Analog Computation*. (McGraw-Hill.)


(f) Cheng, D. K.—*Analysis of Linear Systems*. (Addison-Wesley.)

Bower, J. L., and Schultheiss, P. M.—*Introduction to the Design of Servomechanisms*. (Wiley.)

Savant, C.—*Basic Feedback Control System Design*. (McGraw-Hill.)

Wilts, C. H.—*Principles of Feedback Control*. (Addison-Wesley.)


(g) Puchstein, A. F., Lloyd, T. C., and Conrad, A. G.—*Alternating Current Machines*. (Wiley.)

Carr, C. C.—*Electric Machinery*. (Wiley.)

**Group II**

General


or Molloy, E., Say, M. G., Walker, R. C., and Windred, G.—*Electrical Engineers' Reference Book*. (Newnes.)

(a) Teago, F. J.—*The Commutator Motor*. (Methuen.)

Adkins, B., and Gibbs, W. J.—*Polyphase Commutator Machines*. (Cambridge.)

Taylor, E. O.—*The Performance and Design of A.C. Commutator Motors*. (Pitman.)

Rasik, H.—*Mercury Arc Current Converters*. (Pitman.)

(b) Smith, S. P., and Say, M. G.—*Electrical Engineering Design Manual*. (Chapman and Hall.)
Say, M. G.—Design of Alternating Current Machines. (Pitman.)
Gibbs, W. J.—Conformal Transformations in Electrical Engineering.
Westinghouse Engineers—Electrical Transmission Data and Reference Book. (Westinghouse.)
(d) Mortlock, J. R., and Humphrey Davies, M. W.—Power System Analysis. (Chapman and Hall.)
(e) Truxal, J. G.—Automatic Feedback Control System Synthesis. (McGraw-Hill.)
(f) Walsh, J. W. T.—Photometry. (Constable.)
Clark, D. A.—Modern Electric Lamps. (Blackie.)
Stevens, W. R.—Principles of Lighting. (Constable.)
Cotton, H.—Electric Discharge Lamps. (Chapman and Hall.)
Weston, H. C.—Sight, Light and Efficiency. (H. K. Lewis.)
(i) (a) Prescribed text-books:
(b) Recommended for reference:

Group III

(a) Stewart, J. L.—Circuit Theory and Design. (Wiley.)
Martin, T. L.—Electronic Circuits. (Prentice-Hall.)
Thomason, J. G.—Linear Feedback Analysis. (Pergamon.)
Joyce, M. V. and Clarke, K. K.—Transistor Circuit Analysis. (Addison-Wesley.)
(b) Reich, H. J., and others.—Microwave Theory and Techniques. (Van Nostrand.)
Barlow, H. E. M., and Cullen, A. L.—Microwave Measurements. (Constable.)
Bronwell, A. B., and Beam, R. E.—Theory and Application of Microwaves. (McGraw-Hill.)
Soohoo, R. F.—Theory and Application of Ferrites. (Prentice-Hall.)
Reich, H. J.—Microwave Principles. (Van Nostrand.)
(c) Benham, W. E., and Harris, I. A.—The Ultra High Frequency Performance of Receiving Valves. (MacDonald.)
Van der Ziel, A.—Solid State Physical Electronics. (Prentice-Hall.)
(d) Guillemin, E. A.—Synthesis of Passive Networks. (Wiley.)
Cauer, W.—Synthesis of Linear Communication Networks. (McGraw-Hill.)
Van Valkenburg, M. E.—Introduction to Modern Network Synthesis. (Wiley.)
Balabanian, N.—Network Synthesis. (Wiley.)
Stewart, J. L.—Circuit Theory and Design. (Wiley.)
(e) Black, H. S.—Modulation Theory. (Van Nostrand.)
Schwartz, M.—Information Transmission Modulation and Noise. (McGraw-Hill.)
Fano, R. M.—Transmission of Information. (Wiley.)
Hancock, J. C.—An Introduction to the Principles of Communication Theory. (McGraw-Hill.)
Goldman, S.—Information Theory. (Prentice-Hall.)
Johnson, W. C.—Transmission Lines and Networks. (McGraw-Hill.)
Jackson, W.—*High Frequency Transmission Lines*. (Methuen.)
Jackson, L. C.—*Wave Filters*. (Methuen.)
Ryder, J. D.—*Networks, Lines and Fields*. (Prentice-Hall.)
Stewart, J. L.—*Circuit Analysis of Transmission Lines*. (Wiley.)
(g) Kraus, J. D.—*Antennas*. (McGraw-Hill.)
Schelkonoff—*Advanced Antenna Theory*. (Wiley.)
(h) Beranek, L. L.—*Acoustics*. (McGraw-Hill, 1954.)
Olson, H. F.—*Acoustical Engineering*. (Van Nostrand.)
Huebsch, T. F., and Bolt, R. H.—*Sonic Techniques for use of sound and ultrasound in Engineering and Science*. (Wiley, 1955.)
Kretzmann, R.—*Industrial Electronics*. (Cleaver Hume.)
Davis, W. L., and Weed, H. R.—*Industrial Electronic Engineering*. (Prentice-Hall.)
(k) Caldwell, S. H.—*Switching and Logic Circuit Design*. (Wiley.)
Humphrey, W. S.—*Switching Circuits*. (McGraw-Hill.)

**Examinations.** Examinations will be held during the year at the end of the unit courses. There will be four 3-hour papers, or an equivalent number of hours of shorter papers, for Pass at the end of the year. Exemption from two of these papers is granted to those who pass in the unit examinations during the year. There will be four 3-hour papers, or an equivalent number of hours of shorter papers for Honours at the end of the year.

656. **ELECTRICAL ENGINEERING DESIGN**
(Mr. Bonwick, and Mr. King-Smith)

A course of about 25 lectures and 80 hours' practical work.

**SYLLABUS.** (i) Introductory concepts, Design calculations, Conductors, Inductors. Mechanical forces, Frequency effects, Rating, Thermal effects, Contacts and switches, Control gear, Components, Magnetic circuits and materials, Pull magnets, Inductors.

(ii) A Book Study (during Third Term).

**Books.** (a) Prescribed text-books:
Wilson, W.—*The Design and Calculation of Electrical Apparatus*. (Chapman and Hall.)

(b) Recommended for reference:
Molloy, E., Say, M. G., Walker, R. C., and Windred, G.—*Electrical Engineers' Reference Book*. (Newnes.)

**Examination.** One 3-hour paper for pass and honours. Practical work done during the year will be assessed in deciding results.

636. **ELEMENTARY ECOLOGY**
(Dr. Patton)

A course of 26 lectures, with practical work.

**SYLLABUS.** A systematic study of Australian native trees; types of vegetation—grassland, forest, scrub, swamp.
Environmental factors and their relation to the structure and distribution of vegetation in Australia and, in particular, in Victoria.
The study of soils in the field; their texture, structure and pH.; nature of the soil profile; elementary mechanical analysis; elementary physics of the soil; soil mapping.

**Practical and Field Work.** Two hours' laboratory work per week throughout the year, and a minimum of seven half-day and seven full-day field excursions.
BOOKS. Recommended for reference:
Leeper, G. W.—An Introduction to Soil Science. (M.U.P.)
Patton, R. T.—Know Your Own Trees. (3rd imp., M.U.P.)

EXAMINATION. One 3-hour theory paper and one 3-hour practical examination.

552. ENGINEERING PART I
(Professor Francis, Professor Moorhouse, Mr. Vasey, Mr. Brown)

A course of three lectures per week with drawing office work.

Students entering for the first time will be required to attend an introductory course of two weeks' duration, commencing on Monday, 26 February 1962.

SYLLABUS. (a) Descriptive Geometry and Engineering Drawing. A course of about 20 lectures.
The use of drawing instruments, conventional engineering drawing practice and its principles. Construction of graphs and monograms. Descriptive (solid) geometry, including projections and sections of solids. Problems relating to planes, interpenetration and development of surfaces.

(b) Strength of Materials I. A course of about 27 lectures.

(c) Dynamics of Machines I. A course of about 18 lectures.

(d) Engineering Background. A series of about 13 lectures.
The engineering courses and their relationship to developments, past, present and future.

DRAWING OFFICE WORK. Four hours per week throughout the year, entailing the solution of problems relating to sections (a), (b), (c) above.

Students must procure the following set of drawing requisites before the course commences:

1. Set of drawing instruments.
   Engineers should obtain a good set as it will be constantly required throughout the course and probably after graduation.
   The set must contain:
   Compasses—with pen and pencil attachment, and extension arm.
   Pen and pencil spring bows and dividers.
   Ruling pen.
2. One 10 in. slide rule with ABCD, Sin, Tan, log-log scales—preferably Darmstadt pattern, or P.I.C. (A. G. Thornton, Ltd.).
3. Celluloid set squares.
   One 10 in. adjustable set square.
   One 60 degrees set square, 10 in. size or larger.
4. One celluloid protractor 5 in. diameter or larger—preferably full circle type.
5. One French curve.
   One 12 in. "chain" scale graduated 20, 40, 80, 100 parts to the inch (decimal).
7. Pencils—good quality drawing pencils.
   F (2 required), H (2 required), 4H and 5H or 6H.
   Also set of coloured pencils (6 colours).
8. One hard eraser, one art gum, one eraser shield.

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9. One small fine file (5 in. smooth warding file) or sand-paper block.
10. Indian ink. Pen and nibs (303 Gillott).
11. One roll of drafting tape.

Note: University students may claim exemption from sales tax on the above equipment.

Books. (a) Recommended for preliminary reading:
Grinter, L. E.—Engineering Preview. (Macmillan.)
Hogben, L. T.—Science for the Citizen. (Allen and Unwin.)
Huxley, J.—Uniqueness of Man. (Chatto and Windus.)
Shute, N.—Slide Rule. (Heinemann.)
Kirby, R. S., et al.—Engineering in History. (McGraw-Hill.)

(b) Prescribed text-books:
*Abbott, W.—Practical Geometry and Engineering Graphics. (Blackie.)
*Institution of Engineers (Australia)—Australian Standard Engineering Drawing Practice. (A.S. No. CZ. I, 1951.)
*Bevan, T.—Theory of Machines. (Longmans.)

(c) Recommended for reference: British Standards Institution—Engineering Drawing Practice. (B.S. 308—1953.)
Wellman, B. L.—Technical Descriptive Geometry. (McGraw-Hill.)
Lamb, H.—Statics. (C.U.P.)
Meriam, J. L.—Mechanics Part I—Statics. (Wiley.)
Inglis, C. E.—Applied Mechanics for Engineers. (C.U.P.)
Hunt, K. H.—Mechanisms and Motion. (English Universities Press.)
Hart, I. B.—The Great Engineers. (Methuen.)
Cressy, E.—A Hundred Years of Mechanical Engineering. (Duckworth.)
Hall, A. S.—Construction of Graphs and Charts. (Pitman.)

EXAMINATION. Two 3-hour papers for Pass and Honours combined. In order to pass the subject, students must reach a satisfactory standard in both the drawing office work and in each section of the written papers.

556. ENGINEERING DESIGN PART I
(Mr. Svensson)

A course of one lecture per week and about sixty hours drawing office work commencing in the seventh week of first term.


DRAWING OFFICE WORK. Students are required to prepare and submit design reports and drawings as required during the year. Work submitted will be assessed as part of the Annual Examination.

Books. (a) Recommended for preliminary reading:
Wallace, P. J.—The Technique of Design. (Pitman.)
Teague, W. D.—Design This Day. (Studio.)
Van Doren, H.—Industrial Design. (McGraw-Hill.)
(b) Prescribed text-books:

*either *Black, P. H.—*Machine Design.* (McGraw-Hill.)
or *Maleev, V. L., and Hartmann, J. B.—*Machine Design.* (McGraw-Hill.)

(c) Recommended for reference:

Shigley, J. E.—*Machine Design.* (McGraw-Hill.)
Koenigsberger, E.—*Design for Welding.* (Longmans.)
Marks, L. S.—*Mechanical Engineers' Handbook.* (McGraw-Hill.)
Baldwin, E. N., and Niebel, B. W.—*Designing for Production.* (Irwin.)
Gilson, J.—*A New Approach to Engineering Tolerances.* (Machy. Publishing Co.)
Parker, S.—*Drawings and Dimensions.* (Pitman.)
The following Specifications and Codes:

Rolled Steel Sections for Structural Purposes (AS—AI—1940)
Welding Code AS—CA8—1939
and Int 352—1952.

Limits and Fits for Engineering BS—1916 Ptl. —1953
Helical and Straight Spur Gears BS—436—1940
Engineering Drawing Practice BS—308—1953

EXAMINATION. One 3-hour paper for pass only. The drawing office work will be assessed in the deciding of the examination results.

565. ENGINEERING DESIGN A

(Mr. Wood, Dr. Stevens, Mr. Dow)

A course of about 60 lectures and 100 hours' drawing office or laboratory work throughout the year for Civil Engineering students.

SYLLABUS. Group AI. Structural Theory:

A course of twenty-one lectures and fifty hours practice and laboratory class. Analysis of statically determinate structures; influence lines, deflections, general structural theory. Introduction to statically indeterminate structures.

Group AII. Structural Design:

A course of twenty-five lectures and about fifty hours' drawing office work.
Design of structures—loads, wind pressure, impact effect.
Building and bridge frames—bracing of these structures.
Design in reinforced concrete. The elements of prestressed concrete. The design of large built-up members.
A short course in the writing of English is included in this subject.

DRAWING OFFICE WORK. Students are required to prepare and submit during the year original designs based on the lecture course. Work submitted will be assessed as part of the Annual Examination.

Books. (a) Prescribed text-books:

*Timoshenko, S., and Young, D. H.—*Theory of Structures.* (McGraw-Hill.)
*Bresler, B., and Lin, T. Y.—*Design of Steel Structures.* (Wiley.)
or *Gaylord, E. H., and Gaylord, C. N.—*Design of Steel Structures.* (McGraw-Hill.)
*Ferguson, P. M.—*Reinforced Concrete Fundamentals.* (Wiley.)

