The New South Wales. UNIVERSITY of TECHNOLOGY



1954

TECHNOLOGY, CALENDAR,

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N.S.W. UNIVERSITY

CALENDAR, 1954

CALENDAR _

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OF THE

NEW SOUTH WALES: UNIVERSITY OF TECHNOLOGY

1954

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Arms of The New South Males University of Technology

Granted by the College of Heralds, London, on 3rd March, 1952.

Heraldic Description of Arms.

Argent on a Cross Gules a Lion passant guardant between four Mullets of eight points Or a Chief Sable charged with an open Book proper thereon the word SCIENTIA in letters also Sable.

The Arms express both the origin and the purpose of the University. The lion and the four stars of the Southern Cross on the Cross of St. George have reference to the State of New South Wales which brought the University into being; the open book with SCIENTIA across its page reminds us of its purpose. Beneath the shield is the motto "Manu et Mente", which is the motto of the Sydney Technical College, out of which the new University has developed. The motto is not an integral part of the Grant of Arms and could be changed at will; but it was the opinion of the University Council that the connection with the parent institution should in some way be depicted, and the new Arms emphasise very properly the historic stream of Migher education into which the New South Wales University of Technology has been incorporated.

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(Information in this Calendar is correct as at 31st December, 1953).

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NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY.

CALENDAR --- 1954

v	
February	
Monday 1	Australia Day—Puble Holiday.
Wednesday 3	Royal Visit—Public Holiday.
Tuesday 9	Professorial Board meets.
Monday 15	Enrolments begin all courses except 2nd year of courses
1201200 20 000000	I. V. VI. VII. VIII and IX.
Monday 99	First term beging
Monuay 22	Filst form begins.
March-	Council mosta
Monday 8	Council meets.
Tuesday 9	Professorial Doard meets.
Wednesday 24	Faculty of Architecture meets.
April	
Wednesday 7	Faculty of Engineering meets.
Monday 12	Enrolments and lectures commence-National Service
•	trainees 2nd year courses II and III and 2nd year
	courses I, V, VI, VII, VIII and IX.
Tuesday 13	Professorial Board meets.
Wednesday 14	Faculty of Science meets.
Friday 16 to	Faster Holidays
Monday 10 to	Easter Hondays.
Monday 15.	Annes Day Dublis Heliday
Monday 20	Anzae Day—rubhe Honday.
"May—	0
Monday 10	Council meets.
Tuesday 11	Professorial Board meets.
Saturday 15	First term ends.
Monday 17 to	Vacation (2 weeks).
Saturday 29.	
Monday 31	Second term begins.
June	-
Wednesday 2	Faculty of Engineering meets.
Tuesday 8	Professorial Board meets.
Monday 14	Queen's Birthday-Public Holiday.
Wedneedsw 18	Faculty of Science meets
Wednesday 22	Faculty of Architecture ments
Weanesaay 25	Fuently of Atomocoure mesos.
wuly	Come of months
Monday 12	Council meets.
Tuesday 43	Professorial Board meets.
Wednesday 23	Faculty of Engineering meets.
August-	
Monday 2	Bank Holiday-olasses meet as vasual.
Tuesday 10	Professorial Board meets.
Wednesday 18	Faculty of Science meets.
Saturday 21	Second term ends.
Monday 23 to	Vacation (2 weeks).
Saturday, Sep-	
tember 4.	
(Sentember-	
Monday 6	Third term begins
biolitay o	Examinations commence two term courses examt
	and more of courses I W WI WII WIII IV
M 10	Council mosts
Monday 13	
Tuesday 14	Protessorial Board meets.
Wednesday 15	Faculty of Engineering meets.
Saturday 18	Examinations cease—two-term courses.
Monday 20	Industrial training begins-two-term courses not engaged
-	in Survey Camp.

September-continued				
Monday 20 to	Survey Camp-1st year course VIII, 3rd year courses			
Friday 24.	V, VI, VII and VIII, 4th year courses VII and VIII.			
Wednesday 22	Faculty of Science meets.			
Monday 27	Industrial training begins-two-term courses attending			
	Survey Camp, except 3rd year of courses vil and			
	VIII.			
Monday 27 to	Geology excursion—and year of courses vil and ville			
Friday, October 1.	The self- of Architecture mosts			
Wednesday 29	Faculty of Architecture meets.			
October-	C. Haus Daw Dublie Holiday			
Monday 4	Six Hour Day—rubic Honday.			
Tuesday 5	VIII.			
Tuesday 12	Professorial Board meets.			
Saturday 23	Lectures cease—2nd year courses I, V, VI, VII, VIII and IX.			
November-	T 17 T			
Monday 1	Examinations commence—2nd year courses 1, V, VI, VII, VIII and IX.			
Monday 8	Council meets.			
Tuesday 9	Professorial Board meets.			
Saturday 13	Examinations cease—2nd year courses I, V, VI, VII VIII and IX.			
	Lectures cease-Diploma and three-term Degree courses.			
Monday 15	Industrial training commences-2nd year courses 1,			
	V, VI, VII, VIII and IX.			
Monday 22	Examinations begin—Diploma and three-term Degree courses.			
Saturday 27	Third term ends.			
December-				
Saturday 11	Examinations end—Diploma and three-term Degree courses.			
Tuesday 14	Professorial Board meets.			
February-	1955.			
Tuesday 8	Professorial Board meets.			
Monday 14	Enrolments begin.			
Monday 21	First term begins.			

LOCATION OF SCHOOLS AND STAFF.

The Administrative staff is located at the Sydney Technical College, Broadway.

The various Schools of the University and their teaching staff are located as follows:---

The Schools of Applied Physics, Applied Chemistry, Mechanical Engineering, Electrical Engineering, Mining Engineering and Geology, Civil Engineering, Mathematics, Applied Psychology, and Humanities and Social Sciences at the Sydney Technical College, Broadway.

The School of Wool Technology at East Sydney Technical College, Forbes Street, Darlinghurst.

The School of Architecture and Building, Barker Street, Kensington (Postal Address, Box 1, P.O. Kensington) and the Schools of Chemical Engineering and Metallurgy, High Street, Kensington.

It is expected that the School of Humanities and Social Sciences will transfer to Kensington early in 1954. ·

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PREFACE.

Incorporated by Act of the New South Wales Parliament on 1st July, 1949, the N.S.W. University of Technology was established to assist in meeting the urgent demand in Australia for increasing numbers of technologists and applied scientists, and to provide them with the means of advanced training and research.

In the words of the Act, the objects of the University are-

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- (a) the provision of facilities for higher specialised instruction and advanced training in the various branches of technology and science in their application to industry and commerce; and
- (b) the aiding by research and other suitable means of the advancement, development and practical application of science to industry and commerce.

Provision is made for the government of the University by a Council representative of Parliament, industry and commerce, the trade unions, technical education, professional bodies, the University of Sydney, and of the University's own teaching staff and its undergraduates and graduates. The present membership of the Council is listed on pages 40 and 41 of the Calendar.

The Council under the authority given to it by the Act-

- (a) may provide courses in applied science, engineering, technology, commerce, industrial organisation and such other related courses as it deems fit, and may, after examination, confer the several degrees of Bachelor, Master and Doctor, and such other degrees and such certificates in the nature of degrees or otherwise as it thinks fit;
- (b) may from time to time appoint deans, professors, lecturers and other officers and employees of the University;
- (c) shall have the entire control and management of the affairs, concerns and property of the University; and
- (d) may act in all matters concerning the University in such manner as appears to it best calculated to promote the objects and interests of the University.

The University of Technology instituted its first courses, leading to the degree of Bachelor of Engineering, in Civil, Electrical, Mechanical and Mining Engineering, in March, 1948. This initial step was made possible by the work of the Developmental Council, appointed in August, 1947, by the Minister for Education, the Hon. R. J. Heffron, M.L.A. These degree courses were planned to give students lecture and laboratory instruction in the University of Technology for approximately half the year, with practical experience of a planned instruction in the vear.

Courses leading to the degree of Bachelor of Science, in Applied Chemistry and Chemical Engineering, began in March, 1949. A degree course in Architecture (B(Arch.) was introduced in 1950, and degree courses-in Applied Physics and Wöol Technology (B.Sc.) in 1951.

In 1954 the first year of a four year degree course in Metallurgy (BISc.), and a four year degree course in Applied Geology (B.E. Geol.)) will be offered and a chair in Applied Psychology will be established.

First degree courses in operation are similar in content and in laboratory- and lecture-time to those of universities and higher technological institutions overseas. Courses are reviewed and approved by advisory panels, whose members include industrial executives and technologists from the related field, and educationalists from tertiary institutions.

Two features are emphasised in the planning of first degree courses of the University of Technology. The first, is the incorporation in the syllabus of industrial experience to supplement the laboratory and lecture-room work at the University. In the Faculty of Engineering this practical work, amounts, to five, months, a year, and is supervised and organised to suit the stage and syllabus of each course of study,

Secondly, in all faculties, the study of general subjects such as language and literature, history, economics and psychology, is compulsory. These courses are designed to broaden the experience and interests of the student and thus to assist him to take the place in contemporary affairs for which he is otherwise qualified.

The University also offers the customary club, and social features of university life—sport and societies dealing with literature, religion, art, music and public questions. During 1952 the constitution of the University of Technology Students' Union was approved by Council. Membership, of the Union is compulsory for all registered students. Membership, of the N.S.W. University, of Technology Sports Association is also compulsory for all registered students.

Facilities are available to students already in employment and enrolled in appropriate courses at Technical Colleges to transfer at "Conversion courses, the "first of "which "began in 1950," permit those who hold appropriate qualifications from Technical Colleges sto resume their studies and to secure a first or higher degree of the "New South Wales University of Technology.

In order to secure a closer integration between the relevant activities of the Department of Technical Education and the University, arrangements were completed during 1951 for the University to administer twenty of the Department's professional diploma courses. These diploma courses are in fields similar or closely related to those in which the University is conducting degree courses; they require matriculation standard of entrance and five or six years' part-time attendance concurrently with approved employment in industry. The diploma courses now administered by the University of Technology are—

Faculty of Applied Science: Chemistry, Chemical Ergineering, Food Technology, Leather Chemistry, Metallurgy, Optometry, Physics, Science, Secondary Metallurgy.

Faculty of Architecture: Architecture, Building, Quantity-Surveying.

Faculty of Engineering: Aeronautical Engineering, Civil Engineering, Electrical Engineering, Mechanical Engineering, Naval Architecture, Production Engineering, Radio Engineering, Mining Engineering.

During 1953 the syllabuses of the diploma courses in the Faculties of Science and Engineering were revised with a view to achieving as close a relationship as possible with the existing degree courses. As a result of the proposed revisions, it has been possible to provide part-time courses similar in content to the existing degree courses in a number of fields and these part-time degree courses will operate for the first time in 1954.

Special investigations may be carried out on any problem of technology or applied science at the request of any authority, institution, association or person; and in respect of any such investigation the Council of the University may charge such fees therefor and agree to such conditions in relation thereto as it thinks: fit.

A number of industrial undertakings and Government departments are co-operating with the University by their recognition of its courses as a means of training their industrial cadets in the theory and practice of their profession. To this end, they have selected employees as students to attend degree courses, paying their fees and the ordinary cadet rates payable during their periods in industry. In many cases the attendance of such students is also counted as part of their service for seniority grading and salary purposes. In addition to the above, a number of scholarships with liberal living allowances have been granted, particularly from the coalmining and the metal industries.

Students may also prepare for the degrees of Master of Science, Master of Engineering or Doctor of Philosophy in Science or Engineering.

Power to decentralise the University's activities, both in its co-operation with industry and in its teaching services, is given to the Council, which is authorised to establish and maintain branches, departments or colleges at Newcastle, Wollongong, Broken Hill, or such other places in the State of New South Wales as it may approve.

Action has been taken under this authority to establish a College of the University within the Newcastle Technical College and this College was opened on 3rd December, 1951.

Pending the completion of its own buildings and the acquisition of equipment, the University has had at its disposal the facilities of the Department of Technical Education. The foundation stone of the first major building on the sixty-acre site reserved for the University at Kensington was set on 25th February, 1950, by the Governor of New South Wales, Sir John Northcott, K.C.M.G., K.C.V.O., C.B. Work on the building, which will provide 136,745 square feet of floor space, has progressed satisfactorily and it is expected that the building will be completed by the end of 1954. The School of Architecture and Building already occupies the top floor of the new building and plans have been made for occupation by the Schools of Humanities and Social Sciences, Applied Physics, Mathematics and Mining Engineering during 1954.

The School of Chemical Engineering is housed in seven lightframed permanent buildings at the northern end of the University site, and the School of Metallurgy occupies four similar buildings in the same area.

Late in 1953 the Minister for Education announced that the New England University College would become the University of New England in 1954 with authority to confer degrees. In conjunction with this development arrangements were made for students to enrol in classes at the Newcastle College of the New South Wales University of Technology with a view to meeting the requirements for the degree of Bachelor of Arts of the University of New England.

TECHNICAL EDUCATION AND NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY ACT, 1949.

PART III.

THE NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY.

DIVISION 1.-Preliminary.

Commencement.

14. This Part of this Act shall, except where otherwise expressly Proclamation provided, commence upon a day to be appointed by the Governor and 24-6-99 soutions notified by proclamation published in the Gazette notified by proclamation published in the Gazette.

excepted.

Definitions.

15. In this Part of this Act, unless the context or subject matter otherwise indicates or requires-

"By-laws" means by-laws made under this Part of this Act.

"Council" means the Council of the University.

- "Prescribed" means prescribed by this Part of this Act or by the regulations.
- "Regulations" means regulations made under this Part of this Act.
- "University" means the New South Wales University of Technology.

DIVISION 2.-Incorporation of the University and Establishment of a Council thereof.

New South Wales University of Technology.

16. (1) There shall be a New South Wales University of Technology consisting of the Council, the professors and such other classes of persons giving instruction within the University as may be prescribed and the graduate and under-graduate members thereof.

(2) The University shall be a body corporate under the name of "The New South Wales University of Technology" with perpetual succession and a common seal, and shall be capable by that name of suing and being sued, and of doing and suffering all such other acta and things as bodies corporate may by law do and suffer.

(3) The University shall, subject to this Part of this Act and the regulations, have power to take, purchase, hold, grant, alienate, demise or otherwise dispose of real and personal property:

Provided that the University shall not, except with the approval of the Governor, alienate, mortgage, charge or demise any real property.

Common Seal-

17. (I) The common seel of the University shall be kept in such custody as the Council directs, and shall not be used except upon resolution of the Council.

(2) All courts, judges and persons acting judicially shall take judicial notice of the common seal of the University affixed to any document, and shall presume that it was duly affixed.

Objects of the University.

18. The objects of the University shall include the following;-

- (a) to provide facilities for higher specialised instruction and advanced training in the various branches of technology and science in their application to industry and commerce; and
- (b) to aid by research and other suitable means the advancement, development, and practical application of science to industry and commerce.

The Council.

19. (1) There shall be a Council of the University which shall have and may exercise and discharge the powers, authorities, duties and functions conferred and imposed upon the Council by or under this Part of this Act.

(2) The Council shall consist of not more than thirty members who shall be appointed by the Governor.