(b) Recommended for reference:

Matheson, J. A. L.—*Hyperstatic Structures.* Vols. I. and II. (Butterworth.)
Grinter, L. E.—*Theory of Modern Steel Structures,* Vol. I. (Macmillan.)

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Priest, H. M.—The Practical Design of Welded Steel Structures. (Amer.
Welding Soc.)
Dunham, C. W.—Theory and Practice of Re-inforced Concrete. (McGraw-
Hill.)
Sutherland, H., and Reese, R. C. S.—Reinforced Concrete Design. (Wiley.)
Pearson, R. G., Kloot, N. H., and Boyd, J. D.—Timber Engineering Design

EXAMINATION. Two 3-hour papers for Pass and Honours combined. The res-
ults of practical work done during the year will be assessed as part of the
examination.

584. ENGINEERING DESIGN PART II
(Mr. Clifton)

Four hours per week of Drawing Office work throughout the year.
SYLLABUS. Design of pressure vessels, simple structures and the mechanical
parts of prime movers and other machines.
EXAMINATION. One 3-hour paper for Pass and Honours combined. No student
will be admitted to the Final Examination without evidence of satisfactory Draw-
ing Office work which will be assessed in the deciding of examination results.

599. ENGINEERING DESIGN PART II A
(Mr. Clifton)

Three hours per week of Drawing Office work throughout the year.
SYLLABUS. Design of the mechanical parts of prime movers and other machines.
EXAMINATION. One 3-hour paper for Pass and Honours combined. No student
will be admitted to the Final Examination without evidence of satisfactory Drawing
Office work which will be assessed in the deciding of examination results.

652. ENGINEERING DESIGN PART III (MECHANICAL)
(Mr. Clifton)

Three hours per week of Drawing Office work and some lectures for the first
half of the year.
SYLLABUS. Design project of an advanced nature based on work covered in
the whole Mechanical Engineering course.
EXAMINATION. The Design Project will be used to assess the standard of
all candidates.

653. ENGINEERING DESIGN PART III (INDUSTRIAL)
(Mr. Svensson, Mr. Mansoor)

Three hours per week of Drawing Office work and some lectures for the first
half of the year.
SYLLABUS. Product design with special attention to sales potential, cost of
production and selection of suitable production methods.
BOOKS. Recommended for reference:
Baldwin, E. N., and Niebel, B. W.—Designing for Production. (Irwin.)
Boiz, R.—Production Processes—Their Influence on Design. (Penton.)
(Irwin.)
EXAMINATION. The Design Project will be used to assess the standard of
all candidates.

574. ENGINEERING DESIGN (MINING)
(Mr. Aroni)

A course of 25 lectures and about 40 hours drawing office work together with
a short course of not more than ten lectures on mechanical and structural aspects
of mining design.
SYLLABUS. (i) Analysis of statically determinate structures. Influence lines.
Introduction to statically indeterminate structures.
(ii) Structural materials. Types of structures and loads. Margins of safety. Working stresses.

(iii) Theory and design of beams and girders in steel.

(iv) Theory and design of reinforced concrete beams, columns and slabs.

(v) Theory and design of steel and timber compression members. Riveted and welded connections; timber connections.

Drawing Office Work. Students are required to prepare and submit during the year original designs based on the lecture course. Work submitted will be assessed as part of the Annual Examination.

Books. (a) Prescribed text-books:
- Grinter, L. E.—Elementary Structural Analysis and Design. (Macmillan.)
- Ferguson, P. M.—Reinforced Concrete Fundamentals. (Wiley.)

(b) Recommended for reference:

Examination. One 3-hour paper. The results of practical work done during the year will be assessed as part of the examination.

560. ENGINEERING MATERIALS
(Dr. Osborn)

A course of approximately 48 lectures and 36 hours' practical work.

Syllabus. (a) Nature and Structure—Elementary physics of the solid state with particular reference to metals, plastics, ceramics, resins, rubber, etc. The interaction of particles forming aggregate structures, e.g. rocks, soils, concrete. Elementary chemistry of cement and its relation to the macro structure of concrete. The structure of timber and fibres. The physico-chemical structures of gases and liquids.

(b) Engineering Properties and Behaviour—
Mechanical—elasticity and anelasticity, plasticity, strength, fracture, creep, fatigue, etc.
Electrical—conduction, insulation, thermo-electric effect.
Magnetic. Dielectric behaviour.
Thermal—expansion and conductivity.
Nuclear—neutron cross section, radiation damage.
Optical—transparency, photo and electro luminescence.
Volumetric—swelling and shrinking phenomena.
Surface—adhesion, friction, etc.
Deterioration—corrosion, organic decay, chemical attack, etc.

Books. (a) Prescribed text-book:
- Van Vlack, L. H.—Elements of Materials Science. (Addison-Wesley.)

(b) Recommended for reference:
- Hippel, von A. R.—Molecular Science and Molecular Engineering. (Wiley.)
- Jaeger, J. C.—Elasticity, Fracture and Flow. (Methuen.)
- Gensamer, M.—Strength of Materials under Combined Stress. (A.S.M.)
- Sinnott, M. J.—The Solid State for Engineers. (Wiley.)
- Guy, A. G.—Elements of Physical Metallurgy. (Addison-Wesley.)

Examination. One 3-hour paper.
All work done in connection with practical work and practice classes will be taken into account in assessing the results of the year's work in conjunction with the results of the Annual Examination. All records made during the year should be retained for submission if required in connection with the Annual Examination.

553. ENGINEERING MATHEMATICS PART I
(Mr. Ryan)

A course of four lectures and three hours tutorial and practice classes per week throughout the year.

Preliminary reading: At least two of the following:
- Turnbull, H. W.—The Great Mathematicians. (Methuen.)
- Dantzig, T.—Number, the Language of Science. (Allen and Unwin or Anchor.)
- Smeltzer, D.—Man and Number. (Blackie.)
- Kline, M.—Mathematics in Western Culture. (Allen and Unwin.)
- Abbott, A.—Flatland. (Macmillan or Dover.)

(iii) Calculus. Integration and differentiation; geometrical and physical applications. Series expansions. Partial differentiation. Simple differential equations; physical and chemical applications.
(iv) Dynamics. Idealizations of physical systems. Principles of mechanics. Motion of a particle, of a system of particles and of rigid bodies.

Students will be expected to learn to use manual calculating machines.

Books. (a) Prescribed text-books:
- Thomas, G. B.—Calculus and Analytic Geometry. (Addison-Wesley.)
- Kells, L. M.—Analytic Geometry and Calculus. (Prentice-Hall.)
- Kaye, G., and Laby, T.—Four Figure Mathematical Tables. (3rd ed., Longmans.)
- Knott, C.—Four Figure Mathematical Tables. (Chambers.)

(b) Recommended for reference:
- Courant, R.—Differential and Integral Calculus, Vol. I. (Blackie.)
- Tuckey, C. O., and Armistead, W.—Coordinate Geometry. (Longmans.)
- Randolph, J. F.—Calculus. (Macmillan.)
- Caunt, G. W.—Infinitesimal Calculus. (Oxford.)
- Weatherburn, C. E.—Elementary Vector Analysis. (Bell.)
- Brand, L.—Vectorial Mechanics. (Wiley.)

EXAMINATION. Two 3-hour papers for Pass and Honours; the work done in tutorials, practice classes and on test papers will also carry some weight.

557. ENGINEERING MATHEMATICS PART II
(Mr. Barton)

A course of two lectures and two practice classes per week throughout the year.

PRELIMINARY READING. At the beginning of the year, some knowledge will be required of at least two of:
Sawyer, W. W.—Prelude to Mathematics. (Pelican.)
Struik, D. J.—A Concise History of Mathematics. (Bell or Dover.)
Hilbert, D., and Cohn-Vossen, S.—Geometry and the Imagination. (Chelsea.)
Selected topics.
Maxwell, J. C.—Matter and Motion. (Dover.)

SYLLABUS. (i) Vector Analysis. Differentiation and integration of scalar and vector point functions. Vector fields.
(iii) Integration. Reduction formulae. Improper integrals.
(iv) Differential Equations. Standard types of equations of first and second orders. Linear equations with constant coefficients, of second and higher orders, and simultaneous systems.
(vi) Functions of Several Real Variables. Multiple integrals. Differentials. Stationary values. Line integrals.
(vii) Algebra. Boolean algebra; applications to logic, sets and networks.
(viii) Applications. Geometrical and physical applications. Mechanical and electrical principles.

Books. Recommended for reference:
(i) Phillips, H. B.—Vector Analysis. (Wiley.)
Hague, B.—An Introduction to Vector Analysis. (Methuen.)
Gans, R.—Vector Analysis. (Blackie.)
Weatherburn, C. E.—Advanced Vector Analysis. (Bell.)
(ii) Durell, C. V., and Robson, A.—Advanced Trigonometry, Chs. VIII to XIII. (Bell.)
Siddons, A. W., and Hughes, R. T.—Trigonometry, Part IV. Ch. XVII. (C.U.P.)
Maxwell, E. A.—Analytical Calculus, Vol. II. Ch. XI. (C.U.P.)
Bowman, F.—Elementary Algebra, Part II. Chs. XLIII, XLIV. (Longmans.)
(iii), (iv), (v) and (vi) Kells, L. M.—Analytic Geometry and Calculus. (Prentice-Hall.)
Osgood, W. F.—Advanced Calculus. (Macmillan.)
Courant, R.—Differential and Integral Calculus, 2 vols. (Blackie.)
Relton, F. E.—Applied Differential Equations. (Blackie.)
Kaplan, W.—Ordinary Differential Equations. (Addison-Wesley.)
Thomas, G. B.—Calculus and Analytic Geometry. (Addison-Wesley.)
Caunt, G. W.—Introduction to Infinitesimal Calculus. (Oxford.)
(v) Bowman, F.—Elementary Algebra, Part II. Chs. XXXVIII to XLI. (Longmans.)
Durell, C. V., and Robson, A.—Advanced Algebra, Vol. II. Ch. XIV. (Bell.)
Green, J. A.—Sequences and Series. (Routledge and Kegan Paul.)
Jaeger, J. C.—Introduction to Applied Mathematics. (O.U.P.)

EXAMINATION. One 3-hour paper for Pass and Honours; the work done in practice classes and on test papers will also carry some weight.

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A course of two lectures and two hours practice work per week throughout the year.

**Preliminary Reading.** At the beginning of the year some knowledge will be required of at least two of the following:

Bell, E. T.—*Mathematics, Queen and Servant of Science.* (Bell.)
Kasner, E., and Newman, J. R.—*Mathematics and the Imagination.* (Simon and Schuster.)
Sawyer, W. W.—*A Concrete Approach to Abstract Algebra.* (Freeman.)
Stabler, E. R.—*An Introduction to Mathematical Thought.* (Addison-Wesley.)
Bell, E. T.—*Men of Mathematics.* (Pelican.)
Sutton, O. G.—*Mathematics in Action.* (Bell.)
or another of the books listed for preliminary reading for the previous year.

**Syllabus.**

(i) *Matrix Algebra.* Linear transformations; Rank; Partitioning. Eigenvalues. Applications to vibrating systems, networks and dimensional analysis.

(ii) *Vector Analysis.* Integral transformations; physical applications. Curvilinear coordinates. Potential theory.


(v) *Functions of Real Variables.* Functions defined by integrals and differential equations; Bessel and Legendre functions. Partial differential equations. Difference equations.


Computations will involve the use of manual and electric calculating machines.

**Books.**

(a) *Prescribed text-books:*

Hildebrand, F. B.—*Advanced Calculus for Engineers.* (Prentice-Hall.)
Cohn, P. M.—*Linear Equations.* (Routledge and Kegan Paul.)

(b) *Recommended for reference:*

Phillips, H. B.—*Vector Analysis.* (Wiley.)
Hague, B.—*An Introduction to Vector Analysis.* (Methuen.)
Bronwell, A.—*Advanced Mathematics in Physics and Engineering.* (McGraw-Hill.)

Ford, L. R.—*Differential Equations.* (McGraw-Hill.)
Carslaw, H. S., and Jaeger, J. C.—*Operational Methods in Applied Mathematics.* (O.U.P.)
Margenau, H., and Murphy, G. M.—*The Mathematics of Physics and Chemistry.* (Van Nostrand.)
Karman, T., and Biot, M. A.—*Mathematical Methods in Engineering.* (McGraw-Hill.)

Birkhoff, G., and MacLane, S.—*A Survey of Modern Algebra.* (Macmillan.)
Scarborough, J. B.—*Numerical Mathematical Analysis.* (Johns Hopkins.)
Buckingham, R. A.—*Numerical Methods.* (Pitman.)
Hartree, D. R.—*Numerical Analysis.* (O.U.P.)
Jahnke, E., and Emde, F.—*Tables of Functions.* (Dover.)

Langhaar, H. L.—*Dimensional Analysis and Theory of Models.* (Wiley.)

**Examination.** Two 3-hour papers for Pass and Honours, together with prescribed computations during the course.

* Subject to approval of previous mathematical performance.
566. ENGINEERING MATHEMATICS PART IIIA

A course of 1 lecture and an average of 1 hour practice work throughout the year.

Preliminary Reading. One of the following books:
Bell, E. T.—Mathematics, Queen and Servant of Science. (Bell.)
Sutton, O. G.—Mathematics in Action. (Bell.)
or another of the books listed for preliminary reading for Engineering Mathematics Part II.

Syllabus. A selection of topics from the following:
(i) Matrix Algebra. Linear transformations. Inverse of a matrix.
(ii) Vector Analysis. Integral transformations; equations of hydrodynamics, heat and electromagnetism.
(iii) Laplace Transforms. Solution of linear differential equations with constant coefficients.

Computations will involve the use of manual and electric calculating machines.

Books. (a) Prescribed text-book:

(b) Recommended for reference:
Hildebrand, F. B.—Advanced Calculus for Engineers. (Prentice-Hall.)
Jaeger, J. C.—An Introduction to the Laplace Transformation. (Methuen.)
Cohn, P. M.—Linear Equations. (Routledge and Kegan Paul.)
Scarborough, J. B.—Numerical Mathematical Analysis. (Johns Hopkins.)

Examination. One 3-hour paper together with prescribed computations during the course, for pass standard only.

594. ENGINEERING MATHEMATICS PART IIIB

A course of two lectures a week and one hour practice/tutorial throughout the year.

Syllabus. (i) As in Engineering Mathematics Part III A.
(ii) Introduction to Operational Research (See under separate heading).
(iii) Introduction to the theory of Control Systems, as in Industrial Electronics and Control Syllabus.

Books. (a) As in Engineering Mathematics Part III A, and

(b) Prescribed text-book:
Murphy, G. J.—Control Engineering. (Van Nostrand, 1959.)

(c) Recommended for reference:

Examination. Two 3-hour papers: one in section (a) (Engineering Mathematics Part IIIA), and one in sections (b) and (c) together, together with prescribed computations during the course, for pass standard only.
A course of two lectures and two practice classes weekly throughout the year. For part of the year, three lectures a week may be given, but attendance at only two of these will be required.

Preliminary Reading. At the beginning of the year some knowledge will be required of at least two of:

Bell, E. T.—The Development of Mathematics. (McGraw-Hill.)
Klein, F.—Elementary Mathematics—Arithmetic, Algebra, Analysis. (Dover.)
Klein, F.—Elementary Mathematics—Geometry. (Dover.)
Cohen, M. R., and Nagel, E.—An Introduction to Logic and Scientific Method. (Harcourt Brace.)
Smith, D. E.—A Source Book in Mathematics. (McGraw-Hill or Dover.)
Newman, J. R.—The World of Mathematics. (Simon and Schuster.)
or another of the books listed for preliminary reading for previous years.


(vi) \textit{Linear Programming}. Convex sets; extrema. Simplex method. Duality.

(vii) Extension of treatment of a selection of topics prescribed for Engineering Mathematics Part III.

Books. (a) Prescribed text-books:
Hildebrand, F. B.—Methods of Applied Mathematics. (Prentice-Hall.)
Smith, L. P.—Mathematical Methods for Scientists and Engineers. (Prentice-Hall.)

(b) Recommended for reference:
Morse, P. M., and Feshbach, H.—Methods of Theoretical Physics. (McGraw-Hill.)
Osgood, W. F.—Advanced Calculus. (Macmillan.)
Beckenbach, E. F.—Modern Mathematics for the Engineer. (McGraw-Hill.)
Lighthill, M. J.—Fourier Analysis and Generalised Functions. (Chapman and Hall.)
Friedmann, B.—Principles and Techniques of Applied Mathematics. (Chapman and Hall.)
Sokolnikoff, I. S.—Tensor Analysis. (Wiley.)
Gibbs, W. J.—Tensors in Electrical Machine Theory. (Chapman and Hall.)
Stoker, J. J.—Non-Linear Vibrations. (Interscience.)
Vajda, S.—The Theory of Games and Linear Programming. (Methuen.)
See also books listed for Engineering Mathematics Part III.

Examination. Two 3-hour papers for Pass and Honours. The work done in practice classes will also carry some weight.

600. ENGINEERING PRACTICES

(Dr. Craig and external lecturers)

A course of about 40 lectures with periodical practical classes of up to two hours' duration, for Electrical Engineering students.

*Subject to approval of previous mathematical performance.
SYLLABUS.

(i) Business administration—the study of the factors of cost, sources of capital, and other issues relating to industrial activity of concern to the practising engineer.
(ii) Law—contract, tort and workers' compensation.
(iii) Specifications and Contracts—from the points of view of purchasers, suppliers, consultants, or members of standardizing bodies.
(iv) Electrical Wiring Regulations—their composition, application and enforcement.
(v) The writing of English.

BOOKS. (a) Prescribed text-books:
*Australian Standard C.B. 16-1957—General Conditions of Tendering and Contract for the Supply or Supply and Erection of Plant and Machinery. (Standards Association of Australia.)

(b) Recommended for reference:
State Electricity Commission of Victoria.—Wiring Regulations.
Abbett, R. W.—Engineering Contracts and Specifications. (Wiley.)

EXAMINATION. One 3-hour paper for Pass and Honours.

568. FLUID MECHANICS A

(Dr. Lawson, Mr. Joubert and Mr. Sharp)

(i) Introductory Fluid Mechanics
A course of two lectures per week in the first part of the year (approximately 30 lectures total), together with practical and tutorial work.

SYLLABUS. The subject will deal with the basic principles and behaviour of fluids at rest and in motion and will include: statics, kinematics and dynamics of fluids; incompressible flow in closed conduits; compressible flow; flow around immersed bodies; fluid machinery; flow measurement; dynamical similarity.

PRACTICAL WORK. Tutorial classes and laboratory work, totalling about 36 hours, relating to the above course.

BOOKS. (a) Prescribed text-book:

(b) Recommended for reference:
Rouse, H., and Howe, J. W.—Basic Mechanics of Fluids. (Wiley.)
Addison, H.—A Treatise on Applied Hydraulics. (Chapman and Hall.)
Prandtl, L.—The Essentials of Fluid Dynamics. (Blackie.)
Barna, P. S.—Fluid Mechanics for Engineers. (Butterworth.)

(ii) Applications in Hydraulic Engineering
A course of two lectures per week following syllabus (a) (approximately 20 lectures total), together with practical and tutorial work.

SYLLABUS. Flow of liquids over weirs and in channels; flow of liquids in pipe systems; operation characteristics of hydraulic machinery; elaboration of some aspects of syllabus (a).

PRACTICAL WORK. Tutorial classes and laboratory work, totalling about 24 hours, relating to the above course.

BOOKS. (a) Prescribed text-book:
(b) Recommended for reference:

As for syllabus (a).

EXAMINATION. Two 3-hour papers for Pass and Honours. There will be no practical examination, but the written paper may include questions on the practical work. The practical and tutorial work will be assessed in deciding the examination results. Candidates may be required to resubmit their practical books before the examination.

575. FLUID MECHANICS B
(Dr. Lawson, Mr. Joubert and Mr. Sharp)

As for Fluid Mechanics A syllabus (a) together with lectures only of syllabus (b).

EXAMINATION. Two 3-hour papers for Pass standard only. There will be no practical examination, but the written paper may include questions on the practical work. The practical work will be assessed in deciding the examination results. Candidates may be required to resubmit their practical books before the examination.

587. FLUID MECHANICS C
(Dr. Lawson and Mr. Joubert)

As for Fluid Mechanics A syllabus (a).

EXAMINATION. One 3-hour paper for Pass standard only. There will be no practical examination, but the written paper may include questions on the practical work. The practical work will be assessed in deciding the examination results. Candidates may be required to resubmit their practical books before the examination.

654. FLUID MECHANICS PART I
(Dr. Lawson and Mr. Joubert)

A course of two lectures per week throughout the year together with laboratory and practice classes.

SYLLABUS. (i) Introductory Fluid Mechanics.

As for Fluid Mechanics A syllabus (a).

(ii) Classical Hydrodynamics.
Stream functions; circulation; vorticity; velocity potentials; complex potentials; conformal transformations; Kutta-Joukowski conditions; Schwarz-Christoffel theorem; free streamlines; three dimensional vortex motion.

(iii) Gas Dynamics.
One dimensional flow; energy relations; shock waves; entropy changes; flow in nozzles; oblique shock waves.

PRACTICAL WORK. 24 hours of tutorial classes and 36 hours of laboratory work relating to the above course.

Books. (a) Prescribed text-books:
Streeter, V. L.—Fluid Dynamics. (McGraw-Hill.)

(b) Recommended for reference:
Barna, P. S.—Fluid Mechanics for Engineers. (Butterworth.)
Prandtl, L.—The Essentials of Fluid Dynamics. (Blackie.)
Prandtl, L., and Tietjens, O. G.—Applied Hydro and Aero Mechanics. (Dover.)
Lamb, H.—Hydrodynamics. (Dover.)
Rutherford, D. E.—Fluid Dynamics. (Oliver and Boyd.)

EXAMINATION. Two 3-hour papers for Pass and Honours. The first paper will cover the work from syllabus (a). There will be no practical examination but the written papers may include questions on the practical work.
The practical and tutorial work will be assessed in deciding the examination results. Candidates may be required to re-submit their practical books before the examination.

655. FLUID MECHANICS PART II

(Mr. Joubert)

A course of two lectures per week throughout the year together with laboratory and practice classes.

SYLLABUS. (i) Gas Dynamics.
Mach lines; characteristics; hodographs, Prandtl-Meyer expansions; Ackeret theory; small perturbations.

(ii) Wing Theory.
Prandtl lifting line; three dimensional effects.

(iii) Pumps, fans, compressors, propellers and jets. Froude momentum theory; blade element theory, axial flow fans and pumps; centrifugal machines.

(iv) Boundary Layers.
Navier-Stokes equations; Prandtl's assumptions; Laminar solutions; Von Karman's integral relations; Thwaites' solution; transition; turbulence; turbulent boundary layer; velocity defect law, Teten's method; three dimensional effects; Cole's wake function; compressible boundary layers, shock wave interaction; heat transfer.

PRACTICAL WORK. Laboratory work totalling about thirty-six hours given in the first half of the year set under Mechanical Engineering Laboratory plus some further tutorials. A number of projects from this subject will then be set in Mechanical Engineering Project.

Books. (a) Prescribed text-books:
Duncan, Thom and Young.—The Mechanics of Fluids. (Arnold.)
Kuethe and Schetzer.—Foundations of Aerodynamics. (Wiley.)
Liepmann, H. W., and Roshko.—Elements of Gasdynamics. (Wiley.)

(b) Recommended for reference:
Pope.—Wind Tunnel Testing. (Wiley.)
Pankhurst and Holder.—Wind Tunnel Technique. (Pitman.)
Hoerner.—Aerodynamic Drag. (Hoerner.)
Goldstein.—Modern Developments in Fluid Mechanics. Vols. I. and II. (Oxford.)
Thwaites.—Incompressible Aerodynamics. (Oxford.)
Glauer.—Aerofoil and Airscrew Theory. (Cambridge.)
Theodorsen.—Theory of Propellers. (McGraw-Hill.)
Shepherd, D. G.—Principles of Turbo-Machinery. (Macmillan.)
Vavra, M. H.—Aero Thermodynamics and Flow in Turbo Machinery. (Wiley.)

EXAMINATION. One 3-hour paper for Final Pass and Honours. Some further questions on more advanced aspects of the course will be set in one of two combined papers for Final Honours in conjunction with questions from other subjects. Final Honours candidates will also be required to submit an essay on an approved subject not later than 1st December.

In order to pass the subject, candidates must reach a satisfactory standard both in the practical work and in the written papers.

123
A course of three lectures per week, with laboratory and field work, throughout the year.

**SYLLABUS.** Elementary Tectonic and Dynamical Geology, Physiography, Crystallography, Mineralogy, Petrology, Palæontology and Stratigraphy.

**LABORATORY WORK.** Three hours per week, dealing with the study of geological maps and the examination of crystal models, minerals, rocks and fossils.

**FIELD WORK.** Six field excursions, including two whole-day excursions held on Saturdays. Excursion reports may be used in the assessment of candidates' examination results.

**Books.**
(a) Recommended for preliminary reading:
Any of the books recommended for reference below under "General Reading".

(b) Prescribed text-books:
* Rutley, F. (ed. Read)—Elements of Mineralogy. (23rd or later ed., Murby.)
* Harker, A.—Petrology for Students. (C.U.P.)
* Hills, E. S.—The Physiography of Victoria. (Whitcombe & Tombs.)

(c) Recommended for reference:
(i) General Reading. Any of the following:
Read, H. H.—Geology. (H.U.L.)
Longwell, C. R., and Flint, R. F.—Introduction to Physical Geology. (Wiley.)
Brown, H. E., Monnett, V. E., and Stovell, J. W.—Introduction to Geology. (Ginn.)
Dapples, E. C.—Basic Geology for Science and Engineering. (Wiley.)
Garrels, R. M.—A Textbook of Geology. (Harper.)
von Engeln, O. D., and Caster, K. E.—Geology. (McGraw-Hill.)
Lect, D. L., and Judson, S.—Physical Geology. (Prentice-Hall.)
Kirkaldy, F. J. F.—General Principles of Geology. (Hutchinson.)
Dury, G. H.—Face of the Earth. (Penguin.)
(ii) Petrology:
Tyrrell, G. W.—The Principles of Petrology. (Methuen.)
Spock, L. E.—Guide to the Study of Rocks. (Harper.)

The library of the Department of Geology is open to students, and advice as to reading on any special section of the work will be given by members of the Staff.

**EXAMINATION.** One 3-hour written paper; one practical test of 3 hours, 20 minutes.

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**604. GEOLOGY PART I (METALLURGY)**

A course of three lectures per week, with laboratory and field work (omitting lectures in Palæontology and Stratigraphy.

**SYLLABUS.** Elementary Tectonic and Dynamical Geology, Physiography, Crystallography, Mineralogy and Petrology.

**LABORATORY WORK.** Three hours per week, dealing with the study of geological maps and the examination of crystal models, minerals and rocks.

**FIELD WORK.** Six field excursions, including two whole-day excursions held on Saturday. Excursion reports may be used in the assessment of candidates' examination results.

**Books.**
(a) Recommended for preliminary reading:
Any of the books recommended for reference below under "General Reading".

(b) Prescribed text-books:
* Rutley, F. (ed. Read)—Elements of Mineralogy. (23rd or later ed., Murby.)
Harker, A.—*Petrology for Students.* (C.U.P.)

*Hills, E. S.—*The Physiography of Victoria.* (Whitcombe & Tombs.)

(c) Recommended for reference:

(i) General Reading. Any of the following:

Gilluly, J., Waters, C. A., and Woodford, A. O.—*Principles of Geology.* (Free-

man.)

Read, H. H.—*Geology.* (H.U.L.)

Longwell, C. R., and Flint, R. F.—*Introduction to Physical Geology.* (Wiley.)

Brown, H. E., Monnett, V. E., and Stovell, J. W.—*Introduction to Geology.*

(Ginn.)

Dapples, E. C.—*Basic Geology for Science and Engineering.* (Wiley.)