Of the members so appointed-

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- (a) five shall be appointed on the nomination of the Minister; being persons who, in the opinion of the Minister, by their knowledge and experience can advance the full development of the University;
- (b) one shall be a member of the Legislative Council elected by that Council;
- (c) one shall be a member of the Legislative Assembly elected by that Assembly;
- (d) four shall be appointed on the nomination of the Minister to represent persons engaged in the professions;
- (e) two shall be officers within the meaning of the Public Service Act, 1902, as amended by subsequent Acts, directly concerned with and engaged in the administration of technical education and shall be appointed on the nomination of the Minister:
- (f) five shall be appointed on the nomination of the Minister to represent industrial and commercial interests;
- (g) three shall be appointed on the nomination of the Minister to represent trade unions and employee organisations;

- (h) one shall be appointed upon the nomination of the Senate of the University of Sydney;
- (i) one shall be a person having the qualifications as prescribed by the by-laws elected, in the manner prescribed by the by-laws, by undergraduates within the University;
- (j) one shall be a person having the qualifications as prescribed. by the by-laws, elected in the manner prescribed by the by-laws, by the graduates of the University;
- (k) one shall be a person elected, in the manner prescribed by the by-laws, by the professors and such other classes of persons giving instruction within the University as may be so prescribed:
- (1) one shall be the person for the time being holding the office of Director of the University;
- (m) not more than four shall be persons elected in the manner prescribed by the by-laws to represent such principal faculties as may be so prescribed.

(3) The person or persons to be nominated by the Minister for appointment pursuant to paragraph (d), (f) or (g) of subsection two of this section shall, in respect of each such paragraph, be selected by him from a panel of such number of names as may be prescribed submitted to him for the purpose by such person or class or classes of persons or body or bodies of persons as may be prescribed in relation to that paragraph.

The regulations may prescribe-

- (a) the time within which any such panel of names shall be submitted to the Minister;
- (b) where any such panel of names is to be submitted by more than one prescribed class or body of persons, the number of names which each such class or body is entitled to include in such panel.

(4) If for any reason a panel of names is not submitted to the Minister in accordance with this section or the regulations or is not submitted within the time prescribed with respect thereto, the Minister may nominate such person or persons as he thinks fit and such person or persons shall be deemed to have been validly nominated in accordance with subsection three of this section and the regulations.

(5) (a) Members of the Council, other than the Director of the University, shall, subject to this Part of this Act, hold office for such period not exceeding four years as may be prescribed, Different periods may be prescribed in respect of the different classes of members.

The Director of the University shall hold office while he remains. Director. (b) The regulations may provide for the retirement in rotation of members of any particular class and for that purpose may provide that, on the first appointment of members of any such class after the introduction of rotational retirement, such number as may be prescribed of the members of that class shall be appointed for a less period than that prescribed pursuant to paragraph (a) of this subsection with respect to members of that class.

(c) All retiring members shall, unless otherwise disqualified, be eligible for reappointment.

(6) Where a casual vacancy occurs in the office of a member of the Council the Governor may appoint a person to the vacant office. The person so appointed shall have the like prescribed qualification (if any) as that of the member whose office has become vacant and shall, subject to this Part of this Act, hold office for the residue of his predecessor's term of office.

(7) The provisions of the Public Service Act, 1902, as amended by subsequent Acts, shall not apply to or in respect of the appointment by the Governor of any member of the Council, and any member so appointed shall not, in his capacity as such member, be subject to the provisions of such Act during his term of office.

Vacation of Office.

20. A member of the Council shall be deemed to have vacated his office if he-

- (a) dies;
- (b) resigns his office by writing under his hand addressed to the Governor;
- (c) becomes bankrupt, compounds with his creditors or makes any assignment of his salary or estate for their benefit;
- (d) becomes an insane person or patient or an incapable person within the meaning of the Lunacy Act, 1898-1947:
- (e) absents himself from four consecutive meetings of the Council without leave of the Council; or
- (f) in the case of a member elected by either House of Parliament—ceases to be a member of that House.

President and Vice-President.

21. (1) (a) The first President of the University shall be appointed by the Minister and shall hold office for a period of one year.

The person so appointed shall be a member of the Council.

(b) Whenever a vacancy in the office of President occurs, the Council shall elect one of its number to be President of the University.

(c) The President, other than the first President, shall hold office for such period and on such terms and conditions as may be prescribed by the by-laws. 15

(2) (a) The Council shall, at its first meeting and thereafter whenever a vacancy in the office of Vice-President occurs, elect one of its number to be Vice-President of the University.

(b) The Vice-President shall hold office for such period and on such terms and conditions as may be prescribed by the by-laws.

Chairman.

22. At every meeting of the Council the President or, in his absence, the Vice-President shall preside as chairman, but if the President and Vice-President are both absent, the members present shall elect a person from among their number to preside as chairman.

Questions How Decided.

23. (1) All questions which come before the Council shall be decided at any meeting duly convened, at which a quorum is present, by a majority of the votes of the members present.

(2) The chairman at any such meeting shall have a vote; and in case of an equality of votes a second or casting vote.

(3) At any such meeting ten members shall form a quorum.

Validity of Acts and Proceedings.

24. (1) No act or proceeding of the Council or any committee of the Council, or of the Director or any person acting pursuant to any direction of the Council shall be invalidated or prejudiced by reason only of the fact that at the time when such act or proceeding was done, taken or commenced there was a vacancy or vacancies, not exceeding twelve in number, in the office or offices of any member or members of the Council.

(2) All acts and proceedings of the Council or any committee of the Council, or of the Director or any person acting pursuant to any direction of the Council shall, notwithstanding the subsequent discovery of any defect in the appointment, nomination or election of any member of the Council, or that any such member was disqualified from acting as or incapable of being a member of the Council, be as valid as if such member had been duly appointed, nominated or elected and was qualified to act as or capable of being a member and had acted as a member of the Council and as if the Council had been properly and fully constituted.

DIVISION 3.—Administration.

Powers of the Council.

25. Subject to this Part of this Act and to the regulations and by-laws, the Council---

(a) may provide courses in applied science, engineering, technology, commerce, industrial organisation and such other related courses as it deems fit and may, after examination. ... confer the several degrees of Bachelor, Master and Doctor, and such other degrees and such certificates in the nature of degrees or otherwise as it thinks fit;

- (b) may from time to time appoint deans, professors, lecturers and other officers and employees of the University;
- (c) shall have the entire control and management of the affairs, concerns and property of the University; and
- (d) may act in all matters concerning the University in such manner as appears to it best calculated to promote the objects and interests of the University:

Provided that no appointment of a dean, professor, lecturer or other officer or employee shall be made pursuant to this section before the day appointed and notified pursuant to subsection three of section thirty-three of this Act.

Director.

"26. (1) There shall be a Director of the University who shall be the chief executive officer of the Council.

(2) The Director shall have and may exercise and discharge such powers, authorities, duties and functions as may be prescribed in the regulations and by-laws.

(3) The Director shall be appointed in the manner prescribed and shall hold office for such period and upon such terms and conditions as may be prescribed.

Delegation to Committees, etc.

27. (1) The Council may constitute and appoint such committees as it thinks fit and may delegate all or any of its powers, authorities and functions (except this power of delegation and the power to make by laws) to any such committee or to any member of the Council, or to any officer or officers of the University.

(2) Every delegation under this section shall be revocable by resolution of the Council and no delegation shall prevent the exercise or discharge by the Council of any of its powers, authorities, duties or functions.

Ad Eundem and Honorary Degrees.

28. (1) Where any person has obtained in any university or other educational establishment recognised by the by-laws of the university in force for the time being any degree or diploma corresponding or equivalent, in the opinion of the Council, to any degree which the Council is now or may hereafter the empowered to confer after examination, the Council may confer such latter degree upon such person without texamination. (2) The persons upon whom degrees are conferred, under the provisions of subsection one of this section, shall be entitled to the same rights and privileges as appertain to those who have taken the same degrees in the ordinary course in the University.

(3) By-laws may be made for or with respect to the conferring of honorary degrees or other distinctions on approved persons.

Power to Establish and Maintain Branches, Departments, or Colleges.

*29. (1) The Council may establish and maintain branches, departments or colleges of the University at Newcastle, Wollongong, Broken Hill or such other place in the State as the Council deems fit.

Council May Authorise Educational Establishments to Issue Certificates.

(2) (a) The Council may authorise any college or educational establishment, whether incorporated or not, engaged in the promotion of applied science and technology, ito issue to candidates for any degree or diploma, certificates to the effect that the candidate for any such degree or diploma has completed such course of instruction therefor as the Council by by-law prescribes.

(b) Any person who presents to the Council any such certificate may be admitted as a candidate for the degree or diploma to which it has reference.

Evidence of Degrees Conferred.

30. All degrees conferred by the University shall be evidenced by a certificate under the common seal of the University and be signed by the President and the Director.

Fees.

21. The Council may by by-law make provision for the payment by students of the University of reasonable fees for entrance to the University, attendance at lectures, conferring of degrees and other University charges, except in the case of any student who is granted any fellowship, scholarship, exhibition, bursary or similar benefit, to the extent to which he is thereby exempted from payment of fees.

Technological and Scientific Investigation.

32. (1) The Council may carry out special investigations in any technological or scientific matter at the request of any authority, institution, association, firm or person, and in respect of any such investigation may charge such fees therefor and agree to such conditions in relation thereto as it thinks fit.

(2) The Council may publish information relating to any matter investigated by it pursuant to the provisions of subsection one of this section or otherwise:

Provided that no such publication shall be made in contravention of any condition agreed to pursuant to the said subsection.

Transitional Provisions—Appointments.

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33. (1) (a) During the period commencing on the date of commencement of this Part of this Act and ending on the appointed day the provisions of this subsection shall have effect.

(b) All deans, professors, lecturers and other officers and employees necessary to enable the Council to exercise and discharge the powers, authorities, duties and functions conferred and imposed upon it by this Part of this Act shall be appointed under and subject to the provisions of the Public Service Act, 1902, as amended by subsequent Acts; and every such dean, professor, lecturer or other officer or employee shall be subject to the said Act, as so amended, during his tenure of office or employment; and the permanent head of the Department of Technical Education shall in relation to such deans, professors, lecturers and other officers and employees be the permanent head within the meaning of the said Act, as so amended.

(2) Any person appointed under subsection one of this section and in office immediately before the appointed day who is not appointed by the Council to the staff of the University on that day shall be entitled, if he is under the age of sixty years, to be appointed on the recommendation of the Public Service Board to some office or position in the Public Service not lower in salary than that which he held under the said subsection immediately before the appointed day.

(3) In this section "appointed day" means a day to be appointed by the Governor and notified by proclamation published in the Gazette. The day so appointed and notified shall not be earlier than one month after the date of the publication of such proclamation in the Gazette.

Use of Services of Officers and Employees of the Public Service.

34. For the purpose of exercising and discharging the powers, authorities, duties and functions conferred and imposed on the Council by this Part of this Act the Council may, with the approval of the Minister of the Department concerned and of the Public Service Board, on such terms as may be arranged, make use of the services of any of the officers and employees of any Government Department.

Saving of Rights.

35. (1) Where a person who is appointed by the Council to the staff of the University was immediately before his appointment an officer within the meaning of the Public Service Act, 1902, or an employee within the meaning of the Superannuation Act, 1916, he shall—

(a) retain any rights accrued or accruing under either of those Acts;

(b) continue to contribute to any fund or account and shall be entitled to receive any deferred or extended leave and any payment, pension or gratuity as if he were an officer or employee within the meaning of the Public Service Act, 1902, or the Superannuation Act, 1916, as the case may be, and for such purpose his service with the University shall be deemed to be service for the purposes of such Acts;

(c) in the event of his ceasing to be employed by the University (otherwise than on account of misconduct or disgraceful or improper conduct) be entitled, if he is under the age of sixty years, to be appointed upon the recommendation of the Public Service Board to some office in the Public Service not lower in classification and salary than that which he held immediately before his appointment to the staff of the University.

(2) This section shall commence upon the day appointed and notified pursuant to subsection three of section thirty-three of this Act.

Amendment of Act No. 28, 1916, Sch. III.

36. (1) The Superannuation Act, 1916-1948, is amended by inserting at the end of Schedule Three thereto the following words:-

The New South Wales University of Technology.

(2) This section shall commence upon the day appointed and notified pursuant to subsection three of section thirty-three of this Act.

By-laws.

37. (1) The Council may make by-laws, not inconsistent with this Part of this Act or the regulations, with respect to all matters pertaining to the University.

(2) Without prejudice to the generality of subsection one of this section the Council may make by-laws with respect to—

- (a) the management, good government, and discipline of the University;
- (b) the method of election of members of the Council (other than the members referred to in paragraphs (b) and (c) of subsection two of section nineteen of this Act) who are to be elected;
- (c) the manner and time of convening, holding and adjourning the meetings of the Council; the manner of voting at such meetings, including postal voting or voting by proxy; the powers and duties of the chairman thereof; the conduct and record of the business; the appointment of committees of the Council, and the quorum, powers and duties of such committees;

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- (d) the number, stipend, manner of appointment, and dismissal of deans, professors, lecturers, examiners, and other, officers and servants of the University;
- (e) the entrance standards for students;
- (f) the examinations for and the granting of degrees, diplomas, certificates and honours;
- (g) the examinations for and the granting of fellowships, scholarships, exhibitions, bursaries, and prizes;
- (h) the admission of students of other universities and technical colleges to any corresponding status or of graduates of other universities or technical colleges to any corresponding degree or diploma without examination;
- (i) generally, all other matters authorised by this Part of this Act or necessary or convenient for giving effect to this Part of this Act.

(3) Every by-law made by the Council shall be sealed with the common seal of the University, shall be submitted for the consideration and approval of the Governor, and when so approved shall—

- (a) be published in the Gazette;
- (b) take effect from the date of publication or from a later date to be specified in the by-law.

(4) A copy of every such by-law shall be laid before each House of Parliament within fourteen sitting days after the publication thereof in the Gazette if Parliament is in session, and if not, then within fourteen sitting days after the commencement of the next session.

(5) Any such by-law may be proved in any court by the production of a verified copy under the seal of the University or by the production of a document purporting to be a copy of such by-law. and to be printed by the Government Printer.

Division 4.—Finance.

New South Walss University of Technology Account.

38. (1) The University shall have an account which shall be called the "New South Wales University of Technology Account" (in this section referred to as the "Account").

(2) There shall be paid to the credit of the Account-

- (a) all moneys received by the University by way of fees, charges, gifts, bequests or otherwise;
- (b) all moneys made available to the University or the Council in accordance with the provisions of this Division.

(3) All expenditure incurred by the University (including the repayment of moneys borrowed by or advanced to the University in accordance with this Division) shall be paid from the Account.

Colonial Treasurer to Meet Certain Costs.

39. (1) Any expenditure incurred by the University with the approval of the Governor given on the recommendation of the Colonial Treasurer is in this, section referred to as approved expenditure.

(2) The Colonial Treasurer shall, in each year, pay to the University the amount by which the approved expenditure exceeds the income from all sources of the University or so much of such income as is capable of being applied for the purpose of meeting approved expenditure.

(3), Any moneys payable by the Colonial Treasurer under this section shall be paid out of moneys provided by Parliament.

Advances by Colonial Treasurer.