Garrels, R. M.—*A Textbook of Geology.* (Harper.)


(McGraw-Hill.)

von Engel, O. D., and Caster, K. E.—*Geology.* (McGraw-Hill.)

Lect, D. L., and Judson, S.—*Physical Geology.* (Prentice-Hall.)

Kirkaldy, F. J. F.—*General Principles of Geology.* (Hutchinson.)

Dury, G. H.—*Face of the Earth.* (Penguin.)

(ii) Petrology:


Tyrrell, G. W.—*The Principles of Petrology.* (Methuen.)

Spock, L. E.—*Guide to the Study of Rocks.* (Harper.)

The library of the Department of Geology is open to students, and advice as
to reading on any special section of the work will be given by members of the Staff.

**EXAMINATION.** One 3-hour written paper; one practical test of 3 hours 20
minutes.

### 363. GEOLOGY PART II

A course of three lectures per week, with laboratory and field work, through-
out the year.

**SYLLABUS.** Crystallography, Mineralogy, Petrology, Palaeontology, Stratifi-
graphy, and Structural Geology.

**LABORATORY WORK.** Six hours per week.

**FIELD WORK.** Nine field excursions, of which two may be week-end excursi-
ions spent in the field, and the remainder day excursions held on Saturdays
during the session.

**Books.** (a) Recommended for preliminary reading:

Students should seek advice on vacation reading at the end of their First Year.

(b) Prescribed text-books:

* Dana, E. S.—*Text-Book of Mineralogy.* (Wiley.)

* Kerr, P. F.— Optical Mineralogy.* (McGraw-Hill.)


* Hills, E. S.— Outlines of Structural Geology.* (Methuen.)

Harker, A.— *Petrology for Students.* (C.U.P.)

(c) Recommended for reference:

Phillips, F. C.—*An Introduction to Crystallography.* (Longmans.)


(Harper.)

Hartshorne, N. H., and Stuart, A.—*Crystals and the Polarizing Microscope.*

(Arnold.)

Wahlstrom, E. E.— *Optical Crystallography.* (Wiley.)

Winchell, A. N.—*Elements of Optical Mineralogy, Part I.* (Wiley.)

Wahlstrom, E. E.—*Petrographic Mineralogy.* (Wiley.)

Tyrrell, G. W.—*Principles of Petrology.* (Methuen.)

Harker, A.—*Metamorphism.* (Methuen.)


(McGraw-Hill.)


Gignoux, M.—Stratigraphic Geology. (Freeman.)

Dunbar, C. O., and Rodgers, J.—Principles of Stratigraphy. (Wiley.)

Students should make full use of the library in the Geological Department for reference purposes, and help will be given by members of the Staff in the selection of suitable literature.

EXAMINATION. Two 3-hour written papers; three 3-hour practical papers.

572. GEOLOGY PART II (MINING)

As for Geology Part II, but omitting Stratigraphy and Palaeontology.

369. GEOPHYSICS PART I

A course of one lecture and three hours' practical work per week throughout the year.

SYLLABUS.


Thermal Properties: Temperature measurements and thermal conductivity of the earth. Temperatures within the earth.


Radioactivity: Radioactivity of rocks and distribution of radioactivity on the surface of the earth. Radioactive age determinations.

Books. (a) Recommended for preliminary reading:
Jeffreys, H.—Earthquakes and Mountains. (2nd ed., Methuen, 1950.)

(b) Prescribed text-books:

(c) Recommended for reference:
Nettleton, L. L.—Geophysical Prospecting for Oil. (McGraw-Hill, 1940.)

EXAMINATION. One 3-hour paper. There is no practical examination, but the work of each student is assessed continually throughout the year, and is taken into account in determining the success of candidates at the Annual Examination.

637. HYDROLOGY

(Mr. Alexander, Mr. Sharp)

A course of one lecture per week throughout the year.

Rainfall; evaporation; percolation; frequency and intensity of storms; measurement of rainfall; stream gauging. Rainfall—run-off relationship; effect of nature of watershed. Use of hydrographic records for prediction in connection with water supply, drainage and irrigation. Data for erosion control.

Books. (a) Prescribed text-book:

(b) Recommended for reference:
Wisler, C. O., and Brater, E. F.—Hydrology. (Wiley.)
Hydrology Handbook. (Prepared by the Hydrologic Committee of the Hydraulics Division of the American Society of Civil Engineers.)

EXAMINATION. One 3-hour paper for Pass standard only.

232. INDUSTRIAL ADMINISTRATION

A course of two lectures and one tutorial class per week throughout the year.

SYLLABUS. (a) Organisation. Organization as the framework of management. Formal and informal organization. Authority, power and status. The individual and the organization.


Books. Prescribed text-books:
Barnard, C. I.—The Functions of the Executive. (Harvard.)
*Brown, J. A. C.—The Social Psychology of Industry. (Pelican.)
Drucker, P. F.—The Practice of Management. (Harper.)
Newman, W. H.—Administrative Action. (Fisher.)
*Simon, H. A.—Administrative Behaviour. (Macmillan.)

EXAMINATION. Two 3-hour papers.

583. INDUSTRIAL ELECTRONICS AND CONTROL

(Mr. Hewitt, Mr. King-Smith)

A course of two lectures per week throughout the year and approximately 60 hours' laboratory work.

(ii) Practical applications of electronics and electronic circuits.
(iii) Linear control systems—transfer functions, closed-loop systems, transient response, stability, root-locus analysis, error constants, frequency response, Nyquist criterion.

LABORATORY WORK. Approximately 60 hours on experiments and projects related to the course.

No student will be admitted to the final examination without evidence of satisfactory laboratory work.

Books. (a) Prescribed text-book:
Ryder, J. D.—Engineering Electronics with Industrial Applications and Control. (McGraw-Hill.)

(b) Recommended for reference:
Farley, F. J. M.—Elements of Pulse Circuits. (Methuen.)
Gray, T. S.—Applied Electronics. (Wiley.)
Hurley, R. B.—Junction Transistor Electronics. (Wiley.)
Cage, J. M.—Theory and Application of Industrial Electronics. (McGraw-Hill.)
Kloeffler, G.—Industrial Electronics and Control. (Wiley.)
Kretzmann, R.—Industrial Electronics. (Cleaver Hume.)
Savant, C. J.—Basic Feedback Control System Design. (McGraw-Hill.)
Truxal, J. G.—Automatic Feedback Control System Synthesis. (Wiley.)
Murphy, G. J.—Control Engineering. (Van Nostrand.)
Wils, C. H.—Principles of Feedback Control. (Addison-Wesley.)
Cheng, D. K.—Analysis of Linear Systems. (Addison-Wesley.)

Examination. One 3-hour paper for Pass and Honours.

630. INDUSTRIAL ENGINEERING PART I
(Mr. Svensson, Mr. Brown)

A course of two lectures per week and 65 hours practical work throughout the year.


Books. (a) Prescribed text-books:
Shaw, M. C.—Metal Cutting Principles. (3rd ed., Massachusetts Inst. of Technology.)
Degarmo, E. P.—Materials and Processes in Manufacturing. (Macmillan.)

(b) Recommended for reference:
Chisholm, A. J., Lickley, J. M., and Brown, J. P.—The Action of Cutting Tools. (Machining.)
Ernst, H., and others—Machining Theory and Practice. (A.S.M.)
Ernst, H., and others—Machining of Metals. (A.S.M.)
Wright-Baker, H.—Modern Workshop Technology. (Parts I and II.) (Cleaver Hume.)
A.S.E.—Tool Engineers Handbook. (McGraw-Hill.)
Jevons, J. D.—Metallurgy of Deep Drawing and Pressing. (Chapman and Hall.)
Sachs, G.—Fundamentals of Working of Metals. (Pergamon.)

Examination. One 3-hour paper for Pass and Honours.

632. INDUSTRIAL ENGINEERING PART II
(Professor Henderson, Mr. Brown, Mr. Mansoor, Mr. Svensson)

A course of three lectures per week and practical work throughout the year.

SYLLABUS.


Industrial Experimentation. Planning of experiments, analysis of results.

Work Study. History—Gilbreth and others. Field of work study, definitions and application. Human aspects, effect of work study on manager, supervisor and


The dimensional analysis of tolerances on length and on position, design for interchangeability. Probability theory applied to tolerances.


Books. (a) Prescribed text-books:
- B.S. 308-1953—Engineering Drawing Practice.
- B.S. 1916-1953—Parts 1 and 2. Limits and Fits.
- Hume, K. J.—Engineering Metrology. (Macdonald.)

(b) Recommended for reference:
- Rolt, F. H.—Gauges and Fine Measurement. (Macmillan.)
- Grant, E. L.—Statistical Quality Control. (McGraw-Hill.)
- Brownlee, K. A.—Industrial Experimentation. (H.M.S.O.)
- Barnes, R. M.—Motion and Time Study. (Wiley.)
- Bowman, E. H., and Fetter, R. B.—Analysis for Production Management. (Irwin.)
- Parker, S.—Drawings and Dimensions. (Pitman.)
- Baldwin, E. N., and Niebel, B. W.—Designing for Production. (Irwin.)
- Bolz, R.—Production Processes—their Influence on Design. (Fenton.)

EXAMINATION. Two 3-hour papers for Final Pass and Honours. Some further questions on more advanced aspects of the course, together with questions from other subjects, will be set in one of two combined papers for Final Honours. Final Honours candidates will also be required to submit an essay on an approved subject not later than 1st December. In order to pass the subject, candidates must reach a satisfactory standard in both practical work and written papers.

659. INDUSTRIAL ENGINEERING (M)
(Professor Henderson, Mr. Brown, Mr. Mansoor, Mr. Svensson)

A course of about 52 lectures and seminar classes, with practical work.


PRACTICAL WORK. Three hours per week for about half the year.

Books. (a) Prescribed text-books:
- B.S. 308-1953—Engineering Drawing Practice.
- B.S. 1916-1953—Limits and Fits for Engineering Parts I and II.

(b) Recommended for reference:
- Shaw, M. C.—Principles of Metal Cutting. (M.I.T.)
- Rolt, F. H.—Gauges and Fine Measurements, Vols. 1 and 2. (Macmillan.)
- Hume, K. J.—Engineering Metrology. (Macdonald.)
- Parker, S.—Drawings and Dimensions. (Pitman.)
- Bowman, E. H., and Fetter, R. B.—Analysis for Production Management. (Irwin.)
- Barnes, R. M.—Motion and Time Study. (Wiley.)
EXAMINATION. One 3-hour paper for Final Pass and Honours.
Some further questions on more advanced aspects of the course, together
with questions from other subjects, will be set in one of two combined papers for
Final Honours.
Final Honours candidates will also be required to submit an essay on an
approved subject not later than 1st December.
In order to pass the subject, candidates must reach a satisfactory standard in
both practical work and written papers.

660. INDUSTRIAL ENGINEERING LABORATORY
Nine hours per week during the first half of the year, on experiments and
practice classes associated with the subject matter in the fourth year.
No student will be admitted to the Final Examinations without evidence of
satisfactory laboratory work which will be assessed in the deciding of examination
results. Records of laboratory work must be submitted as required.

661. INDUSTRIAL ENGINEERING PROJECT
On the completion of Engineering Design Part III (Industrial) and Industrial
Engineering Laboratory, all students will be required to undertake a special pro-
ject. This may cover an investigation or design relating to some aspect of
Industrial Engineering. The time allotted is approximately 120 hours. The student
will be required to write a thesis and present a paper on the results of his project.
No student will be admitted to the Final Examinations without evidence of
satisfactory Project work which will be assessed in the deciding of examination
results.

631. INDUSTRIAL MANAGEMENT PART I
A course of 68 lectures throughout the year with tutorial classes.
SYLLABUS.
History of industrial development, development of the factory system, types of
ownership, partnership, companies, employer associations, trade unions. Outline of
the theory of economic systems, cost analysis and control, principles of estimating,
elements of the legal system, law of contract, elements of law of tort, arbitration
agency, industrial law, history of development of management, changes in the
philosophy of management—specialization—the functional system, functions to be
performed by management.

Books. (a) Prescribed text-books:
Filippetti, G.—Industrial Management in Transition. (Irwin, 1953.)
Robertson, G. A.—Engineering Management. (Blackie.)
Rubinstein, R.—John Citizen and the Law. (Pelican.)

(b) Recommended for reference:
Fayol, H.—General and Industrial Management. (Pitman.)
Hammond.—Rise of Modern Industry. (Methuen.)
Metcalfe and Urwick.—Dynamic Administration. (Management Prod. Trust
Ltd.)
Wiley, 1955.)
Amrine, H. T., Ritchey, J. A., and Hulley, O. S.—Manufacturing Organiza-
tion and Management. (Prentice-Hall, 1957.)
Shawer, G.—Australian Government Today. (M.U.P.)
Cheshire and Fifoot.—Law of Contract. (Butterworths.)
Street, H.—Law of Tort. (Butterworths.)

EXAMINATION. Two 3-hour papers for Pass and Honours.
633. INDUSTRIAL MANAGEMENT PART II

A course of 3 lectures per week and 26 hours' practical work throughout the year.

SYLLABUS.

Industrial organization, efficiency of production, standardization and simplification of materials and products, organization of unit, batch and flow production, selection of plant, materials handling, process control and inspection, automatic methods, plan location and design, operation of a productive plant.


BOOKS. Recommendations will be made on textbooks and reference books during the course.

EXAMINATION. Two 3-hour papers for Final Pass and Honours.

Some further questions on more advanced aspects of the course, together with questions from other subjects, will be set in one of two combined papers for Final Honours.

Final Honours candidates will also be required to submit an essay on an approved subject not later than 1st December.

In order to pass the subject, candidates must reach a satisfactory standard in both practical work and written papers.

INTRODUCTION TO OPERATIONAL RESEARCH

A course of 12 lectures.

The nature and general method of operational research. The scope and application of specific operational research techniques, including linear programming, simulation models, theory of queues, theory of stock control, decision functions, theory of games, experimental design, statistical control.

Prescribed book.


Note. This course forms part of the subject Engineering Mathematics Part III but may be taken separately.

641. THE LAW OF PROPERTY IN LAND

(Mr. A. L. Turner)

A course of about 10-12 lectures.


(b) To obtain a pass in this subject, candidates must also attend the lectures and pass the examination in "Laws and Regulations for Surveyors."†

EXAMINATION. One 2-hour paper for Pass only.

590. MACHINE DESIGN

A course of about 60 lectures together with 3 hours of drawing office/practice class a week, throughout the fourth year of Agricultural Engineering.

SYLLABUS. (i) Kinematics
   (ii) Lubrication as in Dynamics of Machines Part IV.

†A full-year course conducted by the Royal Melbourne Institute of Technology and delivered by Mr. R. R. Johnston, Staff Surveyor, Office of Titles. The course begins in February, and an examination is held in November. The fee for the course is £6. A pass at this examination will gain exemption from examination and credit for the subject "Laws and Regulations" in the examinations of the Surveyors Board of Victoria.
(iii) Kinetics—portions selected from Dynamics of Machines Part IV.
(iv) Heat transfer—as in Applied Thermodynamics Part II: radiation, convection and conduction, steady state; design of heat transfer equipment.

Books. Recommended for reference:
Hunt, K. H.—Mechanism and Motion. (E.U.P., 1960.)
Rosenauer, N., and Willis, A. H.—Kinematics of Mechanisms. (Associated General Publications.)
Bowden, F. P., and Tabor, D.—Friction and Lubrication of Solids. (O.U.P.)
Marks, L. S.—Mechanical Engineers' Handbook. (McGraw-Hill.)
Hartman, J. B.—Dynamics of Machinery. (McGraw-Hill.)
Holowenko, A. R.—Dynamics of Machinery. (Wiley.)

EXAMINATION. Two 3-hour papers, for Pass only, together with the practical work and projects prescribed during the year.

589. MANAGEMENT B
(Professor Henderson)

A course of one lecture per week throughout the year.

SYLLABUS. Lectures selected from the following subjects: History of industrialization, the management movement, principles of administration and management, fundamentals of organization, partnerships and companies, company balance sheets. Works location and layout, style of buildings. Lighting, ventilation and heating. Material handling; stores and accessory departments; planning a factory, flowsheets, plans, models. Planning and scheduling; costing and estimating; contracts. Motion and time study; wage and incentive systems. Management and productivity, creative thinking. Industrial arbitration and awards. Industrial hazards, planning of safety measures.

Books. (a) Prescribed text-books:
Metcalfe, H. C., and Urwick, L.—Dynamic Administration.
Ashton, T. S.—The Industrial Revolution 1760-1830. (O.U.P.)
Hutton, G.—We too can prosper. (Allen and Unwin.)
King, W. J.—The Unwritten Laws of Engineering. (M.U.P.)
Williams, W.—Human Relations. (M.U.P.)
Partnership Act, 1958. (Victorian Government Printer.)
Notes and booklets supplied by the Department, for which a fee of £1 will be charged.

(b) Recommended for reference:
Allcut, E. A.—Principles of Industrial Management. (Pitman.)
Alford, L. P.—Principles of Industrial Management. (Ronald.)
Puckey, W.—What is this Management? (Chapman and Hall.)
Koecke, C. A.—Plant Production Control. (Wiley.)
Labour and Industry Act, 1958. (Victorian Government Printer.)
Blatt—Industrial Safety.
Heinrich, H. W.—Industrial Accident Prevention. (McGraw-Hill.)
Williamson, G. W.—The Materials Handling Manual. (Eck.)
Drucker, P. F.—The Practice of Management. (Heinemann.)
Osborn, A. F.—Applied Imagination. (Scribners.)

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558. MECHANICAL ENGINEERING PART I

A course of two lectures per week and 63 hours laboratory work.

SYLLABUS. (i) As for Applied Thermodynamics Part I.
(ii) As for Dynamics of Machines Part II.

BOOKS. As for Applied Thermodynamics Part I and Dynamics of Machines Part II.

EXAMINATION. One 3-hour paper for Pass and Honours. In order to pass the subject, students must reach a satisfactory standard both in the practical work and in the written paper.

663. MECHANICAL ENGINEERING LABORATORY

Nine hours per week during the first half of the year, on experiments and practice classes associated with the subject matter of the optional subjects in the fourth year.

No student will be admitted to the Final Examinations without evidence of satisfactory laboratory work which will be assessed in the deciding of examination results. Records of laboratory work must be submitted periodically as required.

664. MECHANICAL ENGINEERING PROJECT

On the completion of Engineering Design Part IV (Mechanical) and Mechanical Engineering Laboratory, all students will be required to undertake a special project. This may cover an investigation or design relating to some aspect of Mechanical Engineering. The time allotted is approximately 120 hours. The student will be required to write a thesis and present a paper on the results of his project.

No student will be admitted to the Final Examinations without evidence of satisfactory Project work which will be assessed in the deciding of examination results.

605. METALLURGICAL CHEMISTRY

A course of approximately 50 lectures in physical chemistry, with special reference to metallurgical examples.

SYLLABUS. Ideal gas, kinetic theory, real gas, first law of thermodynamics, heat of reaction. Hess's law. Kirchhoff's law, reversible and irreversible processes, Carnot cycle, second law of thermodynamics, entropy, maximum and net work functions, the liquid state, vapour pressure, surface energy, chemical equilibrium, chemical potential, activity, thermodynamics of ideal and real solutions, solutions of electrolytes, reversible cells, electrode potentials, kinetics of electrode processes, general equilibrium conditions, heterogeneous equilibria, pressure-temperature composition relations, reaction rate kinetics, atomic structure and periodic table, valence.

BOOKS. (a) Prescribed text-books:
*Moore, W. J.—Physical Chemistry. (3rd ed., Longmans Green and Co.)
or *Glasstone, S.—Elements of Physical Chemistry. (Nostrand.)

(b) Recommended for general reading and reference:
Everett, D. H.—Chemical Thermodynamics. (Longmans.)
Steiner, L. E.—Introduction to Chemical Thermodynamics. (McGraw-Hill.)

EXAMINATION. One 3-hour paper. (Pass standard only.)
606. METALLURGICAL ENGINEERING PART I
(Dr. Hanson, Mr. Hoggart)

A course of one lecture per week throughout the year together with approximately 36 hours' practical work.

SYLLABUS. (i) *Fuels Technology*. Types of fuel; their production and characteristics. The combustion of coke, fuel oils and gaseous fuels.


Books. (a) Prescribed text-book:
Jaeger, J. C.—*Elasticity, Fracture and Flow*. (Methuen.)

(b) Recommended for reference:
Francis, W.—*Coal*. (Edward Arnold.)
Sachs, G.—*Fundamentals of the Working of Metals*. (Pergamon.)

EXAMINATION. One 3-hour paper for Pass and Honours.

All work done in connection with practical work and practice classes will be taken into account in assessing the results of the year's work in conjunction with the results of the Annual Examination. All records made during the year should be retained for submission if required in connection with the Annual Examination.

609. METALLURGICAL ENGINEERING PART II
(Dr. Cannon)

A course of 36 lectures, together with practical work.

SYLLABUS. *Process Engineering*.

(i) *Heat Transfer*. Conduction, convection and radiation, steady and transient states, heat exchangers, regenerators, recuperators, waste heat boilers.

(ii) *Mass Transfer*. Theory of diffusion controlled processes, ion exchange, solvent extraction, humidifying, drying, cooling, counter current decantation.

(iii) *Phase Separations*. Filtering, settling, cyclones and centrifuges.

(iv) *Refractories*. Their selection and testing, furnace design and construction.

PRACTICAL WORK. Approximately 75 hours on experiments relating to the syllabus.

Books. (a) Prescribed text-book:
Schuhmann.—*Metallurgical Engineering*. (Addison-Wesley, 1952.)

(b) Recommended for reference:
Brown, C. G. *et al.—Unit Operations*. (Chapman and Hall, Wiley.)
U.S. Steel Co.—*The Making, Shaping and Treating of Steel*. (7th ed.)

EXAMINATION. One 3-hour paper for Pass and Honours.

All work done in connection with practical work and practice classes will be taken into account in assessing the results of the year's work in conjunction with the results of the Annual Examination. All records made during the year should be retained for submission if required in connection with the Annual Examination.
612. METALLURGICAL ENGINEERING PART III

(Prof. Warner, Assoc. Prof. Dunkin, Dr. Wood, Mr. Walker)

A course of three lectures per week with practical work, practice classes and excursions to be arranged.


The applications of physical and chemical principles in the extraction and refining of metals. General outline of the design and operation of integrated processes for the production of metals. Relation of extraction metallurgy to mining, ore dressing, fuel technology and physical metallurgy.


(iii) Metallography. (Approximately 20 lectures.) Principles governing the interpretation of microstructure in metals and alloys. Relation between structure and properties. Principles of heat treatment. Application of these principles to particular alloy systems. Structure and properties of some industrially important alloys; steels and cast irons, light alloys and copper base alloys.

Practice Classes. One hour per week on calculations, discussions and demonstrations illustrating the principles of ore dressing, extraction metallurgy and physical metallurgy.

607. METALLURGY PART I

(Prof. Warner, Assoc. Prof. Dunkin, Dr. Wood, Mr. Walker)

A course of three lectures per week with practical work, practice classes and excursions to be arranged.


Practice Work. Approximately 40 hours of experiments, seminars, practice classes, and works visits relating to the above syllabus.

Books. (a) Prescribed text-books: Students are advised to consult the lecturers.

(b) Recommended for reference:

The books recommended for Metallurgical Engineering Parts I and II, together with:

Hinsley, J. F.—Non-destructive Testing. (Macdonald and Evans, 1954.)

Examination. Two 3-hour papers for pass and honours.

All work done in connection with practical work, practice classes and excursions will be taken into account in assessing the results of the year's work in conjunction with the results of the Annual Examination. All records made during the year should be retained for submission if required in connection with the Annual Examination.
PRACTICAL WORK. A minimum of six hours per week on experiments dealing with:

(a) Chemical Metallurgy. Quantitative and qualitative analyses of ores, metallurgical products and alloys. Fire assaying of ores for gold and silver.

(b) Physical Metallurgy. Metallography and Physics of Metals.

EXCURSIONS. Excursions will be arranged periodically to local industries. Attendance at these is considered as part of the year's work, and a report must be written on each visit.

VACATION WORK. Students are strongly advised to consult the Appointments Board during the second term, with the object of obtaining experience in a metallurgical industry or establishment during the summer vacation.

BOOKS. (a) Recommended for preliminary reading:
Blainey, G.—The Peaks of Lyell. (M.U.P.)
Farwell, G.—Down Argent Street. (Johnson, Sydney.)

(b) Prescribed text-books:
Boas, W.—Physics of Metals and Alloys. (M.U.P.)
Masing, G. (F. C. Thompson trans.)—Foundations of Metallography. (The Institute of Metals, London.)

Other newly published books may be prescribed instead of the above. Students are therefore advised to consult the lecturers before purchasing text-books.

(c) Recommended for reference:
Ore Dressing Methods in Australia and Adjacent Territories. (Fifth Empire Mining and Metallurgical Congress (1953) Publications, Vol. III.)
Newton, J.—Extractive Metallurgy. (Wiley.)
Hume-Rothery, W.—Atomic Theory for Students of Metallurgy. (2nd ed., Institute of Metals.)
Hume-Rothery, W., and Raynor, G. V.—Structure of Metals and Alloys. (3rd ed., The Institute of Metals, London.)
Rhines, F. N.—Phase Diagrams in Metallurgy. (McGraw-Hill.)
Seybolt, A. U., and Burke, J. E.—Procedures in Experimental Metallurgy. (Wiley.)

EXAMINATION. Tests throughout the year and two 3-hour papers for Pass and Honours; a one-day practical examination may be given.

All work done in connection with practical and practice classes and excursions will be taken into account in assessing the results of the year's work in conjunction with the results of the Annual Examination. All records made during the year should be retained for submission if required in connection with the Annual Examination.

662. METALLURGY PART IA

The course of lectures and tutorial classes prescribed for Metallurgy Part I, the course of lectures on fuels that forms part of Metallurgical Engineering Part I, plus the equivalent of three hours per week practical work throughout the year.

EXAMINATION. Tests throughout the year and two 3-hour and one 1½-hour paper for Pass and Honours. A one day practical examination may be given.
A course of about 80 lectures, with practice classes, practical work and excursions throughout the year.

SYLLABUS. (i) Ore Dressing. Commination; crushing and grinding practice and theory. Screen sizing. Motion of solid particles in fluids. Classification. Gravity methods of concentration; heavy media separation, jigging, tabling, etc. Centrifugal, magnetic and electrostatic concentration. Flotation concentration: Introduction to flotation systems, consideration of phases and interfaces, chemical preparation of minerals for flotation, complex relationships involving collectors; foams and flotation froths; technology.


PRACTICE CLASSES. One hour per week on discussions, demonstrations and calculations illustrating the principles of ore dressing, extractive metallurgy and physical metallurgy.

PRACTICAL WORK. A total of 260 hours, involving experiments and calculations dealing with the following topics:

(a) Ore Dressing. Liberation, comminution, sizing, hydraulic classification, electrical separation, tabling, flocculation and flotation.

(b) Chemical Metallurgy. Qualitative and quantitative analysis of steels, non-ferrous alloys, ores and metallurgical products. Instrumental methods of analysis including electro-analysis, polarography and absorptiometry.

(c) Physical Metallurgy. Determination of physical and mechanical properties of metals. X-ray diffraction techniques.

EXCURSIONS. Visits to metallurgical industries and establishments will be arranged from time to time.

Books. (a) Prescribed text-books:
The books prescribed for Metallurgy Part I, together with:
*Cottrell, A. H.—Theoretical Structural Metallurgy. (Arnold.)
Cullity, B. D.—Elements of X-Ray Diffraction. (Addison-Wesley.)
Other newly-published books may be prescribed instead of the above. Students are therefore advised to consult the lecturers before purchasing.