40. The Colonial Treasurer may for the temporary accommodation of the University advance such moneys to the Council as the Governor may approve upon such terms and conditions as to repayment and interest as may be agreed upon.

Power of Council to Borrow.

41. The Council may borrow money for-

- (a) the purpose of carrying out or performing any of its powers, authorities, duties and functions;
- (b) the renewal of loans; or
- (c) the discharge or partial discharge of any indebtedness to the Colonial Treasurer or to any bank,

within such limits, to such extent and upon such conditions as to security or otherwise as the Governor upon the recommendation of the Colonial Treasurer may approve.

Accounts To Be Rendered.

42. The Council shall cause to be kept proper books of account in relation to the funds of the University and shall, as soon as practicable after the thirtieth day of June in each year, prepare and transmit to the Minister for presentation to Parliament a statement of accounts in a form approved by the Auditor-General exhibiting a true and correct view of the financial position and transactions of the University.

Audit.

43. The accounts of the University shall be audited by the Auditor-General, who shall have, in respect thereof, all the powers conferred on the Auditor-General by any law now or hereafter in force relating to the audit of public accounts: and the Audit Act, 1902, and any Acts amending the same, shall apply to the members of the Council: and to the officers and employees of the University in the same manner as it applies to accounting officers of public departments.

DIVISION 5.—General.

No Religious Test.

44. No religious test shall be administered to any person in order to entitle him to be admitted as a student of the University, or to hold office therein, or to graduate thereat, or to enjoy any benefit, advantage or privilege thereof.

Power to Accept Gifts, etc.

45. (1) The University shall have power to acquire by gift, bequest or devise any property for the purposes of this Part of this Act, and to agree to and carry out the conditions of any such gift, bequest or devise.

(2) The rule of law relating to perpetuities shall not apply to any condition of a gift, bequest or devise to which the University has agreed.

Council to Co-operate with Other Bodies.

46. In the exercise of its powers, authorities, duties and functions under this Part of this Act the Council shall, so far as is practicable, co-operate with the University of Sydney, the Commonwealth Scientific and Industrial Research Organisation, the Department of Technical Education, and other Commonwealth and State institutions devoted to science and research.

Report of Proceedings.

47. (1) As soon as practicable after the thirtieth day of June in each year, the Council shall prepare and furnish to the Minister a report upon the proceedings of the University during the period of twelve months immediately preceding that day. Such report shall include a summary of the work, researches and investigations carried out by the University during such period.

(2) A copy of such report shall be laid before both Houses of Parliament as soon as practicable after it has been received by the Minister.

Regulations.

48. (1) The Governor may make regulations not inconsistent with this Part of this Act prescribing all matters which by this Part of this Act are required or permitted to be prescribed or which are necessary or convenient to be prescribed in relation to any matter within the powers and functions of the University and the Council and generally for carrying out or giving effect to the objects of the University and to this Part of this Act. (2) The Regulations shall—

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- (a) be published in the Gazette;
- (b) take effect from the date of publication or from a later date to be specified therein;
- (c) be laid before both Houses of Parliament within fourteen sitting days after the publication thereof if Parliament is in session, and if not, then within fourteen sitting days after the commencement of the next session.

If either House of Parliament passes a resolution of which notice has been given at any time within fifteen sitting days after such regulations have been laid before such House disallowing any regulation or part thereof, such regulation or part shall thereupon cease to have effect.

PART IV.

Acquisition of Land.

49. (1) For the purposes of this Act, the Governor may, under the Public Works Act, 1912, as amended by subsequent Acts, resume or appropriate any land and the Minister may, under the said Act as so amended, purchase any land.

(2) (a) Where any land has been appropriated or resumed pursuant to this section the Governor may, by notification published in the Gazette, notify that the land so resumed or appropriated and specified in such notification is vested in The New South Wales University of Technology.

(b) Thereupon the land so specified shall vest in the said University.

(3) For the purposes of the Public Works Act, 1912, as amended by subsequent Acts, any such resumption, appropriation or purchase shall be deemed to be for an authorised work, and the Minister shall be deemed to be the Constructing Authority:

Provided that sections thirty-four, thirty-five, thirty-six and thirtyseven of the Public Works Act, 1912, as amended by subsequent Acts, shall not apply to any such resumption, appropriation or purchase, but section thirty-eight of such Act shall, mutatis mutandis, apply to and in respect of any contracts relating to any such resumption, appropriation or purchase. Power to Rescind Resumptions. Cf. Act No. 7, 1912, s. 40.

50. (1) The Governor may, by notification in the Gazette, rescind in whole or in part any notification of resumption made in pursuance of section forty-nine of this Act.

(2) Upon the publication of any notification of rescission the land described in such notification shall revest in the person who was entitled thereto immediately before the resumption for his estate, interest or right immediately before such resumption, but subject to any interest in or equity binding upon such land created by the Constructing Authority since such resumption; and the land shall be subject totall trusts, obligations, estates, interests, contracts, charges, rates, rights-of-way or other easements from which it was freed and discharged by such resumption as if the land had not been resumed and shall also be subject to any interests in or equities binding on the compensation moneys created since the resumption.

(3) On the lodgment with the Registrar-General of a copy of a notification in the Gazette rescinding a notification of resumption of land under the provisions of the Real Property Act, 1900, the Registrar-General shall cancel any entry or notification in the register book made by him pursuant to section 46A of the Real Property Act, 1900, in so far as it relates to the land the notification of the resumption of which has been rescinded, and for the purpose of any dealing with such land the entry or notification made pursuant to section 46A of the Real Property Act, 1900, shall be deemed never to have been made.

(4) The person in whom any land is revested under this section shall be entitled to be compensated by the Constructing Authority for any loss or damage actually suffered by him as a direct consequence of the resumption and its rescission other than compensation in respect of the value of the land.

(5) Any claim for compensation arising under this section shall be heard and determined in like manner and subject to the like conditions as a claim for compensation by reason of the acquisition of land under the Public Works Act, 1912, as amended by subsequent Acts, and the provisions of the Land and Valuation Court Act, 1921, as amended by subsequent Acts, shall, mutatis mutandis, apply to and in respect of the hearing and determination of any such claim.

REGULATIONS.

Interpretation:

1. In: these Regulations, "Act" means, the Technical: Education and New South Wales University of Technology Act; 1949.

Incorporation of the University.

2. For the purposes of subsection one of section sixteen of the Act, "lecturers and fellows of the University" are hereby prescribed as classes of persons giving instruction within the University.

Submission to Minister of Panels of Names Relating to the Appointment of Certain Members of the Council of the University.

3. (1) The persons to be nominated by the Minister for appointment-

- (a) pursuant to paragraph. (d) of subsection two of section nincteen of the Act shall be selected by him from a panel of twenty-one names submitted to him by the organisations specified in Part A of the Schedule hereto;
- (b) pursuant to paragraph (f) of the same subsection shall be selected by him from a panel of twenty-two names submitted to him by the organisations specified in Part B of the Schedule hereto;.
- (c) pursuant to paragraph (g) of the same subsection shall be selected by him from a panel of four names submitted to him by the organisations specified in Part C of the Schedule hereto.

(2) The number of names which each such organisation is entitled to include in the appropriate panel shall be the number specified in the said Schedule opposite the name of such organisation.

For the purposes of this Regulation the four bodies grouped together at the end of Part B of the said Schedule shall be deemed to be one organisation.

(3). All names which any such organisation is entitled to include in a panel shall, in respect of the first appointment of members to the Council of the University, be submitted to the Minister not later than the twenty-eighth day of June, one thousand nine hundred and forty-nine, and in respect of any subsequent appointment of members to that. Gouncil, be submitted, to the Minister not later, than the fourteenth day of June in the year in which any such appointment, is to be made.

SCHEDULE.

Part A.

Representation of Persons Engaged in the Professions. Organisation. Number of Names.

	TATTON OF TATTO
The Institution of Engineers, Australia, Sydney Divisio	n 3
The Institution of Engineers, Australia, Newcastle Divisio	n 3
The Royal Australian Chemical Institute (N.S.W. Branch) 3
The Institute of Optometrists of New South Wales	. <u> </u>
The Royal Australian Institute of Architects, New Sout	h
Wales Chapter	. 3
The Institution of Production Engineers (Sydney Section) 3
The Institute of Physics (Australian Branch, N.S.W	•
Division)	. 3

Part B.

Representation of Industrial and Commercial Interests.

Organisation.

Number of Names.

Chamber of Manufactures of New South Wales	3
Sydney Chamber of Commerce	3
Metal Trades Employers' Association	3
The Employers' Federation of New South Wales	3
Building Industry Congress of New South Wales	3
The Institute of Management	3
Primary Producers' Union)
The Graziers' Association of New South Wales	4
Farmers and Settlers' Association of New South Wales	Chosen conjointly.)
Wheat Growers' Union of New South Wales	}

Part C.

Representation	of	Trade	Unions	and	Employee) Or	ganisations.
(Drga	nisation	ı .			Nu	mber of Names.
Labor Council of N	New	South '	Wales .				1
Technical Teachers'	Ass	sociatior	ı of New	' Sout	h Wales		3

Period of Office.

4. (1) The members of the Council of the University, other than the Director of the University and the members referred to in clauses two, three and four of this regulation, shall, subject to the Act, hold office for a period of four years.

(2) The member of the Council of the University elected by the Legislative Council shall, subject to the Act, hold office until his successor has been elected by the Legislative Council as hereinafter provided and has been appointed by the Governor to the Council of the University.

After the first election of a member by the Legislative Council in the year one thousand nine hundred and forty-nine each subsequent election shall be held as soon as practicable after the commencement of the term of service of the fifteen members of the Legislative Council elected at each triennial election of members of the Legislative Council held after such year. (3) The member of the Council of the University elected by the Legislative Assembly shall, subject to the Act, hold office until his successor has been elected by the Legislative Assembly as hereinafter provided and has been appointed by the Governor to that Council.

After the first election of a member by the Legislative Assembly in the year one thousand nine hundred and forty-nine each subsequent election shall be held as soon as practicable after every general election of members of the Legislative Assembly held after such year.

(4) The members of the Council appointed pursuant to paragraphs (i), (j), (k) and (m) of subsection two of section nineteen of the Act shall hold office for a period of two years: Provided that the members first appointed pursuant to paragraphs (i), (k) and (m) of the said subsection shall hold office for a period of one year.

The Director.

5. (1) The Director shall be the chief executive officer of the Council and shall be specially charged with the duty of promoting the interests and furthering the development of the University.

(2) The Director shall, under the Council, subject to the by-laws and to any resolution of the Council—

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- (a) manage and supervise the administrative, financial and other activities of the University;
- (b) consult with and advise the Professorial Board, and all other University Boards, Faculties, Committees, Professors, and other Heads of Departments;
- (c) exercise supervision over the discipline of the University, with power, in the case of students, to impose penalties in accordance with academic usage for breach of discipline or for misconduct of any kind;
- (d) give effect to the by-laws and to any resolution or report passed or adopted by the Council;
- (e) perform such other duties as may from time to time be assigned to him by the Council.

(3) Nothing in this Regulation shall affect the precedence or authority of the President or Vice-President.

BY-LAWS.

CHAPTER I.-THE PRESIDENT AND VICE-PRESIDENT.

1. (a) The President shall hold office for a period commencing from his election and terminating at the close of the ordinary meeting of Council next preceding the expiration of two years from the date of his election.

(b) The Vice-President shall hold office for a period commencing from his election and terminating at the close of the ordinary meeting of the Council next preceding the expiration of two years from the date of his election.

(c) Any retiring President or Vice-President shall be eligible / for re-election.

2. (a) The President and Vice-President shall, by virtue of their office, be members of any Committee constituted by any By-law or by any resolution of the Council and of any Board or Faculty within the University.

(b) The President may preside at any meeting of any such Committee, Board or Faculty and shall have all the rights and powers of the Chairman of any such Committee, Board or Faculty.

(c) If the President is absent or does not desire or is unable to act, or if the office of President is vacant, the Vice-President may preside at any such meeting and shall have the like rights and powers.

(d) In the absence of the President, or if the office of President is vacant, any powers or duties conferred or imposed upon the President by these By-laws may be exercised and discharged by the 'Vice-President.

(e) This By-law shall have effect notwithstanding the provisions of .any other By-law.

CHAPTER II-THE COUNCIL.

'Meetings and Rules of Procedure.

1. The Council shall meet on the second Monday of March, May, July, September and November in each year, and on such other days as may be necessary for the despatch of business: Provided that if the Monday so specified for the regular meeting is a public holiday the Council shall meet on the following Monday. The Council shall have power to adjourn any meeting to a later date.

2. At any time in the interval between such meetings the President or, in his absence, the Vice-President or, in the absence of both, the Director shall have power to call a special meeting for consideration of any urgent business which he may wish to submit to the Council. 3. Upon the written requisition of any five members, the President or Vice-President or Director, or in their absence, the Registrar shall convene a special meeting of the Council to be held within fourteen days after the receipt of the requisition. The written requisition shall set forth the objects for which the meeting is required.

4. Except in the case of a special meeting as aforesaid or unless otherwise decided by the Council no motion initiating any subject for discussion shall be made except in pursuance of notice given to the Secretary to the Council at any time not less than ten clear days before the meeting of the Council at which the motion is to be moved, and the Secretary shall enter all such notices in the Notice of Motion Book in the order in which they are received by him.

5. The Secretary to the Council shall transmit by post or deliver to each member of the Council a written or printed notice of the date of the next ensuing meeting of the Council, whether such meeting is an ordinary or special meeting. Such notice shall, except in any case of emergency, be so posted or delivered at least seven days previous to the meeting. Except in any case of emergency all matters to be considered at the meeting shall be stated in the said notice or in a supplementary notice transmitted by post or delivered to each member of the Council not less than three days before the meeting. The said notice or supplementary notice shall be accompanied by supporting statements in sufficient detail to allow members to consider the matters prior to the meeting.

6. In the event of a quorum of the Council not being present at any meeting within half-an-hour after the time appointed for the meeting, whether such meeting is an ordinary or special meeting, the members then present may appoint any convenient future day, of which at "least seven days' notice shall be given by the Secretary to the members of the Council in the usual way. Such day may be chosen as the day of the next ordinary meeting of the Council and all business which should have been transacted at the meeting lacking a quorum shall take precedence thereat.

7. The Minutes of any preceding meeting of the Council, whether ordinary or special not previously approved as being a true record, shall be circulated to members of the Council prior to the meeting at which they are to be considered. Upon being approved as correct such Minutes shall be signed by the Chairman as being a true record.

Members Representing Principal Faculties.

8. The members to be elected pursuant to paragraph (m) of subsection two of section nineteen of the Technical Education and New South Wales University of Technology Act, 1949, shall be elected by the three principal Faculties to be chosen by the Council at its 'May meeting in 1950 and in 1951 and in every alternate year after .1951. 9. The election of a member by each of the Faculties so chosen shall be held at a meeting of the Faculty duly convened by the Registrar to be held in May in 1950 and in 1951 and in every alternate year after 1951.

10. The Registrar shall act as Chairman of the meeting.

11. The method of election shall be by ballot, at which the candidate polling the largest number of votes shall be declared elected. Where an equal number of votes is cast for more than one candidate and it is necessary to determine between them which of them shall be elected the Registrar shall determine the matter by lot.