(b) Recommended for reference:
The books recommended for Metallurgy Part I, together with:
Ore Dressing Methods in Australia and Adjacent Territories. (Fifth Empire Mining and Metallurgical Congress (1953) Publications, Vol. III.)
Rabone, P.—*Flotation Plant Practice.* (Mining Pub.)
Taggart, A. F.—*Elements of Ore Dressing.* (Wiley.)
Darken, L. S., and Gurry, W. R.—*Physical Chemistry of Metals.* (McGraw-Hill.)

*Physical Chemistry of Process Metallurgy.* (Faraday Soc., Disc. No. 4. 1948.)
Sisco, F. T. (ed.)—*Basic Open-hearth Steelmaking.* (A.I.M.E.)
Bain, E. C.—*Alloying Elements in Steel.* (Amer. Soc. Metals.)
Hollomon, J., and Jaffe, L.—*Ferrose Metallurgical Design.* (Wiley.)

Impurities and Imperfections. (Amer. Soc. Metals.)

*Relation of Properties to Microstructure.* (Amer. Soc. Metals.)
Lumsden, J.—*Thermodynamics of Alloys.* (Inst. of Metals.)

**EXAMINATION.** Tests throughout the year, and four 3-hour papers for Pass and Honours; a three-day practical examination may be given.

All work done in connection with practical and practice classes and excursions will be taken into account in assessing the results of the year's work in conjunction with the results of the Annual Examination. All records made during the year should be retained for submission if required in connection with the Annual Examination.

### 611. METALLURGY PART III

(Professor Worner, Associate Professor Dunkin, Mr. Willis, Mr. Carr, Dr. Wood, Mr. Hoggart)

A course of about 100 lectures for Pass, and 125 lectures for Honours, throughout the year. In addition there are practice classes, discussions and practical work. Three optional courses are available, permitting some specialization in any one of the following:

(a) Ore Dressing
(b) Extraction Metallurgy
(c) Physical Metallurgy.

**SYLLABUS.** (i) *Ore Dressing.* A more advanced treatment of the topics listed under the heading "Ore Dressing" in the details for the subjects Metallurgy Part I and Metallurgy Part II, including: thickening, filtration, relation of ore dressing to hydro- and pyro-metallurgy, treatment of gold and uranium ores, mineral economics, mineragraphic examinations applied to the control of ore dressing practice, relationships between metallurgical and economic efficiencies in ore dressing, design of treatment plants, plant operation and control. Selected topics in flotation, with particular reference to testing. The surface chemistry of systems involved in flotation operations.

(ii) *Extraction Metallurgy.* The iron blast furnace, its functions, design, chemical and physical control. Steelmaking by the Bessemer, open-hearth, electric and oxygen methods. Production of ferro-alloys. Steel ingots. Electrolytic recovery and refining of metals. Examples of metallurgical practice in the production of zinc, copper, lead, aluminium, etc. Extraction of reactive metals.


(iv) *Mechanical Metallurgy.* Plasticity theory and its applications to typical mechanical working processes including forging, rolling, wire drawing, extrusion, deep drawing.

(v) *Materials for Nuclear Reactors.* Introduction to nuclear engineering. (The production, utilization and properties of metallic materials of importance in nuclear engineering will be covered in the lectures on ore dressing, process metallurgy, and physical metallurgy.)
PRACTICE CLASSES. One hour per week on discussions, demonstrations and calculations illustrating the principles of ore dressing, extraction metallurgy and physical metallurgy.

PRACTICAL WORK. A minimum of 12 hours per week.

Ore Dressing: Ore examination and testing, including mineragraphy, sampling, sizing and concentration of ores and assaying of products.

Chemical Metallurgy: Experiments illustrating the principles of metal extraction and refining. Electro-metallurgy, Spectrography.

Physical Metallurgy: Experiments dealing with metallography; mechanical, physical and non-destructive testing; metal shaping processes; X-ray diffraction and metal physics.

PROJECTS. Each student will be required to carry out a literature survey and an investigation appropriate to the student's field of specialization. Final Honour candidates will be expected to attain a higher standard in their projects.

Books. (a) Recommended for preliminary reading:
Bray, J. L.—*Ferrous Production Metallurgy*. (Wiley.)

(b) Prescribed text-books: The books prescribed for Metallurgy Parts I and II, together with:

Taggart, A. F.—*Handbook of Mineral Dressing*. (2nd ed., Wiley.)


(c) Recommended for reference:
The books recommended for Metallurgy Part II, together with:
Adam, N. K.—*The Physics and Chemistry of Surfaces*. (O.U.P., 1941.)

Honours only.

Short, M. N.—*Microscopic Determination of the Ore Minerals*. (U.S. Geol. Survey Bull. 914.)

Weiser, H. B.—*Colloid Chemistry*. (Wiley, 1939.)

Elliott, G. D., and Bond, J. A.—*Practical Iron Making*. (United Steel Companies.)

Mathewson, C. H. (ed.)—*Zinc*. (Rheinhold.)


Read, W. T.—*Dislocations in Crystals*. (McGraw-Hill.)

Sully, A. H.—*Metallic Creep*. (Butterworth.)

Glasstone, S.—*Principles of Nuclear Reactor Engineering*. (Macmillan.)

EXAMINATION. Tests throughout the year, and three written papers for Pass, four for Honours. A three-day practical test may be given.

All work done in connection with practical and tutorial classes, and excursions will be taken into account in assessing the results of the year's work in conjunction with the results of the Annual Examination. All records made during the year should be retained for submission if required in connection with the Annual Examination.

620. METALLURGY FOR CHEMICAL ENGINEERS
(Professor Worner, Mr. Willis)

A special course of lectures dealing with the structure of metals and alloys and its relation to mechanical properties; alloys of special importance in chemical engineering.


Books. Recommended for reference:


Evans, U. R.—*Introduction to Metallic Corrosion*. (Arnold.)


EXAMINATION. One 3-hour paper for Pass only.
581. MINERAL INDUSTRY MANAGEMENT
( Associate Professor Dunkin, Mr. Nevill)

A course of about 32 lectures.

SYLLABUS. The following topics are dealt with in general terms and with special reference to the mining and metallurgical industries: Development of industry. Principles of management. Organization of industry. Elements of book-keeping. Control of supplies, stores, production, personnel, etc. Accounts, costs, budgets, finance. Accident prevention; health and hygiene.

Mine and plant location and design, lighting, housing, the town and community.

Brief introduction to the law relating to contracts, partnerships, companies, mines, factories, etc.

Planning, research, education and training.

Valuation of mining properties (for mining students only).

Mineral economics: The pattern of mineral and metal trade, trends in production and use, buying and selling, cost of production, the Australian position.

Final Honours. Students who elect to take Final Honours must consult with the Head of the Department at the beginning of the academic year. These students may be set additional work during the year.

Books. Recommend for reference:
Alford, L. P.—Principles of Industrial Management. (Ronald.)
Metcalfe, H. C., and Urwick, L.—Dynamic Administration.
Fayol, H.—General and Industrial Management. (Pitman.)
Aitchison, L.—Introduction to Industrial Metallurgy. (Macdonald & Evans.)
The Law relating to Factories and Shops in Victoria. (Vic. Govt. Printer.)
The Companies Act. (Vic. Govt. Printer.)
The Mines Acts of the Australian states and other countries.
Heinrich, H. W.—Industrial Accident Prevention. (McGraw-Hill.)
Publications of the Standards Association of Australia.
Publications of the Department of Labour and National Service.
The Haley Report. (U.S. Govt. Printing Office.)

For Mining students only:
Parks, R. D.—Examination ond Valuation of Mineral Property. (Addison-Wesley.)
McAdam and Davidson.—Mine Rescue Work. (Oliver & Boyd.)

EXAMINATION.
One 3-hour paper.

576. MINING PART I
( Associate Professor Dunkin, Mr. Nevill, Mr. Carr, Mr. Guerin)

Group I: Mining Principles
A course of about 35 lectures with practical work.


PRACTICAL WORK. About 20 hours of excursions, practical work and practice classes, including examination of rock drills and drill steel, computation of tonnages and values.

Candidates may be required to visit mines and other places associated with mining at times to be arranged during the year.

Group II: Introduction to Ore Dressing and Extractive Metallurgy.
A course of about 53 lectures with practical work.


PRACTICAL WORK: About 73 hours. Assaying. Ore dressing experiments to illustrate principles. Practice classes.
Candidates may be required to visit mines and other places associated with mining at times to be arranged during the year.
A charge of £1 will be made for use of apparatus in the laboratory.

Books. (a) Recommended for preliminary reading:
Alexander, W., and Street, A.—Metals in the Service of Man. (Pelican.)
Blainey, G.—The Peaks of Lyell. (M.U.P.)
Farwell, G.—Down Argent Street. (Johnson, Sydney.)
Haddock, M. H.—Cultural Contacts of Mining. (Routledge & Kegan Paul, 1949.)
Read, J.—Explosives. (Pelican.)

(b) Prescribed text-books:

Group I

Lewis, R. S.—The Elements of Mining. (2nd ed., Wiley.)
or Young, G. J.—Elements of Mining. (4th ed., McGraw-Hill.)
Gregory, C. E.—Explosives for Engineers. (Q'ld. U.P., 1960.)

Group II

Newton, J.—Extractive Metallurgy. (Wiley, 1959.)
Gaudin, A. M.—Mineral Dressing. (McGraw-Hill.)

(c) Recommended for reference:

Group I

McAdam, R., and Westwater, R.—Mining Explosives. (Edinburgh, Oliver and Boyd.)
Davis, T. L.—Chemistry of Powder and Explosives. (Wiley.)
Hoover, H. C.—Principles of Mining. (McGraw-Hill.)
Beringer, B.—Underground Practice in Mining. (2nd ed., Mining Publications.)
Cumming, J. D.—Diamond Drill Handbook. (2nd ed., Toronto.)
Symposium on Diamond Drilling. (Journal of the Chemical, Metallurgical and Mining Society of South Africa, Vol. 52, No. 10, Part 2, April, 1952.)
Mining Methods in Australia and Adjacent Territories. (Fifth Empire Mining and Metallurgical Congress (1953) Publications, Vol. II.)
Jeppe, C. W. B.—Gold Mining in the Witwatersrand. (Transvaal Chamber of Mines.)
Tyler, P. Mcl.—From the Ground Up. (McGraw-Hill.)

Group II

Rabone, P.—Flotation Plant Practice. (Mining Publications, 1957.)
Dalla Valle, J. M.—Micromeritics. (Pitman.)
Taggart, A. F.—Elements of Ore Dressing. (Wiley.)
Ore Dressing Methods in Australia and Adjacent Territories. (Fifth Empire Mining and Metallurgical Congress (1953) Publications, Vol. III.)
Extractive Metallurgy in Australia. (Fifth Empire Mining and Metallurgical

**EXAMINATION.** Tests throughout the year and two 3-hour written papers. One whole day practical test for Pass and Honours may be given.

Practical work done during the course will be assessed as part of the annual examination. Reports of assignments in practical work and excursions should be indexed and suitably bound in a folder and retained for resubmission on the last day of examination in Mining Part I, if required.

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577. MINING PART II

(Associate Professor Dunkin, Mr. Nevill)

A course of three lectures per week, with practical work, throughout the year.

**SYLLABUS. Group I. Mining Principles and Practice.**

A course of about 35 lectures.


**Group II. Mine Engineering.**

A course of about 35 lectures with practical work.


**PRACTICAL WORK.** About two hours per week.

Candidates may be required to visit mines and other places associated with mining at times to be arranged during the year.

A charge of £1 will be made for the supply of materials.

**FINAL HONOURS.** Students who elect to take Final Honours must consult with the Head of the Department at the beginning of the academic year. These students may be set additional work during the year.

**BOOKS.**

(a) Recommended for preliminary reading:
Leith, C. K.—*Mineral Valuations of the Future.* (A.I.M.E.)
Marriott—*Men, Money and Mines.* (A.I.M.E.)
Tyler, P. McL.—*From the Ground Up.* (McGraw-Hill.)
 Jeppe, C. W. B.—*Gold Mining in South Africa.* (Todd.)
 Jones, W. R.—*Minerals in Industry.* (Pelican.)

(b) Prescribed text-books:
Penman, D., and J. S.—*Mine Ventilation.* (Griffin.)
Quality of Mine Air. (Transvaal Chamber of Mines.)
Isaacson, E. D. St. Q.—*Rock Pressure in Mines.* (Mining Publ. Ltd.)
Peele, R.—*Mining Engineer’s Handbook.* (3rd ed., Wiley.)

(c) Recommended for reference:
Spalding, J.—*Deep Mining.* (Mining Publications.)
Metal Mining Practice. (U.S. Bur. Mines Bull. No. 419.)
Mining Methods in Australia and Adjacent Territories. (Fifth Empire Mining and Metallurgical Congress (1953) Publications, Vol. II.)
Elford, H. S., and McKeown, M. R.—*Coal Mining in Australia.* (Tait.)
Coal Mining: Report of the Technical Advisory Committee: Ministry of Fuel and Power. (H.M.S.O.)
Mason, E.—Practical Coal Mining for Miners, Vols. I and II. (2nd ed., Virtue, 1951.)
Statham, L. C. F.—Coal Mining Practice, 4 vols. (Caxton, 1958.)
Coal Miner's Pocket Book (McGraw-Hill.)
**Coal in Australia.** (Fifth Empire Mining and Metallurgical Congress (1953) Publications, Vol. VI.)
Symposium on Shaft Sinking and Tunnelling. (1959.) (Inst. Min. Eng.)
Richardson, H. W., and Mayo, R. S.—Practical Tunnel Driving. (McGraw-Hill.)

Given, I. A.—Mechanical Loading of Coal Underground. (McGraw-Hill.)
Dobrin—Introduction to Geophysical Prospecting. (McGraw-Hill.)

Reference should also be made to the journals of Mining and Metallurgical Societies in Australia, England, U.S.A., Canada and South Africa, and also to mining periodicals published in these countries.

EXAMINATION. Two 3-hour written papers. Additional tests may be set throughout the year.

Practical work done during the course will be assessed as part of the Annual Examination. Reports of assignments in practical work and excursions should be indexed and suitably bound in a folder and retained for resubmission on the last day of examination in Mining Part II if required.

578. MINING DESIGN
(Mr. Nevill)

A course of about four hours per week throughout the year, involving computations, study of mine plans, design and layout of workings and plant, discussions of practice.

**SYLLABUS.** The layout of mine workings in relation to the strength of rock, the shape, size and grade of orebody. The basis of selection and design of electrical, mechanical and structural equipment for mines.

**PRACTICAL WORK.** Calculations, designs and drawing, with specifications and estimates are to be completed by the student and submitted for examination at such times during the year as may be notified.

**FINAL HONOURS.** Students who elect to take Final Honours must consult with the Head of the Department at the beginning of the academic year. These students may be set additional work during the year.

**BOOKS.** Recommended for reference:
Thomas, F. A. W.—Power Plants on Metal Mines. (Mining Publications.)
Broughton, H. H.—Electric Winders. (Benn.)
Given, I. A.—Mechanical Loading of Coal Underground. (McGraw-Hill.)
Richardson, H. W., and Mayo, R. S.—Practical Tunnel Driving. (McGraw-Hill.)
Tillson, B. F.—Mine Plant. (A.M.E.)

**EXAMINATION.** There is no formal examination. Candidates are judged on the work presented during the course. Reports of assignments in practical work should be indexed and suitably bound in a folder and retained for resubmission on the last day of examination in Mining Part II if required.
579. MINING GEOLOGY

A course of about 40 lectures, together with laboratory and field work.

SYLLABUS. The character and distribution of mineral, coal and oil deposits. The principles governing their formation illustrated by examples from mining fields. Applications of Geophysics to mineral location.

LABORATORY WORK. Three hours per week throughout the year. The practical work may be assessed in the deciding of the examination results.

FIELD EXCURSION. One excursion of two or more days at a time to be arranged.

FINAL HONOURS. Students who elect to take Final Honours must consult with the Head of the Department at the beginning of the academic year. These students may be set additional work during the year.

BOOKS. (a) Preliminary reading:
Jones, W. R.—Minerals in Industry. (Pelican.)

(b) Prescribed text-books:
Hills, E. S.—Outlines of Structural Geology. (Methuen.)

(c) Recommended for reference:
Lindgren, W.—Mineral Deposits. (McGraw-Hill.)
Niggli, P.—Ore Deposits of Magmatic Origin. (Murby.)
Levorsen, A. L.—Geology of Petroleum. (Freeman.)
Phillips, F. C.—The Use of Stereographic Projection in Structural Geology. (Arnold.)

Students should make full use of the library in the Geology Department for reference purposes, and help will be given by members of the Staff in the selection of suitable literature.

EXAMINATION. One 3-hour written paper; one 3-hour practical paper (an additional paper may be set for Final Honours candidates).

OPERATIONAL RESEARCH

A course consisting of two hours of lectures and two hours of practical work weekly throughout most of the year.

SYLLABUS. General principles and method. The phases of operational research. Mathematical and statistical models of operational phenomena. Optimisation. Mathematical programming (linear and dynamic); optimal sequencing. Listable methods, with applications to recruiting and replacement. Matrix methods (including input-output analysis). Theory of games, with applications to policy decisions.

Statistical control. Sampling inspection and decision procedures. Trend determination and forecasting. Design and analysis of fact-finding surveys, with applications (e.g.) to consumer research and work measurement. Design of industrial experiments. Tests of significance. Evolutionary operation. Cause-tracing by regression methods.

Simulation models and the theory of queues applied to congestion and stock control. Applications of computers, with design of simple flow diagrams.

BOOKS. (a) Prescribed text-books:

(b) Recommended for reference:
580. ORE DRESSING

(Assoc. Prof. Dunkin, Mr. Carr)

A pass course of about 40 lectures and seminars with practical work; in addition, about 15 lectures and a practical project for final honour candidates.

SYLLABUS. A more advanced treatment of the topics listed under the heading "Ore Dressing" in the details for the subjects Mining Part I or Metallurgy Part I and Metallurgy Part II, including: thickening, filtration, relation of ore dressing to hydro- and pyro-metallurgy, treatment of gold and uranium ores, mineragraphic examinations applied to the control of ore dressing practice, relationships between metallurgical and economic efficiencies in ore dressing. Design of treatment plants. Plant operation and control.

Selected topics in flotation with particular reference to testing. The surface chemistry of systems involved in flotation operations.

Books. (a) Prescribed text-books:

Taggart, A. F.—Handbook of Mineral Dressing. (2nd ed., Wiley.)

(b) Recommended for reference:

Michell, F. B.—The Practice of Mineral Dressing. (Electrical Press, 1950.)
Taggart, A. F.—Elements of Ore Dressing. (Chapman and Hall, Wiley, 1951.)
Adam, N. K.—Physics and Chemistry of Surfaces. (O.U.P., 1941.) Honours only.
Moilliet, J. L., and Collie, B.—Surface Activity. (Spon, 1951.)
Weiser, H. B.—Colloid Chemistry. (Wiley, 1939.)

Practical Work. Three hours per week throughout the year. Additional work for final honour candidates. A charge of £1 will be made for the use of apparatus in the laboratory.

Final Honours. Students who elect to take Final Honours must consult with the Head of the Department at the beginning of the academic year. These students may be set additional work during the year.

Examination. One 3-hour paper. Additional tests may be set throughout the year. The practical work of candidates is judged on the experiments conducted during the course. Reports of assignments in practical work should be indexed and suitably bound in a folder and retained for resubmission on the day of examination in Ore Dressing if required.
642. PHOTOGRAMMETRY  
(Mr. S. G. Bervoets)

A course of three lectures per week and six hours' practical work per week throughout the year.

SYLLABUS. General introduction to photogrammetry and mapping. Stereoscopic measurements. Geometrical principles of the photograph. Radial triangulation, slotted templates, planimetry from aerial photographs. General perspective theorems, graphical and optical rectification.

Elements of stereo-photogrammetry, measurement of parallax differences, relative and absolute orientation, model deformations.


PRACTICAL WORK. The equivalent of six hours per week devoted to field, laboratory and office work, tutorial classes and excursions.

Books. (a) Prescribed text-books:

(b) Recommended for reference:
References will be given in lectures from time to time.

EXAMINATION. Two 3-hour papers for Pass and Honours. There will be no formal practical examination; the practical work performed during the year will be assessed as part of the Annual Examination. However, any candidate may be required to submit to a practical test and to resubmit field notes and assignments of work performed during the course.

555. PHYSICS PART I

A course of three lectures per week, with laboratory work, throughout the year. A knowledge of Physics to the standard of the Matriculation examination will be assumed.

SYLLABUS. A selection from the following topics:


LABORATORY. WORK. Three hours per week. The practical work of each student is examined continually during each term. Records of his success in experiment and impressions of his work are kept. This information determines whether or not a candidate reaches a standard which admits him to the Annual
Examination, and is taken into account in awarding honours at that examination. An additional test in practical work may be given.

Books. (a) Prescribed text-books:
*Sears, F. W., and Zemansky, M. W.—University Physics. (2nd ed., Addison-Wesley.)

(b) Recommended for additional reading:
Resnick, R., and Halliday, D.—Physics for Students of Science and Engineering. (Wiley.)

EXAMINATION. One 3-hour paper for Pass and Honours combined.

597. PHYSICS PART IIC

A course of four 1-hour lecture periods a week.

SYLLABUS. The following topics will be included: Quantum Theory, Heat, Physical Optics, Electromagnetic Theory, Atomic and Nuclear Physics, Physics of Electron Devices.

LABORATORY WORK. Three hours per week on experiments and measurements relating to the above course. The candidate's work in the laboratory is considered in assessing the quality of the year's work.

Books. (a) Prescribed text-book:
Wehr, M. R., and Richards, J. A.—Physics of the Atom. (Addison-Wesley.)

(b) Recommended for reference:
Hercus, E. O.—Elements of Thermodynamics and Statistical Mechanics. (M.U.P.)
Zemansky, M.—Heat and Thermodynamics. (McGraw-Hill.)
Kaplan, I.—Nuclear Physics. (Addison-Wesley.)

EXAMINATION. Examinations will be held at the commencement of second and third terms and at the end of third term.

559. PHYSICS PART II (ENGINEERING COURSE)

Students are required to attend a minimum of 45 lectures, but they may attend the complete course if they so desire.

SYLLABUS. Section (i) Compulsory for all students. Approximately 35 lectures.
Dimensional analysis
Thermodynamics
Electricity and Electromagnetism

plus one of the following units of approximately 10 lectures.
Section (ii) Modern Physics. Acoustics or an approved unit from Physics IIC where lecture theatre space permits.

Books. (a) Prescribed text-books:
Lecturers will advise students as required.

(b) Recommended for reference:
Sears, F. W.—Principles of Physics Part II, Electricity and Magnetism. (Addison-Wesley.)
Hercus, E. O.—Elements of Thermodynamics and Statistical Mechanics. (M.U.P.)
Lapp, R. E., and Andrews, H. L.—Nuclear Radiation Physics. (Prentice-Hall.)
Zemansky, M.—*Heat and Thermodynamics.* (McGraw-Hill.)
Duncan, W. I.—*Physical Similarity and Dimensional Analysis.* (Arnold.)

**EXAMINATION.** Examinations will be held at the beginning of second and third terms and at the end of third term.

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**657. PHYSICAL CHEMISTRY (NEW COURSE)**

A course of approximately 40 lectures in physical chemistry with demonstrations and about 150 hours laboratory work in physical and inorganic chemistry.

**SYLLABUS.** Molecular theory, thermodynamics, reaction kinetics, surface chemistry, molecular structure, electrolysis, catalysis, radio chemistry.

The apparatus used in the course is supplied by the Chemistry Department; a deposit must be paid and evidence of payment must be produced before practical classes begin.

**EXAMINATION.** One 3-hour paper in Physical Chemistry for Pass and Honours.

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**658. PROCESS CHEMISTRY (NEW COURSE)**

A course of one lecture per week throughout the year and about 30 hours laboratory work.

**SYLLABUS.** The study of selected industrial chemical processes with emphasis on those factors of importance in process design and successful commercial operation of the plant.

The unit processes selected will include inorganic and organic chemical operations, e.g. heavy inorganic chemicals and acids, metallurgical processes, electrochemistry, nuclear reactions, organic intermediates, oxidation, nitration, chlorination, hydrogenation, chemicals from coal and acetylene, petro-chemicals, hydrolysis, polymers, etc.

**BOOKS.** (a) Prescribed text-books:

(b) Recommended for reference:
Groggins, P. H.—*Unit Processes in Organic Synthesis.* (McGraw-Hill, 1958.)
Mantell, C. L.—*Electrochemical Engineering.* (McGraw-Hill, 1960.)

**EXAMINATION.** One 2-hour paper for Pass and Honours.

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**621. PROCESS EQUIPMENT DESIGN (OLD COURSE)**

A course of two lectures per week throughout the year and 3 hours drawing office work per week and tutorials for two terms.

**SYLLABUS OF LECTURES.** Stress concentration; stress corrosion; plastic deformation; fatigue; creep and recovery; strain hardening; temper and hydrogen embrittlement; analysis of the stresses occurring in pressure vessels under internal and external pressures; simple cylinders and multi-wall vessel construction; the design of fractionating columns; cooling and absorption towers; tubular reactors and heat exchangers; piping and pipe fittings; thermal stresses in pipes; chemical-engineering materials used in selected process equipment; fundamental theory of automatic control.

**SYLLABUS FOR DRAWING OFFICE WORK.** Design calculations and sketching of chemical apparatus and equipment; criticism of design; detailed drawings of individual plant units.

**BOOKS.** (a) Prescribed text-books:
Brownell, L. E., and Young, E. H.—*Process Equipment Design (Vessel Design).* (Wiley.)
B.S. Code 1500 (1958).—*Fusion Welded Pressure Vessels for Use in the Chemical and Allied Industries.* (British Standards Institution.)

(b) Recommended for reference:
*Standards of Tubular Exchanger Manufacturers’ Association* (1959). (New York.)
EXAMINATION. One 3-hour paper and one 2-day drawing and design problem for Pass and Honours. Results of drawing-office work done throughout the year will be assessed as part of the annual examination.

592. PROPERTIES OF METALS
(Dr. Osborn)

A course of one lecture per week, with practical work, throughout the year.

SYLLABUS. Interpretation of the structures of binary alloys; relation between structure and properties; modification of properties by heat treatment. Commercial and special alloys including special steels; selection, specification and properties. Shaping of metals; defects. Non-destructive testing, including radiographic, magnetic, ultrasonic and fluorescent methods.

PRACTICAL WORK. Approximately 50 hours, on experiments dealing with the heat treatment, mechanical testing and metallographic examination of engineering metals and alloys, metal shaping, non-destructive testing and service failures.

Books. (a) Prescribed text-book:

(b) Recommended for reference:
The Making, Shaping and Treating of Steel. (United States Steel Co.)

EXAMINATION AND TESTS. Tests throughout the year and one 3-hour written paper; one 3-hour practical test; (Pass standard only).
All work done in connection with practical work and practice classes will be taken into account in assessing the results of the year's work in conjunction with the results of the Annual Examination. All records made during the year should be retained for submission if required in connection with the Annual Examination.

PURE MATHEMATICS SUBJECTS
(See under Bachelor of Arts.)

86. PURE MATHEMATICS PART II
PASS COURSE

A course of three lectures per week in first term and two lectures per week in remaining terms, together with practice classes throughout the year.
After the first term the course for day students may be divided into two alternative syllabuses, Option A being devoted to the further study of calculus, Option B to the more fundamental study of algebra and geometry. Only one of these options will be given if the support offering for the other or the staff available to conduct it is inadequate.

It is not necessary to signify which option will be desired until late in first term. Those intending to proceed subsequently to Pure Mathematics Part III should choose Option A in preparation for Pure Mathematics Part IIIA, IIIC or IIIS, Option B for Pure Mathematics Part IIIB.

SYLLABUS. Complex Functions. Exponential and related functions of a complex variable.

Series. Taylor's theorem. Power series for the standard elementary functions, and combinations of them.


Differential Equations. Further linear differential equations, and simultaneous systems.