In this By-law the expression "determine by lot" means determine in accordance with the following directions:—The names of the candidates concerned having been written on similar slips of paper and the slips having been folded so as to prevent identification and mixed and drawn at random, the candidate whose name is first drawn shall be the candidate elected.

Member Representing Teaching Staff.

12. The member to be elected pursuant to paragraph (k) of subsection two of section nineteen of the Technical Education and New South Wales University of Technology Act, 1949, shall be elected by the professors, persons giving full-time instruction within the University and such other persons giving instruction within the University as the Council may determine by resolution from time to time. The election shall be held on such day in the month of June in 1953 and in every alternate year after 1953, as the Council may appoint.

13. At least forty days' notice of the date of election shall be given by notice posted at the University and in such other place as the Council may determine.

14. The Registrar shall prepare a list of electors comprised of all persons eligible to vote as provided under By-law 12 of this chapter, completed to the last day for receiving nominations for any election, and a copy of such list shall be exhibited at the University during the period from that date to the time of election.

14A. (a) No person shall be eligible for election unless his name has been communicated to the Registrar in writing under the hands of two qualified voters not less than twenty-eight days before the day fixed for the election.

(b) Every nomination of the person for election shall contain the written consent of such person to his nomination.

14B. On the expiration of the time for receiving nominations, the Registrar shall cause the name of each person so nominated and the fact of his candidature to be forthwith posted at the University. 14c. In the case of there being only one nomination the Registrar shall declare the candidate duly elected. If there are two or more candidates, the election shall be by postal ballot.

14D. (a) At least fourteen days before the date fixed for the election the Registrar shall transmit a voting paper through the post to each person eligible to vote, addressed to the last known address of the person as noted in the records of the Registrar. Each voting paper shall be accompanied by an envelope marked "voting paper" and by a second envelope addressed to the Registrar on the inside of which shall be printed a form of declaration to be signed by the voter stating that he is a person qualified under the provisions of By-law 12 of this Chapter to vote at the election of a member of Council to represent the teaching staff.

The envelopes addressed to the Registrar shall be numbered in consecutive numerical order and the number appearing on such an envelope sent to each person eligible to vote shall be entered on the list of electors prepared by the Registrar opposite the name of the person to whom such envelope is sent.

(b) The provisions of paragraphs (b), (c), (d), (e), (f) and (g) of By-law twenty-one of this Chapter shall apply to and in respect of any such election.

Member Elected by Graduates.

15. The member to be elected pursuant to paragraph (j) of subsection two of section nineteen of the Technical Education and New South Wales University of Technology Act, 1949, shall be elected in May in 1953 and in every alternate year thereafter.

The election shall be held on such day in that month as the Council may appoint.

16. At least sixty days' notice of the day of election shall be given by advertisement in two or more of the daily newspapers published in Sydney, and by notice posted at the University.

17. The Registrar shall prepare a list of electors comprised of all graduates of the University, completed to the last day for receiving nominations for any election, and a copy of such list shall be exhibited at the University during the period from that date to the time of election.

18. (i) No person shall be eligible for election-

- (a) unless he is a graduate of the University and of the full age of twenty-one years; and
- (b) unless his name has been communicated to the Registrar in writing under the hands of two qualified voters not less than twenty-eight days before the day fixed for the election.

(c) if he is engaged in duties connected with the University either on the teaching staff or otherwise.

(ii) Every nomination of the person for election shall contain the written consent of such person to his nomination.

19. On the expiration of the time for receiving nominations the Registrar shall cause the name of each person so nominated and the fact of his candidature to be forthwith advertised in two or more of the daily newspapers published in Sydney; and to be posted at the University.

20. In the case of there being only one nomination, the Registrar: shall declare the candidate duly elected. If there are two or more candidates, the election shall be by postal ballot.

21. The election shall be conducted in the following manner :--

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(a) At least fourteen days before the date fixed for the election the Registrar shall transmit a voting paper through the post to each graduate eligible to vote, addressed to the last known address of the graduate as noted in the records of the Registrar.

Each voting paper shall be accompanied by an envelope marked "voting paper" and by a second envelope addressed" to the Registrar on the inside of which shall be printed **a** form of declaration to be signed by the applicant stating that he is a graduate of the University.

The envelopes addressed to the Registrar shall be numbered in consecutive numerical order, and the number appearing on such an envelope sent to each graduate eligible to vote shall be entered on the list of electors, prepared by the Registrar opposite the name of the graduate to whom such envelope is sent.

- (b) The voting papers shall contain the names of all duly nominated candidates arranged in alphabetical order. The voter shall record his vote by placing the number "1" opposite the name of the candidate for whom he desires to give his first preference vote, and shall give contingent votes for all the remaining candidates by placing, the numbers "2," "3," "4" and so on, as the case may require, opposite the names of such candidates respectively so as to indicate by numerical sequence the order of his preference for them.
- (c) Having marked his voting paper and signed the declaration, the voter shall place the voting paper without any other matter in the envelope marked "voting paper," which he shall seal and transmit to the Registrar in the envelope provided for that purpose.

All voting papers so transmitted and received at the University not later than 5 p.m. on the day of the election shall be counted in the ballot.

- (d) The ballot shall be conducted by the Registrar who shall be assisted in the counting of votes by scrutineers to be appointed by the President. Each candidate shall be entitled to nominate one scrutineer.
- (e) As soon as practicable after the closing of the poll the Registrar, in the presence of such of the scrutineers as choose to be present, shall proceed to the examination of the voting papers.

The method of counting the votes to ascertain the result of the election shall be as prescribed in By-law twenty-nine of this Chapter.

(f) Where in the final count under By-law twenty-nine of this chapter two candidates shall have an equal number of votes, the Registrar shall determine between them by lot which of them shall be elected.

In reckoning an absolute majority of votes for the purposes of the said By-law twenty-nine, the candidate so selected shall be deemed to have received an additional vote.

In this paragraph the expression "determine by lot" means determine in accordance with the following directions:— The names of the candidates concerned having been written on similar slips of paper and the slips having been folded so as to prevent identification and mixed and drawn at random, the candidate whose name is first drawn shall be the candidate elected.

(g) The Registrar shall reject as informal any voting paper upon which the voter has failed to indicate the number of his preference in respect of the name of any candidate: Provided that where there are not more than two candidates a voting paper shall not be informal by reason only of the fact that the voter has recorded his vote by placing the number "1" opposite the name of one candidate and has failed to place the number "2" opposite the name of the other candidate.

Member Elected by Undergraduates.

22. The member to be elected pursuant to paragraph (i) of subsection two of section ninetcen of the Technical Education and New South Wales University of Technology Act, 1949, shall be elected in May in 1950 and in 1951 and in every alternate year after 1951.

The election shall be held on such day in that month as the Council may determine.

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23. At least sixty days' notice of the day of election shall be given by notice posted at the University and in such other places as the Council may determine.

24. (1) No person shall be eligible for election-

- (a) (i) at the elections to be held in 1950 and 1951 unless he is a registered student of the University and of the full age of twenty-one years;
 - (ii) at any subsequent election unless he is a graduate of the University and of the full age of twenty-one years; and
- (b) unless his name has been communicated to the Registrar under the hands of two qualified voters not less than twentyeight days before the day fixed for the election.
- (c) if he is engaged on duties connected with the University either on the teaching staff or otherwise.

(2) Every nomination of a person for election shall contain the written consent of such person to his nomination.

25. On the expiration of the time for receiving nominations the Registrar shall cause the name of each person so nominated and the fact of his candidature to be forthwith posted at the University.

26. In the case of there being only one nomination the Registrar shall declare the candidate duly elected. If there are two or more candidates, the election shall be by ballot of qualified voters voting personally.

27. The election shall be conducted in the following manner:-

- (a) A ballot shall be taken on the day appointed for the election at the University and at such other place as the Council may determine, of which due notice shall be given.
- (b) The ballot shall commence at 10 a.m. and close at 9.30 p.m. on the day appointed.
- (c) The provisions of paragraphs (b), (d), (e), (f) and (g) of By-law twenty-one of this Chapter shall apply to and in respect of any such election.

Method of Counting Votes.

29. (1) (a) The Registrar shall count the total number of first preference votes given for each candidate.

(b) The candidate who has received the largest number of first preference votes shall, if that number constitutes an absolute majority of votes, be elected.

(c) If no candidate has received an absolute majority of first preference votes, the Registrar shall make a second count.

(d) On the second count the candidate who has received the fewest first preference votes shall be excluded, and each ballotpaper counted to him shall be counted to the candidate next in the order of the voter's preference.

(e) If any candidate then has an absolute majority of votes he shall be declared elected; but if no candidate then has an absolute majority of votes, the process of excluding the candidate who has the fewest votes and counting each of his ballot-papers to the continuing candidate next in the order of the voter's preference shall be repeated until one candidate has received an absolute majority of votes.

(f) The candidate who has received an absolute majority of votes shall be declared elected.

(2) If on any count two or more candidates have an equal number of votes, and one of them has to be excluded, that candidate amongst them who had the least number of votes at the last count at which they had not an equal number of votes, shall be excluded. And if such candidates had an equal number of votes at all preceding counts, the Registrar shall determine between them by lot which of them shall be excluded.

(3) In this By-law-

The expression "an absolute majority of votes" means a greater number than one-half of the whole number of ballotpapers counted.

The expression "continuing candidate" means a candidate not already excluded at the count.

The expression "determine by lot" means determine in accordance with the following directions:—The names of the candidates concerned having been written on similar slips of paper, and the slips having been folded so as to prevent identification and mixed and drawn at random, the candidate whose name is first drawn shall be excluded.

CHAPTER III-THE PROFESSORIAL BOARD.

1. The Professors and Associate Professors in the several Faculties and such other persons as Council may appoint shall form a Board, to be called the Professorial Board.

2. The members of the Professorial Board shall elect a Chairman at a duly convened meeting to be held in May in 1950 and in 1951 and in May of every alternate year after 1951.

The Chairman shall hold office for a period of two years from the first day of July following the election: Provided that the first Chairman shall hold office for a period of one year from the first day of July following his election.
If the office becomes vacant by death, resignation or otherwise before the expiration of the full term, a successor shall be elected at a duly convened meeting of the Board to be held as soon as conveniently may be, and the Chairman so elected shall hold office during the remainder of his predecessor's term of office.

3. The Registrar shall, by virtue of his office, be a member of the Professorial Board and shall act as Secretary to the Board.

4. (i) The Professorial Board shall be specially charged with the duty of furthering and co-ordinating the work of Faculties and Departments and of encouraging scholarship and research and of considering the studies and discipline of the University.

The Board shall consider and report upon all matters referred to int by the Council or by the Director.

(ii) Subject to By-laws and to any resolution of the Council the Board-

- (a) may consider and take action upon reports submitted to it by any Faculty;
- (b) may refer matters to Faculties for consideration and report;
- (c) may appoint internal and external examiners after report from the Faculty or from the Dean of the Faculty concerned:
- (d) shall, on the recommendation of the appropriate Faculties, annually prescribe all books and details of subjects for lectures or annual examinations in the University, but in any of these subjects pertaining to more than one Faculty when the recommendations of the Faculties concerned do not coincide, the Professorial Board shall, after further communication with the said Faculties, prescribe such books and details;
- (e) may determine the conditions of competition for any postgraduate fellowship, scholarship or prize and make the awards: Provided that any conditions of competition approved by the Board for any post-graduate fellowship, scholarship or prize shall be subject to conditions, if any, with respect thereto made by the founder or donor;
- (f) may, after report from the Faculties concerned, decide all questions of admission ad eundem gradum. The Professorial Board may by an absolute majority of its members. (provided that the Faculty, if any, concerned concurs by an absolute majority of its members) recommend to the Council that a person who has obtained any degree or diploma in another University or educational establishment be admitted to a Degree in the New South Wales University of Technology without any examination;

- (g) may submit recommendations to the Council on the invitation of the Council with respect to the selection of Professors, Lecturers and other teaching and research staff;
- (h) may, after a report of the Faculties concerned, decide all questions of admission with advanced standing. The Professorial Board may by an absolute majority of its members (provided that the Faculty, if any, concerned concurs by an absolute majority of its members) recommend to Council that a person who has completed an approved course of study in a University or educational establishment approved by the Council be admitted with such advanced standing as may be permitted in each case to a course leading to a Degree of the New South Wales University of Technology;
- (i) may perform the duties of a Faculty for all subjects not pertaining to any faculty and perform any function committed to it by this By-law, although any Faculty or Faculties may have failed to report;
- (j) may submit recommendations to Council with respect to any other matter pertaining to academic standards or facilities.

Where the Board does not approve without amendment any recommendation made by a Faculty, the Board shall, if so requested by the Faculty, transmit the recommendation to the Council.

(iii) The Board shall have such other duties and powers as may from time to time be assigned to it by the Council.

(iv) A report of the proceedings of the Board shall be circulated to members of the Council with the notice or supplementary notice of matters to be considered at the meeting of the Council next following that of the Board and shall be laid upon the table of the Council at that meeting.

(v) The Council may at any time of its own motion or at the request of a Faculty review any decision of the Board.

5. (a) The Director or any member of the Professorial Board may suspend any student from attendance at classes and examinations for breach of discipline or misconduct, and may impose penalties in accordance with academic usage on any student for breach of discipline or misconduct, provided that the circumstances relating to the suspension or fine shall be reported in writing by the member to the Director forthwith. This By-law shall only extend to breach of discipline or misconduct committed in or with respect to the classes or work of the Department of such member, or committed in his presence. (b) On reference by the Director the Board shall investigate matters which involve any question as to breach of discipline or misconduct of any kind by any student or candidate at any University examination and may impose penalties in accordance with academic usage.

(c) Any person affected by a decision of any member of the Professorial Board (other than the Director) in respect of breach of discipline or misconduct may appeal to the Director, and in the case of disciplinary action by the Director, whether on appeal or otherwise, to the Council.

6. (a) The Professorial Board shall meet at the discretion of the Chairman or upon the written request of the President, or Director, or of three members of the Board.

(b) Except where otherwise provided by these By-laws, all -questions which shall come before a meeting of the Professorial Board at which a quorum is present shall be decided by the majority - of members present, and the Chairman shall have a vote, and in the - case of an equality of votes, a casting vote.

The number of members who shall constitute a quorum of the Professorial Board shall be the product obtained by multiplying the total number of members of the Board by two-thirds, any fraction in the product being disregarded.

(c) All meetings shall be convened by written notice from the Registrar, specifying the time and place and agenda of the meeting.

CHAPTER IV-THE FACULTIES.

1. (a) The Council may constitute such Faculties as it may deem fit.

(b) Each Faculty so constituted shall consist of the Professors and Associate Professors in the subjects of the curriculum of the Faculty concerned and of such lecturers and other persons having appropriate qualifications as the Council may appoint thereto.

(c) The Registrar shall, by virtue of his office, be a member of -each Faculty.

2. The Dean appointed to a Faculty pursuant to the Technical Education and New South Wales University of Technology Act, 1949, shall be the Chairman thereof.

.3. Each Faculty shall-

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((a) supervise the teaching in the subjects with which the Faculty is concerned;

(b) be responsible, with the assistance of such examiners as the Professorial Board may from time to time appoint on the report of the Faculty or of the Dean, for the conduct of examinations in those subjects;

- (c) take cognizance of and encourage scholarship and research in those subjects;
- (d) consider and report upon all matters referred to it by the Council or by the Director, or by the Professorial Board.

4. Each Faculty shall consider and report to the Professorial Board upon all matters relating to the studies, lectures, examinations and Degrees of the Faculty.

5. Each Faculty shall have such other duties and powers as may from time to time be assigned to it by the Council.

6. Except where otherwise provided by these By-laws all questions which come before a meeting of a Faculty at which a quorum is present shall be decided by the majority of the members present and the Chairman shall have a vote, and in the case of an equality of votes, a casting vote.

The number of members who shall constitute a quorum of any Faculty shall be the product obtained by multiplying the total number of that Faculty by two-thirds, any fraction in the product being disregarded.

7. The Chairman of a Faculty shall be the Executive Officer of the Faculty and shall have such other duties and powers as may from time to time be assigned to him by the Council.

8. Each Faculty shall deal with all applications for information and other correspondence on subjects appropriate to such Faculty which may be brought before it by the Dean or by the Registrar.

CHAPTER V-DIRECTOR.

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1. The Director shall, by virtue of his office, be a member of every Board, Faculty and Committee within the University, and may, if he so desires, preside at any meeting of such Board, Faculty or Committee.

Nothing in this By-law shall affect the precedence or authority of the President or Vice-President.

CHAPTER VI-HONORARY DEGREES.

1. The Council may admit on Honoris Causa to any Degree of Doctor in the New South Wales University of Technology any graduate of another University who is recommended for such admission by an absolute majority of the Professorial Board and by an absolute majority of the Faculty in which the Degree is to be conferred as being a person of distinguished eminence in some branch of learning appropriate to such Faculty.

2. The Council may admit on Honoris Causa to the Degree of Doctor in an appropriate field in the New South Wales University of Technology any person considered by the Council to be distinguished by eminent public service in a particular technical field.

NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY.

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Recreativited in July 1953, in accordance with the flavisions of the Technical Education and New South Wales University of Technology Act, 1949...

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E. C. Daniels, A.S.T.C. (Arch.), A.R.A.I.A.

M. J. Dunphy, F.R.A.LA.

D. P. Kirkland, A.A.Dip, Londi, A.R.LB.A., A.R.A.I.A.

D. Lennon, B.Arch. Syd., A.R.I.B.A., A.R.A.I.A., M.T.C.P.I. (Aust.).

E. C. Parker, A.S.T.C. (Arch.).

R. O. Phillips, B.Arch. Syd., A.R.A.I.A.

F. Woolard, A.S.T.C. (Arch.), A.R.A.I.A., M.R.San.I. Lond.

D. F. Wrigley, Dip.A. Manc., A.R.I.B.A., A.R.A.I.A.

R. G. Sutton, A.S.T.C. (Bldg:), A.A.L.B.

FACULTY OF ENGINEERING.

SCHOOL OF CIVIL ENGINEERING.

PROFESSOR OF CIVIL ENGINEERING.-C. H. MUNRO, B.E. Syd., M.R.San.I., A.M.I.E. Aust.

Senior Lecturers.

A. S. Hall, B.Sc. (Eng.) Lond., D.I.C., A.M.I.E. Aust., A.Am.Soc.C.E. H. W. Holdaway, B.Sc., B.E. Syd., A.M.I.R.E. (Aust.), A.Am.Soc.C.E.

P. W. S. Ryan, A.S.T.C., A.M.I.E. Aust.

H. R. Vallentine, B.E. Syd., M.S. Iowa, A.S.T.C., A.M.I.E. Aust. Lecturers.

F. E. Archer, B.Sc., B.E. Syd.

P. Balint, B.E. Bud., A.M.I.E. Aust.

H. J. Brettle, B.E. Syd., A.S.T.C.

A. J. Carmichael, B.E., A.S.T.C., A.M.I.E. Aust., A.I.P.E.

L. S. Edwards, B.E. Melb., B.Ec. Syd.

H. K. Fischer, Dip.Ing. Hanover, A.M.S.E.

D. T. Howell, B.E. Syd.

J. L. Jenkins, B.E. Syd., A.S.T.C.

E. M. Kitchen, B.E. Syd.

A. F. S. Nettleton, B.Sc., B.E. Syd

P. Shuleshko, M.Sc., B.E. Regensourg.

O. G. F. Ward, L.S. (N.S.W.), A.R.I.C.S., M.I.S. (Aust.).

K. K. Watson, B.E. Syd.

G. B. Welch, B.E. Syd., A.M.I.E. Aust.

R. W. Woodhead, B.E. Syd., A.M.I.E. Aust.

SCHOOL OF ELECTRICAL ENGINEERING.

PROFESSOR OF ELECTRICAL ENGINEERING-R. M. Vowels, M.E. Adel., A.M.I.E. Aust.

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Senior Lecturers.

- A. P. Blake, B.Sc., B.E. Syd., A.M.I.E. Aust.
- G. C. Dewsnap, M.E.E. Melb., A.M.I.E. Aust.

R. M. Huey, B.Sc., B.E. Syd., A.M.I.E. Aust.

W. F. Lovering, M.Sc. Birm., A.M.I.E.E.

E. L. Mortimer, B.Sc. (Eng.) Lond., A.M.I.E.E.

G. J. Parker, B.Sc., B.E. Syd., A.M.I.E. Aust.

Lecturers.

W. H. Arnold, A.S.T.C., A.M.I.E. Aust.

R. H. J. Clarke, B.E., A.S.T.C., A.M.I.E. Aust. (on leave).

D. J. Cole, B.E.E. Melb., A.M.I.E. Aust.

H. N. Edwardes, B.Sc., B.E. Syd.

W. W. T. H. Ehlers, Dr. Nat. Scs. Ham.

R. Guertler, B.E., Dr.Tech., Brno.

H. R. Harrington, A.M.I.E. Aust.

E. G. Hopkins, B.E., A.S.T.C., A.M.I.E. Aust.

H. L. Humphries, B.Sc., B.E., B.Ec. Syd.

C. St. J. Lamb, A.S.T.C.

O. Pawloff, Dip.Ing. Berl.

A. S. Plowman, A.S.T.C., M.I.E. Aust., A.M.I.E.E., A.Am.I.E.E.

H. J. A. Turner, A.R.C.S., B.Sc. Lond., A.M.I.E.E.

SCHOOL OF MECHANICAL ENGINEERING.

NUFFIELD RESEARCH PROFESSOR OF MECHANICAL ENGINEERING-A. H. Willis, B.Sc. (Eng.), Ph.D. Lond., A.M.I.Mech.E., A.M.I.E. Aust,. Wh.Sc.

Associate Professor of Mechanical Engineering-J. F. D. Wood, B.Sc., B.E. Syd., A.M.I.E. Aust.

Senior Lecturers.

T. M. Baylis, A.S.T.C., A.M.I.E. Aust.

S. E. Bonamy, A.S.T.C., B.E. Syd., A.M.I.E. Aust.

R. E. Corbett, A.S.T.C., A.M.I.E. Aust.

J. Hirschhorn, Dip.Ing. Vienna, A.M.I.E. Aust.

J. Munro, B.E. Syd., M.I.Mar.E. (Lond.).

N. Rosenauer, M.E. St. Petersburg, Dr.Ing. Riga, A.M.I.E. Aust.

G. P. Taylor, B.S. Chic., B.A.Sc. Tor.

R. J. Tuft, A.S.T.C. (Mech. and Nav. Arch.), A.M.I.E. Aust.

Lecturers.

A. F. Allen, A.S.T.C. (Mech. and Elec.), A.M.I.E. Aust., A.M.I. Prod.E.

P. S. Barna, M.E. Syd., A.M.I.E. Aust.

H. Brock, Dip.Ing. Vienna, A.M.I.E. Aust.

- R. A. A. Bryant, A.S.T.C., Grad.I.E. Aust.
- G. F. Butler, B.E. Syd.
- A. J. Carroll, B.E. Syd., A.M.I.E. Aust.
- R. A. Dane, A.S.T.C.
- E. W. Dodds, A.F.R.Ae.S.

M. Forsythe, A.M.I.E. Aust.

T. W. Girdler, B.Sc., B.E., LL.B. Syd., A.M.I.E. Aust.

M. J. Hallinan, A.S.T.C.

J. N. Hool, B.E. Syd., Ph.D. Oxon., A.S.T.C. (Mech. and Civil Eng.).

- A. K. James, A.S.T.C.
- A. Kahane, Dip.Ing. Vienna, A.M.I.E. Aust.

R. T. B. McKenzie, A.R.T.C. Glasgow, G.I.Mech.E.

H. McD. McLachlan, B.E. Syd., A.S.T.C., A.M.I.E. Aust.

J. O. Muiznieks, Grad.Mech.Eng. Latvia, Dr.Ing.Aer. Rome.

R. J. O'Connor, B.E. Syd., A.M.I.E. Aust.

R. G. Robertson, B.A. Oxon., A.F.R.Ae.S., A.M.I.Mech.E.

- C. M. Sapsford, B.Sc. (Eng.) Lond., A.M.I.E. Aust., G.I.Mech.E.
- H. Selinger, Dip.Ing. Berl., A.M.I.Prod.E., A.M.I.E. Aust.
- D. R. Stewart, B.Sc., B.E. Syd., Ph.D. Oxon.
- R. C. P. Walters, A.S.T.C., A.M.I.E. Aust.
- K. Weiss, Dip.Ing. Vienna, A.M.I.E. Aust.

H. E. Wulff, Dip.Ing. Cologne.

SCHOOL OF MINING ENGINEERING.

PROFESSOR OF MINING ENGINEERING-D. W. Phillips, B.Sc. Wales, Ph.D. Cantab., Dip.Met.Min., Cert. Colly Manager, F.G.S., M.I.Min.E., M.Amer.I.M.E., M.Aus.I.M.M., Dean of the Faculty of Engineering.

Lecturens.

R. G. Burdon, A.S.A.S.M., A.M.Aus.J.M.M.

F. N. Hanlon, B.Sc., Dip.Ed. Syd.

L. E. Koch, Dr. phil habil, Cologne, M. Swiss Min. and Pet. Soc.

L. J. Lawrence, B.Sc., Dip.Com, Syd., A.M.Aus.I.M.M.

F. C. Loughnan, B.Sc. Syd.

SCHOOL OF HUMANITIES AND SOCIAL SCIENCES. PROFESSOR OF ECONOMIC HISTORY-R. M. Hartwell, M.A., Dip.Ed. Syd.

ENGLISH.

Senior Lecturer.

P. K. Elkin, B.A. Syd., B.Litt. Oxon., Dip.Ed. Syd.

Lecturers.

O. N. Burgess, M.A., Dip.Ed. Syd.

R. G. Geering, B.A., Dip.Ed. Syd.

A. M. Ginges, B.A. Syd.

PHILOSOPHY.

Senior Lecturer.

J. B. Thornton, B.A., B.Sc. Syd.

Lecturers.

C. F. Presley, B.A. Wales, B.Litt. Oxon.

D. C. Stove, B.A. Syd.

HISTORY.

Lecturers.

G. A. Cranfield, B.A., Ph.D. Cantab.

S. M. Ingham, M.A. Melb.

N. B. Nairn, B.A. Syd.

ECONOMICS.

Lecturer.

N. Runcie, B.Ec. Syd.

GOVERNMENT.

Lecturer.

Miss Ruth Atkins, B.A., B.Ec., Dip.Ed. Syd.

RESEARCH ASSISTANTS.

J. P. S. Bach, B.A. Syd.

H. F. Cruise, B.A. Syd.

D. R. N. Donaldson, B.A. Syd.

F. M. Dunn, B.Ec. Syd,

R. S. Walters, B.A. Syd.

SCHOOL OF APPLIED PSYCHOLOGY.

PROFESSOR OF APPLIED PSYCHOLOGY-J. F. Clark, M.A., B.Sc., Dip.Ed. Syd., Ph.D. Lond.

FACULTY OF APPLIED SCIENCE.

SCHOOL OF APPLIED CHEMISTRY.

Laboratory Manager.

C. W. Death, A.S.T.C. (Chem. Eng. and Met.), A.M.I.Chem.E., A.R.A.C.I.

Technical Officers.

J. R. Anderson, B.Sc., A.S.T.C., A.R.A.C.I. (on leave).

G. H. Aylward, B.Sc., A.S.T.C., A.R.A.C.I.

N. T. Barker, Dip.Sc. Liv.

G. T. Barnes, M.Sc. Syd.

E. Challen, Dr.Ing. Berl., A.R.A.C.I.

L. I. H. Faulkner, B.Sc. Syd.

P. E. Fielding, M.Sc. Syd.

B. N. Figgis, M.Sc. Syd.

J. M. Gannon, A.S.T.C., A.R.A.C.I.

P. T. Gilham, B.Sc. Syd.

B. R. Hewitt, M.Sc. Syd.

J. J. Holloway.

A. M. Ingster, Dip.Elec.Eng. Warsaw, Dip.Radio Eng. (E.F.E.), Paris.

S. L. Lowy, Ph.D. Vienna, A.R.A.C.I.

Miss M. H. Maguire, B.Sc. Syd.

G. F. D. Moir, B.Sc. Syd.

P. D. C. Mumby.

V. A. Pickles, A.S.T.C., A.R.A.C.I.

N. Sinicins, Dr.Chem.Ing. Riga.

H. Taylor.

J. R. Tetaz, B.Sc. Syd., A.R.A.C.I.

E. C. Watton, A.S.T.C.

SCHOOL OF APPLIED PHYSICS.

Technical Officers.

J. W. Bolin.

H. Hofer, Ph.D. Vienna.

A. Schwartz, A.S.T.C., Dip.Ing. Vienna.

C. J. Tenukest.

SCHOOL OF CHEMICAL ENGINEERING.

Technical Officers.

K. McG. Bowling, B.Sc., A.S.T.C., A.R.A.C.I. W. R. S. Briggs, B.Sc., A.S.T.C., A.R.A.C.I.

J. G. Donnellan, A.S.T.C., A.R.A.C.I.

H. Fowler, A.S.T.C., A.R.A.C.I.

H. Fowler, A.S.I.U., A.R.A.U.I.

J. R. Norman, B.Sc.

H. C. Pincas, Ph.D. Berl.

SCHOOL OF CHEMICAL ENGINEERING (Technical Officers)-continued. C. L. Samways, B.Sc. Syd. P. Souter, M.Sc. Syd. N. A. Warner, B.Sc. SCHOOL OF METALLURGY. Technical Officers. S. E. Coalstad, B.Sc., W. Aust., A.S.A.S.M., A.R.A.C.I. . N J. M. Newburn, A.S.T.C. A. F. Sievers, A.S.T.C. SCHOOL OF WOOL TECHNOLOGY. Technical Officer. J. A. Lambert, B.Sc. Syd. FACULTY OF ENGINEERING. SCHOOL OF CIVIL ENGINEERING. Technical Officers. D. R. Axelrad, Dip.Ing. Vienna. L. Cridland, A.S.T.C. W. R. Copeland, B.E. P. H. Fekete, B.E. D. E. Hattersley, A.S.T.C. J. R. Learmonth, B.E. Syd. R. K. Petersen, A.S.T.C. O. K. Taglight. SCHOOL OF ELECTRICAL ENGINEERING. Technical Officers. S. N. Graves, A.S.T.C. M. P. Moore, A.S.T.C. H. G. Philips. SCHOOL OF MECHANICAL ENGINEERING. Technical Officers. F. J. Brzozowski-Bernatowicz., Dip.Ing. Zur. W. Dollar, A.S.T.C. W. S. Dougall, M.Sc. Washington. E. C. Hind, A.S.T.C. A. W. Roberts, A.S.T.C. D. F. Swinfield, A.S.T.C. SCHOOL OF MINING ENGINEERING. Technical Officers. K. S. Basden, A.S.T.C. H. G. Golding, A.R.C.S., B.Sc. Lond. P. H. J. Hammett, A.C.S.M. G. T. See, A.S.T.C. ŧ A. V. Weatherhead.