Option B. Geometry. Critical study of Euclidean geometry.


Books. (a) Preliminary reading:

(b) Prescribed text-books:
Cooley, H. R.—First Course in Calculus. (Wiley.)
Ferrar, W. L.—Higher Algebra (the sequel, starting with ch. XV). (O.U.P.)

EXAMINATION. Two 3-hour papers.

665. PURE MATHEMATICS PART II (MIN.)
The first term of the course prescribed for Pure Mathematics Part II (Pass) evening lectures.

EXAMINATION. Not more than two 3-hour papers.

638. PURE MATHEMATICS PART III
(SURVEYING COURSE)

A course of two lectures per week and two practice classes per week throughout the year.


Books. Recommended for reference:
Clarke, A. R.—Geodesy. (O.U.P.)
Whittaker, E. T., and Robinson, G.—Calculus of Observations. (Blackie.)

EXAMINATION. Two 3-hour papers.

561. STATISTICS FOR ENGINEERS

A course of 12 lectures and 12 hours practice classes.

SYLLABUS. Statistical nature of engineering data; chance variability and variability ascribable to assignable causes. Probability relations between population (lot) and sample. Parameters and statistics; averages, measures of dispersion. Histograms and probability distributions. The standard theoretical distributions (normal, hypergeometric, binomial, Poisson). Distribution of means and associated tests of significance. Control chart technique for means, measures of dispersion, number and fraction defective. Sampling inspection procedures. General procedure for the introduction of control technique in production engineering, with illustrations from current practice.

PRACTICAL WORK. Illustrative arithmetical examples, together with the construction and interpretation of control charts relating to the production of piece parts. The practical work will be assessed in the deciding of examination results.

Books. (a) Prescribed text-book:
Moroney, M. J.—Facts from Figures. (Pelican.)

(b) Recommended for reference:
Burr, I. W.—Engineering Statistics and Quality Control. (McGraw-Hill.)

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Dudding, B. P., and Jennett, W. J. *Quality Control Charts* (published by the British Standards Institution as B.S. 600 R—1942).

Tippett, L. H. C.—*Statistical Methods in Industry*. (British Iron & Steel Federation.)

Tippett, L. H. C.—*Technological Applications of Statistics*. (Wiley.)

Grant, E. L.—*Statistical Quality Control*. (McGraw-Hill.)

Brownlee, K. A.—*Industrial Experimentation*. (H.M. Stationery Office.)


Davies, O. L.—*Statistical Methods in Research and Production*. (Oliver and Boyd.)

Hald, A.—*Statistical Theory with Engineering Applications*. (Wiley.)

Dodge, H. F., and Romig, H. G.—*Sampling Inspection Tables—Single and Double Sampling*. (Wiley.)

In addition, references to other publications and to articles in recent and current Engineering journals will be made in class.

**EXAMINATION.** One 3-hour paper, to be held at the end of first term. Before admission to the examination, candidates must have satisfactorily completed the practical work.

### STATISTICAL TECHNIQUES

A course consisting of one hour of lectures, along with one hour of practical work weekly throughout the year.

**SYLLABUS.** Principles of scientific inference. Elements of probability; population and sample, parameter and statistic. Introduction to the standard distributions (hypergeometric, binomial, Poisson, normal, $t$, $F$ and chi-square). Estimation and hypothesis testing. Regression, simple, multiple and curvilinear. Normal correlation. Experimental design; completely randomized, randomized block and Latin square designs; split-plot designs, balanced incomplete block designs; confounding; fractional replication. Analysis of variance and covariance.

**PRACTICAL WORK.** One hour per week throughout the year involving computation with the use of calculating machines.

The course is intended for graduates and others whose research work calls for a knowledge of statistical techniques. An elementary knowledge of mathematics will be assumed.

**Books.** (a) Prescribed text-books:

Davies, O. L. (Ed.)—*Statistical Methods in Research and Production*. (Oliver and Boyd.)


(b) Recommended for reference:

Cox, D. R.—*The Planning of Experiments*. (Wiley.)

Davies, O. L.—*Design and Analysis of Industrial Experiments*. (Oliver and Boyd.)

Quenouille, M. H.—*Introductory Statistics*. (Butterworth-Springer.)

Fisher, R. A., and Yates, F.—*Statistical Tables*. (Oliver and Boyd.)

Moroney, M. J.—*Facts from Figures*. (Pelican.)

**EXAMINATION.** One 3-hour paper and a practical test.

### 666. STRENGTH OF MATERIALS PART II

(Prof. Stevens)

A course of two lectures per week with 27 hours laboratory and 25 hours tutorial work.


Combined bending and axial forces. Buckling of columns.

Principles of Superposition, Reciprocity and Virtual Work. Strain Energy. Castigliano's First Theorem. Introduction to statically determinate and indeterminate problems in frames and beams.

Stresses in thick walled vessels subjected to internal and external pressure.

Books. (a) Recommended for preliminary reading:

(b) Prescribed text-books:
Morley, A.—Strength of Materials. (Longmans.)
Case, J.—Strength of Materials. (Arnold.)

EXAMINATION. One 3-hour paper for Pass and Honours. Practical work done during the year will be considered in assessing a candidate's standard.
Books. (a) Prescribed text-book:
*Timoshenko, S.—Strength of Materials (2 Vols.). (Van Nostrand.)

(c) Recommended for reference:

EXAMINATION. One 3-hour paper for Pass and Honours; the work done in practice classes will carry some weight.

668. STRENGTH OF MATERIALS PART II A

A course of 24 lectures and 24 hours of practice/tutorial.

SYLLABUS. Section (B) of Strength of Materials Part III, namely—Centrifugal stresses in rotating machinery; analysis of components of reciprocating engines; bending of curved bars.

Books. As in Strength of Materials Part III.

EXAMINATION. One 3-hour paper for Pass only. The work done in practice classes will carry some weight.

593. STRENGTH OF MATERIALS PART IV
(Dr. Laszlo)

A course of two lectures per week throughout the year, and seminars by arrangement.

SYLLABUS. The topics discussed are broadly as follows: Elasticity theory. Special problems connected with beams, curved bars, torsion, stress concentration, elastic stability. Flat plates. Experimental stress and strain analysis. Shells.

Books. Recommended for reference:
*Timoshenko, S.—Strength of Materials, Vol. 2. (Van Nostrand.)
*Timoshenko, S.—Theory of Plates and Shells. (McGraw-Hill.)
Southwell, R. V.—Theory of Elasticity. (O.U.P.)
Jessop, H. T., and Harris, F. C.—Photoelasticity. (Cleaver-Hume.)

EXAMINATION. Two 3-hour papers for Pass and Honours.

563. SURVEYING PART I

A course of two lectures and three hours' practical work per week throughout the year.

SYLLABUS. History and development of surveying and of the instruments used. Nature, causes and classes of errors of measurement. Theory, construction adjustment, care and use of—the steel band, optical square, Abney clinometer, magnetic compass, plane table, dumpy level, theodolite, and sextant.


Practical Work. Field and office work relating to the above.

Students are required to provide themselves with the following: Field book of a recommended type; 12 oz. plumb-bob; rectangular protractor, 6-in. x 2-in.; boxwood scale, 20/40; 5 fig. tables of logarithms of numbers and natural and logarithmic trigonometrical functions of angles tabulated for every minute of arc; or Chambers' 7 Fig. Mathematical Tables (the latter tables will be required later by students proceeding to Surveying Part II or Surveying Part IIA).

Survey Camp. See under Surveying Part IIA.
Books. (a) Prescribed text-book:

(i) For students not proceeding to Surveying Part II or Surveying Part IIA:

(ii) For students proceeding to Surveying Part II or Surveying Part IIA:

(b) Recommended for reference:
*Johnson, J. B., and Smith, L. S.—Theory and Practice of Surveying. (John Wiley.)
*Breed, C. B., and Hosmer, G. L.—Principles and Practice of Surveying. (John Wiley.)
*Thomas, W. N.—Surveying. (Edward Arnold.)
*Taylor, E. W.—Theodolite Design and Construction. (Cooke, Troughton & Simms.)

EXAMINATION. One 3-hour paper for Pass and Honours. There will be no formal practical examination; the practical work performed during the year will be assessed as part of the Annual Examination. However, any candidate may be required to submit to a practical test and to resubmit field notes and assignments of work performed during the course.

639. SURVEYING PART II

A course of three lectures per week and six hours' practical work per week throughout the year.

SYLLABUS. More advanced plane table surveying. Field methods of topographical surveying. Requirements and field work of surveys for roads, railways, water supply, irrigation.

Theory and setting out of compound curves, transition curves, and vertical curves. Setting out of railway tracks. Underground surveying, special instruments and methods used, solution of problems in mining surveying. Alignment and setting out of tunnels.

Measuring up and calculation of quantities in earthwork and other engineering materials. Hydrographic surveying in river and ocean, stream and tide gauging, sounding apparatus. Precise levelling with special equipment. Trigonometrical levelling. Introduction to theory of map projections for a spherical earth.


Elementary theory of errors, application to survey observations.

PRACTICAL WORK. The equivalent of six hours per week devoted to field astronomy and other field and office work.

SURVEY CAMP. Before commencing on the course in Surveying Part II, students are required to attend a University Survey Camp of three weeks' duration and to spend two weeks under supervision in the Drawing Office of the Engineering School plotting field notes, or obtain similar experience, to the satisfaction of the lecturer, under an approved civil engineer, or licensed surveyor, or geologist.

Books. (a) Prescribed text-books:

*Star Almanac for Surveyors. (H.M. Stationery Office.)

(b) Recommended for reference:
*Hinks, A. R.—Map Projections. (C.U.P.)
*Close, C. F.—Text-Book of Topographical Surveying. (H.M. Stationery Office.)
*Higgins, A. L.—Higher Surveying. (Macmillan.)
EXAMINATION. Two 3-hour papers for Pass and Honours.

There will be no formal practical examination; the practical work performed during the year will be assessed as part of the Annual Examination. However, any candidate may be asked to submit to a practical test and to resubmit field notes and assignments of work performed during the course.

569. SURVEYING PART II (MINING COURSE)

A course of 19 lectures and 27 hours practical work during First and Second Terms, comprising parts of the syllabus, lectures and practical classes conducted in Surveying Part II.

SYLLABUS. Underground surveying including theory, construction and use of special instruments, transference of position and azimuth, solution of problems in strike and dip and of intersections of ore bodies by workings, measuring up and computing qualities, alignment and setting-out of tunnels.

More advanced plane-table surveying; field methods of topographical surveying; fundamentals of methods of surveying for roads, railways and water supplies; railway points and crossings.

Books. (a) Prescribed text-book:

*Clark, D.—Plane and Geodetic Surveying for Engineers, Vol. I. (Constable.)

(b) Recommended for reference:


EXAMINATION. One 3-hour paper for Pass.

There will be no formal practical examination; the practical work performed during the year will be assessed as part of the Annual Examination. However, any candidate may be required to submit to a practical test and to resubmit field notes and assignments of work performed during the course.

643. SURVEYING PART III

A course of three lectures per week and six hours' practical work per week throughout the year.

SYLLABUS. Astronomy. More precise astronomical observations for latitude, longitude and azimuth.


Map Projections. Theories of the common map projections of the spheroid. Grid co-ordinates. Transformation from geographical to grid co-ordinates and vice versa. Problems in the use of grid co-ordinates by the surveyor.

Topographical Surveys. Methods of topographical surveying for mapping; precise traverses and their adjustment; precise levelling and adjustment of level nets.

Practical Work. The equivalent of six hours per week devoted to field and office work, tutorial classes and excursions.

Books. (a) Prescribed text-books:


(b) Recommended for reference:

Other books will be referred to in lectures from time to time.

EXAMINATION. Two 3-hour papers for Pass and Honours. There will be no formal practical examination; the practical work performed during the year will be assessed as part of the Annual Examination. However, any candidate may be asked to submit to a practical test and to resubmit field notes and assignments of work performed during the course.

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571. TOWN PLANNING

Thirty lectures throughout the year.

Note. This is an introductory course only and is not intended to provide adequate training for professional qualification.

Syllabus. The history of town planning and human environment; ancient, Greek, Roman, Medieval, Renaissance and 19th century; study of examples; the history of Australian towns; the development of transportation; the development of planning technique in the 20th century; Ebenezer Howard and the Garden Cities movement; Patrick Geddes and other pioneers; introduction to the principles and practice of town and country planning; the outlines of planning legislation.

Books. (a) Prescribed text-books:
Hackett, B.—*Man, Society and Environment*. (P. Marshall, 1955.)

(b) Recommended for reference:
Ashworth, W.—*The Genesis of Modern British Town Planning*. (Routledge and Kegan Paul.)
Unwin, R.—*Town Planning in Practice*. (London, 1909.)
Lanchester, H. V.—*Art of Town Planning*. (London, Chapman and Hall, 1932.)

Examination. One 3-hour paper.
The University of Melbourne

LIST OF PUBLICATIONS

The following publications of the University are obtainable from the University Press at the prices indicated, plus postage. Orders, with remittances, should be addressed to the Melbourne University Press, Trade Department, Parkville, N.2, Victoria.

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<td>University Calendar</td>
<td>12s. 6d.</td>
<td>2s. 5d.</td>
<td>4s. 11d.</td>
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<tr>
<td>Handbook of Public and Matriculation Examinations</td>
<td>12s. 6d.</td>
<td>1s. 2d.</td>
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**FACULTY HANDBOOKS**

Faculty Handbooks are obtainable at the prices indicated, plus postage. Orders, with remittances, should be addressed to the Melbourne University Press, Trade Department, Parkville, N.2, Victoria. The Handbooks contain regulations, details of subjects and other information useful to students.

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<td>1.- Arts (including Journalism)</td>
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<td>11d.</td>
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<td>2.- Education and Physical Education</td>
<td>3/-</td>
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<td>3.- Law</td>
<td>3/-</td>
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<td>4.- Economics and Commerce and Public Administration</td>
<td>3/-</td>
<td>5d.</td>
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<td>5.- Science</td>
<td>6/-</td>
<td>8d.</td>
<td>1s. 2d.</td>
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