NEWCASTLE UNIVERSITY COLLEGE. WARDEN.-R. Basden. B.Sc. Lond., M.Ed. Melb. A.S.T.C. A.R.A.C.I., F.I.M. Aust. LECTURING STAFF. SCHOOLS OF APPLIED CHEMISTRY, CHEMICAL ENGINEERING · AND METALLURGY. Senior Lecturer. F. L. Ward, M.Sc. Qld., A.S.T.C., A.R.A.C.I. Lecturers. K. A. Allen, M.Sc. N.Z., A.R.I.C., A.R.A.C.I. H. Bardsley. C. H. Cooke, A.S.T.C. G. C. Curthoys, B.Sc. Syd. W. G. Kirchner, A.S.T.C. A May, M.A., Ph.D. Prague, M.A., Dr.Phil. Berl., A.R.A.C.I. W. E. Pickering, B.Sc., A.S.T.C., A.R.A.C.I. J. S. Ratcliffe, A.S.T.C. (Chem. Eng. and Mech. Eng.), A.R.A.C.I., A.M.I.E. Aust., A.M.I.R.E. (Aust.). W. R. Walker, M.Sc., Dip.Ed. Syd. SCHOOL OF APPLIED PHYSICS. Senior Lecturer. S. C. Baker, M.Sc. Syd., A.Inst.P. SCHOOL OF CIVIL ENGINEERING. Lecturers. W. S. Butcher, B.E. Syd., A.M.I.E. Aust. G. J. Haggarty, B.E. Syd., A.M.I.E. Aust. SCHOOL OF ELECTRICAL ENGINEERING. Senior Lecturer. H. G. Middlehurst, A.S.T.C., A.M.I.E.E., A.M.I.E. Aust., M.I.R.E. (Aust.). Lecturer. J. W. Wilson, A.S.T.C. SCHOOL OF MATHEMATICS. Senior Lecturer. I. L. Rose, B.E. Syd. Lecturer. M. Temple, M.A. Dublin.

SCHOOL OF HUMANITIES AND SUCIAL SCIENCES ..

Associate Professor of History-J. J. Auchmuty, M.A., Ph.D. Dublin, M.R.I.A., F.R.Hist.S.

Associate Professor of Economics-C. C. Renwick, M.Ec. Syd. Lecturer.

A. J. Anderson, B.A., Syd.

SCHOOL OF MECHANICAL ENGINEERING.

Senior Lecturer.

A. K. Johnston, B.E. Syd., M.S. Iowa.

Lecturers.

K. R. Bridger, A.S.T.C., A.M.I.E. Aust. H. S. Craddock, B.E. Syd.

W. M. S. Gower, A.S.T.C., A.M.I.E. Aust.

SCHOOL OF MINING ENGINEERING.

Lecturer.

A. S. Ritchie, A.S.T.C.

TECHNICAL STAFF.

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SCHOOL OF APPLIED CHEMISTRY.

Technical Officer.

E. B. Jacobs, B.Sc. Syd.

SCHOOL OF APPLIED PHYSICS.

Technical Officer.

E. F. Palmer, A.S.T.C.

SCHOOL OF CIVIL ENGINEERING.

Technical Officer.

A. Herzog, B.Chem.E. Bud.

SCHOOL OF MECHANICAL ENGINEERING.

Technical Officer.

E. Betz, A.S.T.C., A.M.I.E. Aust. K. R. Irvine, A.S.T.C.

WOLLONGONG.

SCHOOLS OF APPLIED CHEMISTRY AND METALLURGY. Lecturers. T. W. Barnes, A.S.T.C. (Metallurgy), A.R.A.C.I.

P. Beckman, F.S.T.C. (Chem.), A.R.I.C., A.R.A.C.I.

F. M. Hall, A.S.T.C. (Chem.), A.R.A.C.I.

M. C. Steele, A.S.T.C. (Chem.), A.R.A.C.T.

SCHOOL OF ELECTRICAL, ENGINEERING.

Lecturer.

C. A. Stapleton, B.Sc., B.E. Syd., A.M.I.E. Aust.

SCHOOD OF MATHEMATICS.

Lecturer.

A. Keane, M.Sc. Syd., F.R.A.S.

SCHOOL OF MECHANICAL ENGINEERING.

J. McA. Carswell, A.S.T.C., Head of School.

Lecturers;

Ht A. Borchhardt, Dip, Ing.Eth. Zur., A.M.I.E. Aust.

J'. B. Mackaness, B.E. Syd.

BROKEN HILL.

SCHOOL OF APPLIED CHEMISTRY.

Leoturer.

K. G. O'Brien, M.Sc. Syd.

SCHOOL OF ELECTRICAL ENGINEERING.

Lecturer.

B. C. Yates, B.E. Adel., F.S.A.S.M., A.M.I.E.E.

SCHOOL OF MECHANICAL ENGINEERING.

Lecturer.

J. R. Allen, B.E. Syd.

Technical Officer.

B. Santich, A.S.T.C.

SYDNEY TECHNICAL COLLEGE.

(Staff, approved, to, conduct, courses on behalf, of, the New South Wales University of Technology.)

DEPARTMENT OF APPLIED PSYCHOLOGY.

Head of Department-E. M. Haynes, B.A. Syd.

Lecturers.

E. E. Davies, B.A. Syd.
G. Fitzgerald, M.A. Coli
C. P. Kenna, B.A., B:Se: Syd.
R. T. Martin, B.A., Dip.Pub.Admin. Syd.
J. C. Murray, B.A. Syd.
A. K. Olley, B:A. Syd.

GENERAL INFORMATION.

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There are three Faculties in the University, each being responsible under the Professorial Board for the supervision of courses of study given in their respective fields. The Faculties are Applied Science, Engineering and Architecture.

The Academic Year.

The academic year is divided into three terms. Each term is of twelve weeks' duration. In the third term classes cease at the close of the tenth week and examinations begin one week later. Vacations, each of two weeks' duration, occur between the first and second terms and between the second and third terms. The dates of commencement and ending of each term are given in the Calendar on pages 4 and 5.

Undergraduate Courses of Study.

The undergraduate courses of the New South Wales University of Technology aim to provide---

- (a) a thorough training in the fundamental sciences of mathematics, physics and chemistry;
- (b) a sound training in the professional topics of the course chosen and such subjects in allied professional fields as are considered necessary;
- (c) a study of the art of expression, both written and oral, and of selected general subjects which aim to extend the student's understanding of himself and his environment;
- (d) a close link with industry on the practical aspects of the profession throughout the course.

This latter objective applies to all courses with one exception, General Science, and is achieved through requiring students to complete an approved period of industrial training prior to graduation. The staff at the University will assist students to obtain this employment either as sponsored students or as trainees employed on a temporary basis. Private students may make their own arrangements for industrial training but such employment and training must be of a standard approved by the University. Where reports are required on industrial experience, they must be submitted by 31st March following the training period.

The University provides undergraduate courses leading to the degrees of Bachelor of Science, Bachelor of Science (Optometrical Science), Bachelor of Engineering, Bachelor of Engineering (Geology) and Bachelor of Architecture. First Degree Courses.

Faculty of Applied Science.

Two first degrees are awarded in the Faculty of Applied Science, namely, Bachelor of Science and Bachelor of Science (Optometrical Science). The degree of Bachelor of Science may be taken by completing courses specialising in Applied Physics, Applied Chemistry, Chemical Engineering, Industrial Chemistry, Leather Chemistry, Applied Biology, Metallurgy, Food Technology or Wool Technology. In addition, students may take a General Science course with emphasis on (1) Physics and Chemistry or (2) Geology and Biology.

Faculty of Engineering.

Two first degrees are awarded in the Faculty of Engineering, namely, Bachelor of Engineering and Bachelor of Engineering (Geology). The degrees of Bachelor of Engineering may be taken by completing courses specialising in Mechanical Engineering, Electrical Engineering, Mining Engineering or Civil Engineering.

Faculty of Architecture.

One degree is awarded in the Faculty of Architecture, the degree of Bachelor of Architecture.

A number of these first degree courses may be taken by either full-time attendance at the University or by part-time attendance concurrently with employment in industry. Details of the alternative courses where they occur are set out in the section of the Calendar headed "Syllabuses for Undergraduate Courses".

Diploma Courses.

By arrangement with the Department of Technical Education the University provides the undermentioned diploma courses leading to the award of the Associateship of the Sydney Technical College (A.S.T.C.). Students enrolled in these courses are Registered Students of the University.

Faculty of Architecture-

Diploma courses in: Architecture, Building, Quantity Surveying.

Faculty of Applied Science-

Diploma courses in: Chemistry, Chemical Engineering, Food Technology, Leather Chemistry, Metallurgy, Optometry, Physics, Science, Secondary Metallurgy.

Faculty of Engineering-

Diploma courses in: Aeronautical, Civil, Electrical, Mechanical, Metalliferous Mining, Production and Radio Engineering and Naval Architecture.

Details of these courses are published in the Handbook of the Department of Technical Education. Conversion Courses for Diplomates of the New South Wales Devartment of Technical Education.

Associates of the New South Wales Department of Technical Education are given special consideration by the University of Technology so as to permit them to pursue their studies in the appropriate degree course with the minimum of repetition or overlap.

The Professorial Board may refuse to accept applications for conversion courses from students who completed their diploma course prior to 1944, and may require such students to enter the normal undergraduate courses with such advanced standing as it prescribes. The acceptance of such applicants for entry into conversion courses shall be at the discretion of the Professorial Board.

In all cases, an Associate wishing to proceed to a degree must first make application in writing to the Registrar of the University of Technology for a statement of requirements for conversion. Each application is considered individually according to the applicant's academic record and professional experience. Applications for conversion requirements should be made before 31st December of the year prior to that in which the applicant wishes to enter upon the additional studies. This applies equally to students who are completing the final year of their diploma course and are not in possession of the results of their final examinations.

The application must set out full details of the applicant's academic and professional career under the following headings:----

Full name, and address for correspondence.

Date and place of birth.

Details of passes in Matriculation, Leaving Certificate or Diploma Entrance examination, with dates, school and passes in each subject.

Full details of academic career and awards granted, with dates and college.

(Additional subjects to those normally included in the course should be given, and details of prizes, credits, honours, etc., gained.)

Professional and trade experience.

Research work undertaken and technical articles published.

Course in which applicant wishes to graduate.

Each application will be considered on its merits, but the minimum requirements to qualify for a degree, subsequent to completing a normal diploma course at the standard set down in the current Handbook of the Department of Technical Education, are indicated following the outline of the related degree course in later pages of the Calendar. Where these requirements provide for full-time attendance, special consideration will be given to providing the course on a part-time basis for students who are unable to meet this requirement.

Applicants who have completed diploma courses other than those set out in the current Handbook of the Department of Technical Education may be required to take a longer course than those specified above according to the content of the courses at the time of receiving their diplomas.

Examinations.

In assessing students' progress in the University courses, consideration is given to work in laboratory, and class exercises and any term or other tests given throughout the year, as well as to the annual examination results.

Students are required to attend lectures punctually and diligently, and to complete all practical work prescribed for the year and course in which they are enrolled. In general, no exemptions from subjects or examinations are granted.

No student will be permitted to attend lectures or to sit for examination in any subject in any year until he has passed in all subjects of the previous year, unless special permission has been granted by the faculty in which he is enrolled. Such permission must be applied for, and, if allowed, will be for one subject only in any year. The student must then, during the subsequent year, pass the examination in the subject for which the special permission has been granted. A student availing himself of the provisions of this section will not be eligible for any prizes or scholarships at the annual examinations.

Higher Degrees and Graduate Courses.

Graduate students may proceed to the degree of Master of Science, Master of Engineering or Doctor of Philosophy in Science or Engineering. Conditions for the award of these degrees are set out on pages 74 to 79 of the Calendar.

Special, short, intensive graduate courses are provided from time to time according to demand. The programme of such courses for 1954 is advertised separately.

Fees.

(Fees shown are those payable as at 31st December, 1953, and may be revised subsequently.)

Undergraduate (Degree or Conversion). Courses:

Full-time Course,* £30 per annum (or two payments of £15 per term or three payments of £10 per term according to number of terms in year).

^{*} A full-time course is one which involves more than 15 hours per week attendance for one or more terms.

Part-time years of Courses II, III and XI, £15 per annum or £5 per term.

Wholly part-time courses, £10 per annum or £4 per term.

Late fee, £1 if enrolment is effected later than three weeks after commencement of term, but not later than 31st March first term, or 30th June second term, or 30th September third term. In the case of enrolments effected after the abovementioned dates the late fee will be £2.

Deferred examination, irrespective of number of papers, £2 2s.

Master of Science or of Engineering:

Qualifying examination, £5 5s. Registration, £2 2s. Internal full-time student annual fee, £30; term fee, £10. Internal part-time student annual fee, £15; term fee, £5. External student annual fee, £10. Final examination, £15.

Doctor of Philosophy: Qualifying examination, £5 5s. Registration, £2 2s. Annual fee. £30.

Final examination, £21.

University of Technology Students' Union:

Annual subscription, £1 1s. (compulsory for all registered students).

N.S.W. University of Technology Sports Association:

Annual subscription, 10s. (compulsory for all registered students).

Research:

One day per week, £10 per annum.

Two or three days per week, £20 per annum.

Four or five days per week, £30 per annum.

Student Hostel.

Accommodation is available for approximately 200 students in a hostel on the University site at High Street, Kensington.

Terms are weekly in advance, the fee being £3 10s. per week. This fee covers full board and residence (excluding personal laundry).

Students wishing to reside at the hostel should make application to the Supervisor of Amenities, Major R. K. Wilthew, Amenities. Office, Broadway.

GUIDANCE OFFICE.

Through the Guidance Office a general student educational and vocational counselling service is provided to all students and prospective students of the University. The activities of the Guidance Office may be indicated under the following headings:—

1. Student Counselling Service.

For the prospective student, the aim of the counselling service, stated briefly, is to enable the individual to take the fullest advantage of the educational and vocational opportunities available to him. A guidance officer may thus assist in the choice of a career, firstly discussing with the prospective student the relation between his previous educational attainments, assessed abilities, special aptitudes and interests and the demands of the many University courses offering and, secondly, by facilitating contact with other sources of information and advice.

Each student of the University is therefore invited to discuss with a guidance officer at any time during his course, his methods of study, his general adjustment to the course and other factors complementary to the normal relationship existing between him and his lecturers and of significance to his progress in his chosen course e.g., a distracting personal problem.

An appointment may be arranged personally or by telephone.

2. Educational and Occupational Information Service.

Information concerning training facilities within the University, the N.S.W. Department of Technical Education and other training institutions may be regarded as essential for a person's proper choice of, and adjustment and success in, a particular vocation. For this reason, the Guidance Office provides facilities for answering enquiries concerning—

- (a) Courses of training offered, e.g. types, duration, entrance and occupational requirements, fees and special conditions applicable.
- (b) Financial assistance in studies, e.g. scholarships, bursaries, exhibitions.
- (c) Occupational Information.—Information booklets concerning a wide variety of occupations are also available. These cover such points as methods of entry, fees, methods of training, prospects, personal qualifications needed and descriptions of the actual work involved in a particular vocation. Quite often it is necessary for arrangements to be made for enquiries to be referred for detailed advice on particular vocations to experts in the respective teaching departments.

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3. Applications for Variations in Courses.

Applications for permission to vary, or to secure special admission to courses laid down in the University Calendar or the Department of Technical Education Handbook, or to defer or resume courses of study, should be made, in the first instance, at the Guidance Office. Where applicable, documentary evidence should be tendered on lodging the application for such a variation. In the case of certificates a copy should accompany the original, as this will allow the immediate return of the original document.

4. Service to Students from Overseas.

(a) Initial Application for Enrolment-

Students from overseas already resident in New South Wales should enquire initially and in person at the Guidance Office regarding enrolment procedure.

Intending students who have not yet arrived in New South Wales are advised to address their enquiries to the Guidance Officer, New South Wales University of Technology, Broadway, Sydney, clearly stating details of their educational standing.

(b) Documentary Evidence-

It is desirable that students from overseas seeking admission to, or advanced standing within, a course should bring with them to the Guidance Office documentary evidence of all relevant subjects studied in other countries. This evidence might include diplomas, statements of examinations passed, course syllabuses and samples of examination papers. Where the original of a certificate is in a language other than English, the applicant should secure a translation of this document through his appropriate consular representative or from the N.S.W. Government Interpreter and Translator, Central Court of Petty Sessions, Liverpool Street, Sydney.

(c) English Language Test-

A special examination in the English language is generally required of overseas applicants. In certain cases they may be required to undertake a Special English Course before, or concurrently with, the main course, and progression in the course may depend on success in this subject. Each person will be advised by the Guidance Officer concerning the requirements in his own particular case, and close fiaison should be maintained with the Guidance Office until the English language requirement has been satisfied. (d) Landing Permits—

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'The Guidance Office (or the University of Technology or the Technical Education Department) is unable to assist in the procurement of "landing permits" for overseas students, who are advised to contact the Australian (Commonwealth Government representative in their own country for further advice in this matter.

5. Location and Hours of Guidance Office.

At Sydney the Guidance Office is located at 45-47 Broadway (ground floor) and is open from 9 a.m. to 9 p.m. daily. Telephone enquiries should be made to M0422, Extension 284.

At Newcastle the Guidance Office is located at the University College, Tighe's Hill—Telephone M1281.

LIBRARY.

The main library is housed with the library of the Sydney Technical College on the Broadway site at the corner of Mews and Thomas Streets. Each School has a departmental library, that of the Schools of Architecture, Chemical Engineering and Metallurgy being on the Kensington site. Libraries are also provided at the University College, Newcastle, and in the metropolitan and country technical colleges conducting degree and University diploma courses.

The Sydney Technical College library has approximately 45,600 volumes, mainly in the fields of science, technology, engineering and architecture. It receives currently 1,700 periodicals, the majority of which are permanently filed. The collection also includes pamphlets, trade catalogues, British and Australian Standards, abstracts of patent specifications, and the calendars and examination papers of other Universities and examination authorities. The collection is arranged according to the Dewey Decimal Classification. The dictionary catalogue of the main collection and special indexes and bibliographies are located near the reference desk.

To facilitate borrowing the book collection has been divided by distinguishing signs, into books for reference and books for lending. The conditions under which staff and students may borrow are posted in the library.

The library is open for reference and lending at the following hours:-

During term:

Monday-Friday 9.15 a.m.- 9.15 p.m. Saturday 9.00 a.m. - 12 noon

During vacation:

Monday	9.15 a.m 7.30 p.m.
Tuesday-Friday	9.15 a.m 6.00 p.m.
Saturday	9.00 a.m 12 noon

REQUIREMENTS FOR ADMISSION.

1. A candidate for any degree of the New South Wales University of Technology must satisfy the conditions for admission set out hereunder *before* entering upon the prescribed course for a degree.

Candidates who have satisfactorily met the conditions for admission shall be classed as "registered students" of the University after enrolment.

2. (i) Applicants for entry to undergraduate courses leading to a degree may satisfy entrance requirements by passing the New South Wales Leaving Certificate, or equivalent examination, in at least five subjects, of which one must be English and one other must be Mathematics I, or Mathematics II, or General Mathematics, three other subjects being chosen from the following groups, at least one of the three being from Group A:

Group A.—Latin, French, Greek, German, Italian, Hebrew, Chinese, Japanese, Russian, Dutch, Geology, Geography, Agriculture, Economics, Modern History, Ancient History, Combined Physics and Chemistry, Physics, Chemistry, Physiology, Biology, Botany, or Zoology.

Group B.—Applied Mathematics, Theory and Practice of Music, General Mathematics, Mathematics I, or Mathematics II.

(It should be noted that a number of subjects taken for the Leaving Certificate are *not* approved subjects for admission to the University of Technology.)

(ii) General Requirements.

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The following general provisions apply:----

- (A) Candidates must meet the requirements set out in section
 - 2 (i) above at one examination provided that—
 - (a) neither Physics nor Chemistry be taken along with the combined subject Physics and Chemistry;
 - (b) neither Botany nor Zoology be taken with Biology;
 - (c) neither Botany nor Zoology nor Biology be taken with Physiology;
 - (d) neither Mathematics I nor Mathematics II be taken with General Mathematics;
 - (e) a candidate who offers Mathematics and elects to take General Mathematics may not sit for Mathematics I or Mathematics II; a candidate who offers Mathematics and does not elect to take General Mathematics *must take both* Mathematics I and Mathematics II: a pass in either Mathematics I or Mathematics II will count as a pass in one subject; a pass in both papers will count as passes in two subjects;

- (f) Theory and Practice of Music is accepted only from March, 1946;
- (g) Ancient History is accepted only in cases where the pass was obtained at an examination held in 1945 or subsequent years; and further, both Modern History and Ancient History may be offered as qualifying subjects at the examinations held at the end of 1951 and subsequent years;
- (h) Agriculture is accepted only in cases where the pass was obtained at an examination held in 1945 or subsequent years;
- (i) Economics is accepted only in eases where the pass was obtained at an examination held in 1947 or subsequent years.
- (B) Candidates who have presented themselves for the Leaving Certificate or equivalent examination in five or six subjects selected in accordance with the requirements prescribed in (A) and who have passed in English and a Mathematics and two other of the subjects shall be granted admission provided that they have been awarded "A" passes or passes with Honours in at least three of these four subjects.
- (iii) Examinations.

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- Candidates may qualify for entry at the Leaving Certificate Examination held by the Department of Education, or the Matriculation Examination conducted by the University of Sydney, or the Qualifying or Qualifying (Deferred) examination of the Department of Technical Education.
- The Leaving Certificate Examination is usually held in November, and entries must be lodged with the Department of Education during August.
- The Matriculation Examination is held in February, and applications must be lodged at the University of Sydney during the first ten days of January except by candidates who have taken the Leaving Certificate Examination in the previous November. The closing date for such candidates will be announced when the Leaving Certificate results are published.
- The Qualifying Examination is conducted by the Department of Technical Education in November-December for students attending Qualifying and Matriculation courses conducted by the Department of Technical Education. The Qualifying (Deferred), an open examination, is held in February. Entries must be lodged at the Technical College, Broadway, or other participating Technical Colleges throughout the State, for the Qualifying (Deferred) Examination before the middle of January.

Candidates who have satisfactorily met the matriculation requirements of the University of Sydney, but who have not obtained the requisite pass in Mathematics as prescribed for entrance to the New South Wales University of Technology, will be permitted to complete their qualifications to enter the University of Technology by passing in Mathematics only, at a subsequent Matriculation, Lea.ing Certificate, Qualifying or Qualifying (Deferred) Examination.

3. Notwithstanding By-law 2 above, candidates may be accepted as "registered students" of the University of Technology under the following conditions, subject to the approval of the Professorial Board:--

- (i) Any person who has satisfied the examination requirements for entrance to the diploma courses of the Department of Technical Education, New South Wales, since and including the Qualifying examinations of the Department of Technical Education held at the end of 1940 may be admitted as a "registered student" of the University of Technology, but this provision shall not apply to examinations held later than March, 1955.
- (ii) Any person who holds a diploma from the New South Wales Department of Technical Education, or any other Technical College which may from time to time be recognised by the University of Technology, may be admitted to the University of Technology as a "registered student" with such status as the Board may determine, provided that, in the opinion of the Board, the applicant's qualifications are sufficient for entry into the Faculty nominated.
- (iii) Persons of other than Australian education may be admitted as "registered students" of the University of Technology after examination as directed by the Board, provided they give evidence that satisfies the Board that they are of good fame and character.
- (iv) The Board may admit as "registered students" in any Faculty with such status as the Board may determine in the circumstances--
 - (a) A graduate of any approved University.
 - (b) An applicant who presents a certificate from any University, showing that he is qualified for entrance to that University, and who, in addition, satisfies the Board that he has met the requirements of the University of Technology, provided that, in the opinion of the Board there is an acceptable correspondence between the qualifying conditions relied upon by the applicant and the conditions laid down for ordinary entrance to the nominated Faculty of the New South Wales University of Technology.

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4. Any person qualified to enter a degree course in the University of Technology in terms of the preceding By-laws shall become a "registered student" of the University of Technology after he has signed his name in the Student Register in the presence of the Registrar or other person appointed for the purpose by the Council, and has paid the first term fee.

5. (i) The Board may in special cases declare any person qualified to enter a Faculty as a "provisionally registered student" although he has not complied with the requirements set out above, and in so doing may prescribe the completion of certain requirements before confirming the person's standing as a "registered student." Students who satisfactorily complete these requirements will be permitted to count the courses so passed as qualifying for degree **purposes**.

(ii) Persons over the age of twenty-five years may be admitted to provisional status provided that—

- (a) they have a meritorious pass at the Leaving Certificate Examination or an equivalent examination and have passed in at least five subjects at such examination, or
- (b) they have satisfactorily completed an approved course of systematic study extending over at least three years after passing the Intermediate Certificate Examination, or
- (c) they satisfy the Board that they have reached a standard of education sufficient to enable them profitably to pursue the first year of the proposed course.

(iii) Any applicant for provisional status may be required to take such examination as the Board may prescribe before such status is granted.

6. Any person desirous of attending lectures at the University of Technology may be granted permission to do so by the Board without satisfying the requirements for admission and without being a "registered student," on payment of such fee as the Council may from time to time direct, but such person shall not necessarily have the privileges of "registered students" and shall not be eligible to proceed to a degree.

SCHOLARSHIPS AND CADETSHIPS.

Many industrial organisations and Government Departments are sponsoring students in the New South Wales University of Technology. Such students are generally employed as cadets and receive the cadet rate of pay during training. Their University fees are in general paid by the employer.

Mining Scholarships.

A number of scholarships tenable in Mining Engineering are offered each year by the Joint Coal Board and the Combined Colliery Proprietors' Association.

The values of the scholarships are as follows:---

	Plus Allowance.						
Basic Rate.*	Fees.	Books.	Instru- ments.	Students Residing Away from Home.	Total Value.		
1st year—£253 10s. 0d 2nd year—£279 10s. 0d 3rd year—£305 10s. 0d 4th year—£331 10s. 0d	£ 30 30 30 30 30	£ 12 12 12 12 12	£ 10 	£ 65 65 65 65	£ 370 386 412 438	s. 10 10 10 10	d. 0 0 0 0

Joint Coal Board.

Combined Colliery Proprietors' Association.

	Plus Allowance.					
Basic Rate.*†	Fees.	Books.	Instru- ments.	Students Residing Away from Home.	Total Value.	
lst year—£265 2nd year—£291 3rd year—£317 4th year—£343	£ 30 30 30 30	£ 12 12 12 12 12	£ 10 	£ 52 52 52 52	£ 369 385 411 437	

* Weekly equivalent.

† Subject to some adjustment with variations in the basic wage.

Note.--The Joint Coal Board scholarships cover, in addition, fees for membership in Students' Union and Societies. Particulars and application forms for these scholdrships can be obtained from the Guidance Office, Broadway, Sydney.

Mining and Metallurgical Bursaries Fund.

1. The Mining and Metallurgical Bursaries Fund provides for the award of bursaries to students proceeding to the degree of Bachelor of Engineering in Mining or Metallurgy or Bachelor of Science with Geology as a major subject. The bursaries are each valued at £30 per annum up to a total value of £90, payable in annual instalments.

2. Candidates must be British subjects and must have completed ' the first year of their course for the degree of Bachelor of Engineering or Bachelor of Science.

3. The bursaries will be awarded by the Trustees of the Mining and Metallurgical Bursaries Fund, Melbourne, upon the recommendation of a local selection committee, consisting of representatives of the Trustees, the University and the Australasian Institute of Mining and Metallurgy.

4. The selection committee will base its recommendations on considerations of personality and scholarship, and candidates should submit evidence under both these headings. The committee will give chief consideration under the heading of scholarship to proficiency in subjects relating to mining engineering and metallurgy, respectively.

5. No recommendation will be made if, in the opinion of the selection committee, no candidate is qualified.

6. Candidates must lodge their applications and credentials, endorsed "Mining and Metallurgical Bursaries," with the Registrar of the University on or before 31st December.

7. Payments will be made during the first term of the second, third and fourth years. The payment of the second and third annual instalments of each bursary will be contingent on the holder having completed his second and third years, respectively, and on the decision of the selection committee that he has sufficiently distinguished himself in the subjects of the year.

In general, the attainment of distinction in two subjects or credit in three subjects will be accepted as evidence of sufficient distinction. Special consideration will be given to engineering and geological subjects in the case of a bursary in Mining and to engineering and chemical subjects in the case of a bursary in Metallurgy.

8. Bursars in any year desiring renewal of their bursaries for the following year must apply in writing for such renewal before 31st December.

Commonwealth Scholarships.

Students attending first degree or diploma courses at the New South Wales University of Technology are eligible to apply for Commonwealth scholarships.

The award of Commonwealth scholarships will be made entirely a on merit, and all students awarded Commonwealth scholarships will be entitled to the following benefits, irrespective of the means of their parents:—

- (a) tuition fees;
- (b) examination fees;
- (c) degree fees;
- (d) general service fees.
- (e) other compulsory fees.

Winners of Commonwealth scholarships who undertake full-time courses on a full-time basis may also apply for living allowances, subject to a means test. The maximum living allowances are £169 per annum for a student living with his parents, and £240 10s. per annum for a student living away from his parents.

The maximum living allowances will be granted where the adjusted family income does not exceed £600 per annum. The adjusted family income is the income of the student and his parents for the financial year immediately preceding the year in which the scholarship is awarded less £100 for the first dependent child under 16 years of age (other than the applicant) and £50 for each other dependent child under 16 years of age. Where the adjusted family income exceeds £600, the amount of living allowance payable abates at the rate of £3 for every £10 by which the adjusted family income exceeds £600. Thus, if the living allowance is to be payable in any particular case the adjusted family income must be less than (i) £1,150 if the student is living at home or (ii) £1,383 if the student is living away from home.

Full particulars and application forms may be obtained from the Officer-in-Charge, University Branch Office, Department of Education, University Grounds, University of Sydney. (Telephone MW 2911.)

New South Wales Public Service Board Traineeships.

The N.S.W. Public Service Board award a number of traineeships in Civil and Mechanical Engineering, Wool Technology and Applied Chemistry. Under these traineeships University fees are paid and also allowances at the following rates while the student is inattendance at the University:

1st and 2nd years-

£182 per annum if living at home, £280 per annum if living away from home. 3rd and subsequent years-

£192 per annum if living at home,

£300 per annum if living away from home.

On reaching the age of 21 years, the trainee receives an allowance at the rate of £261 per annum if living at home or £390 per annum if living away from home.

Married students receive £400 per annum.

During industrial training periods salaries are paid in accordance with the appropriate agreement.

State Bursaries and Exhibitions.

A number of exhibitions and bursaries are awarded by the New South Wales Government on the results of the Leaving Certificate Examination and the Qualifying Examination of the Department of Technical Education. The award of an exhibition exempts the student from payment of fees. A bursary similarly exempts the student from payment of fees and includes an allowance for living expenses and books. Bursaries are awarded subject to the applicant holding an exhibition and satisfying a means test.

Department of Railways, New South Wales, Scholarships.

The Department of Railways, N.S.W., calls applications annually from its employees for scholarships to the degree courses in Civil, Mechanical, and Electrical Engineering.

The scholarships are available under the following conditions:-

Group 1—Cadets and apprentices under 19 years of age as at 31st January in the year in which the scholarships are to be awarded are • eligible for consideration provided they have had at least one year's service and have satisfactorily completed the technical course set • down for that period.

The applicant must be eligible for enrolment in the complete Stage I of the relevant diploma course and also be acceptable to the University as a student of a degree course.

Group 2—Cadets and apprentices or employees with previous training as cadets or apprentices, who are not over 23 years of age as at 31st January in the year in which the scholarships are to be awarded, who have completed Stages 1 and 2 of the relevant diploma course without post examinations and who obtain credit passes in the principal subjects of Stage 2 in the year prior to the award.

Group 3—Employees who have had at least one year's service, who are not over 25 years of age as at 31st January in the year in which the scholarships are to be awarded, who have completed the relevant diploma course in the Honours or Credit Grade, and who have the necessary qualifications for entry to the degree course.

General-Scholarship holders will have all fees paid, be paid full salary while at the University, retain all benefits as an employee of the Commissioner for Railways, and will be required to complete a bond with surety to cover the period of training and to remain in the Commissioner's service after completion of the training period for five years in the case of Group 3, and ten years in the case of Groups 1 and 2.

John Heine Memorial Scholarship.

The Scholarship is awarded annually at the discretion of the Directors. It has a total value of £250 to encourage the recipient to undertake-

- (a) The final two years of the degree course in Mechanical, Electrical or Chemical Engineering or Applied Chemistry.
- (b) The conversion course in Mechanical, Electrical or Chemical Engineering or Applied Chemistry.

Qualifications of Applicants.

Applicants for this Scholarship will be required to be, and furnish evidence of being, students qualified for admission to:--

(a) The 3rd year of the degree course in Mechanical or Electrical Engineering or Applied Chemistry or the 4th year of the degree course in Chemical Engineering.

Table of Payments for Final Two Years of Course.

1st year of	tenure	•••••••	£100 £150
2nd year of	tenure	• • • • • • • • • • • • • • • • • • • •	

or

(b) The conversion course in Mechanical, Electrical or Chemical Engineering, or Applied Chemistry.

Table of Payments for Conversion Course.

Mechanical or Electrical Engineering.

One part-time year plus one full-time year	1st yr. £50 £50	2nd yr. £200 £50	3rd yr. £150
Applied Chemistry or Chemical	Enginee	ring.	
Two part-time years	£100	£150	
One full-time year	£250		

A. E. Goodwin Memorial Scholarship.

The Directors of A. E. Goodwin Ltd. have made provision for the annual award of a scholarship in commemoration of the late A. E. Goodwin.

- 1. The scholarship shall be known as the A. E. Goodwin Memorial Scholarship.
- 2. The scholarship shall be open for award each year to students who are eligible to enrol in the second year of the Mechanical Engineering degree course, and, in making the
award, consideration shall be given to scholarship, personality and aptitude for the engineering profession.

- 3. The total value of the scholarship shall be £90, payable in three equal amounts of £30 each at the beginning of the second, third and fourth years of the course.
- 4. Continued tenure of the scholarship shall be subject to satisfactory progress on the part of the holder.
- 5. Applications shall be made to the Registrar by 31st January in each year.

Broadcasting, Radio, Electrical Industries Fellowship (B.R.E.I.F.) Club, Sydney, Scholarship.

Two scholarships may be awarded annually by the Broadcasting, Radio, Electrical Industries Fellowship Club (B.R.E.I.F.), Sydney. The scholarships will be tenable in the second, third or fourth year of the Electrical Engineering degree course and will exempt holders from payment of fees during the year of tenure. Applications should be made on the prescribed form obtainable from the Registrar and should be lodged by 31st January in each year.

ICIANZ Research Fellowship.

Imperial Chemical Industries of Australia and New Zealand has undertaken to provide a sum of £600 annually to establish a Fellowship to be known as the ICIANZ Research Fellowship. The following conditions apply to the award:—

- 1. The Research Fellowship is to be used to promote knowledge in those fields which have some direct relation to the scientific interests and national responsibilities of ICIANZ, such as pure and applied chemistry, biochemistry, agricultural science, chemotherapy, pharmacology, physics, engineering, mining and metallurgy.
- 2. The appointment to a Fellowship is to be made by the University subject to agreement by ICIANZ and is to be open to any subject of a nation in the British Commonwealth who is a graduate of a recognised University.
- 3. The normal period of tenure will be two years.
- 4. It is a condition of the appointment that a Fellow should engage in teaching activities in the University in addition to research.
- 5. A Fellow will not be under any obligation to take out a higher degree.
- 6. It is intended that the grant should increase the output of research and not be used to relieve the burden on any other source of revenue.
- 7. The annual grant to the University is fixed at £600.

- 8. Where no suitable candidate applies in any year, the University may carry the grant forward.
- 9. Application should be made to the Registrar by 31st December in 1955 and each alternate year thereafter.

Monsanto Research Scholarship.

Monsanto Chemicals (Australia) Ltd. has established a scholarship for research in Chemical Engineering to the value of £600 per annum.

The scholarship will be awarded under the following rules:-

- 1. The scholarship shall be known as the Monsanto Research Scholarship, and
- 2. Shall be open for award each year, normally in February, from applications lodged with the Registrar by December 31st of the previous year. Awards shall be made by the Professorial Board on the recommendation of the Professor of Chemical Engineering, after consultation with Monsanto Chemicals (Australia) Ltd.
- 3. The scholarship shall have an annual value of £600, of which a minimum of £450 shall be paid to the scholar as his emoluments and the remaining £150 to the scholar or to the University towards meeting the expenses connected with the scholar's work, this to be at the discretion of the University.
- 4. The scholarship shall be awarded for research in Chemical Engineering, the subject of the research to be approved by the Professor Chemical Engineering and to be carried out under his direction.
- 5. The scholarship shall be tenable at the New South Wales University of Technology for a period of one year, but may be re-awarded for a second, though not for a further year. The scholar's tenure shall at all times be subject to his work being satisfactory to the Professor.
- 6. Scholars shall be required to devote their full time to research, save that they will be permitted to undertake a limited amount of demonstrating work at the University.
- 7. Candidates for the scholarship shall be graduates in science or engineering (preferably having completed a four-year course) of an Australian University or have at least equivalent qualifications. They should have a good scholastic record and show some aptitude for research. Personality and leadership qualities shall also be taken into consideration.
- 8. The scholar shall forward a copy of any written account of his research work to the library of Monsanto Chemicals (Australia) Ltd. and shall have the right to publish the results of his research.

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CONDITIONS FOR THE AWARD OF DEGREE OF MASTER IN THE FACULTIES OF APPLIED SCIENCE AND ENGINEERING.

1. Applications to register for the degree of Master of Science or Master of Engineering shall be made on the prescribed form which shall be lodged with the Registrar at least one full calendar month before the commencement of the term in which the candidate desires so to register.

2. A candidate for the degree of Master shall have obtained the degree of Bachelor with Honours in the New South Wales University of Technology, or other approved University, in an appropriate department, save that a graduate who holds the degree of Bachelor without Honours may be admitted as a candidate if evidence is submitted to the satisfaction of the Professorial Board that such candidate has attained, by additional work and study since graduating, a standard not lower than Second Class Honours. The Board may require such applicants to sit for such examinations or carry out such prescribed work as the Board may determine before the student is accepted as a candidate for the degree.

3. (i) In exceptional cases persons may be admitted as candidates for the degree of Master if they submit evidence of such general and professional qualifications as may be approved by the Professorial Board.

(ii) The admission of diplomates of the New South Wales Department of Technical Education as candidates for the degree of Master shall be determined in each case by the Professorial Board. Normally such candidates shall be required to produce evidence of academic and professional progress over a period of five (5) years from the time of gaining the diploma.

4. A candidate approved by the Professorial Board shall register in one of the following categories:--

- (i) Student in full-time attendance at the University.
- (ii) Student in part-time attendance at the University.
- (iii) Student working externally to the University.

5. An approved candidate shall be required to pay the undermentioned fees:

- (i) a registration fee of £2 2s.;
- (ii) the appropriate laboratory and supervision fee according to the category in which the candidate is registered;
- (iii) a fee of £15 when submitting the thesis for examination.

The combined laboratory and supervision fee shall be--

- (a) £30 p.a. for students in full-time attendance at the University;
- (b) £15 p.a. for students in part-time attendance at the University;

(c) £10 p.a. for students working externally to the University. Fees shall be paid in advance and no fees shall be refunded under any circumstances.

6. (i) Every candidate for the degree shall be required to submit a thesis embodying the results of an original investigation or design, to take such examinations and to perform such other work as may be prescribed by the Professorial Board. The candidate may submit also for examination any work he has published, whether or not such work is related to the thesis.

(ii) The thesis, investigation, design and other work as provided in paragraph (i) shall be conducted under the direction of a supervisor appointed by the Board or under such conditions as the Board may determine.

(iii) Every candidate shall submit three copies of the thesis as provided under paragraph (i) by 31st December of the year next preceding that in which the candidate may graduate. All copies of the thesis shall be in double-spaced typescript, shall include a summary of approximately 200 words in the nature of an abstract, and a certificate over the hand of the candidate to the effect that the work has not been submitted to any other University or institution for a Higher Degree and one of the three copies of the thesis shall be in accordance with the following specification:—

The size of the paper shall be quarto (approximately 10 in. x 8 in.) except for drawings and maps on which no restriction is placed. A margin of $1\frac{1}{2}$ in. shall occur on the left-hand side of each page and the whole shall be bound in a cover to be supplied by the University.

(iv) Unless there is a specific arrangement to the contrary, the candidate understands that the University shall retain the three copies of the thesis and is free to allow the thesis to be consulted or borrowed or to be issued in whole or in part in photostat or microfilm or other copying medium.

7. No candidate shall be considered for the award of the degree until the lapse of six complete terms from the date of registration.

8. There shall be two examiners appointed by the Professorial Board, one of whom shall, if possible, be an external examiner.

CONDITIONS FOR THE AWARD OF DEGREE OF DOCTOR OF PHILOSOPHY (Ph.D.).

1. The degree of Doctor of Philosophy may be granted by the Council on the recommendation of the Professorial Board to a candidate who has made an important contribution to knowledge and who has satisfied the following By-laws and Regulations made in accordance with these By-Laws.

Qualifications.

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- 2. A candidate for registration for the degree of Ph.D. shall-
 - (i) hold an honours degree from the New South Wales University of Technology; or
 - (ii) hold an Honours degree of equivalent standing from any other approved University; or
 - (iii) if he holds a degree without Honours from the New South Wales University of Technology or an approved University, have achieved by subsequent work and study a standard recognised by the Board as equivalent to Honours; or
 - (iv) in exceptional cases, submit such other evidence of general and professional qualifications as may be approved by the Professorial Board.

3. Where the Professorial Board is not satisfied with the qualifications submitted by a candidate, the Board may require him, before he is permitted to register, to undergo such examination or carry out such work as the Board may prescribe.

Registration.

cit A. candidate for registration for a course of study leading to a the degree of Ph.D. shall---

- (i) apply to the Registrar on the prescribed form at least one calendar month before the commencement of the term in which he desires to register; and
- (ii) submit with his application a certificate from the Head of the University School in which he proposes to study stating that the candidate is a fit person to undertake a course of study or research leading to the Ph.D. degree and that the School is willing to undertake the responsibility of supervising the work of the candidate and of reporting to the Professorial Board at the end of the course on the merita of the candidate's performance in the prescribed yourse of study.

Course of Study.

5. Subsequent to registration the candidate shall pursue a course of advanced study and research for at least nine academic terms, save that--

- (i) a candidate who is not fully engaged in research work for his degree will be required to satisfy the Professorial Board on the amount of time he can devote to research work for the degree; and he may not proceed to the degree before the expiration of ten academic terms from the date of registration as a candidate;
- (ii) any candidate who before registration was engaged upon research to the satisfaction of the Professorial Board, may be exempted from three academic terms.

6. A candidate shall present himself for examination not later than fifteen academic terms from the date of his registration, unless special permission for an extension of time be granted by the Professorial Board.

7. The course, other than field work, must be carried out in a School of the University, under the direction of a supervisor appointed by the Board, or under such conditions as the Board may determine, save that a candidate may be granted special permission by the Board to spend a period of not more than three academic terms in research at another institution approved by the Board.

8. Not later than three academic terms after registration the candidate shall submit the subject of his thesis for approval by the Professorial Board. After the subject has been approved it may not be changed except with the permission of the Board.

9. A candidate may be required to attend a formal course of study appropriate to his work.

Thesis.

10. On completing his course of study every candidate must submit a thesis which complies with the following requirements:---

- (i) The greater proportion of the work described must have been completed subsequent to registration for the Ph.D. degree.
- (ii) It must be a distinct contribution to the knowledge of the subject.
- (iii) It must be written in English and reach a satisfactory standard of literary presentation.

11. The thesis must consist of the candidate's own account of his research. In special cases work done conjointly with other persons may be accepted, provided the Professorial Board is satisfied on the candidate's part in the joint research.

12. Every candidate shall be required to submit with his thesis a short abstract of the thesis comprising not more than 300 words.

13. A candidate may not submit as the main content of his thesis, any work material which he has previously submitted for a University degree or other similar award.

14. Unless there is a specific arrangement to the contrary, the University will be free to allow the thesis to be consulted or borrowed or to be issued in whole or in part in photostat or micro-film or other copying medium.

Entry for Examination.

15. The candidate shall give in writing two months' notice of his intention to submit his thesis and such notice shall be accompanied by the appropriate fee.

16. Three copies of the thesis shall be submitted together with a certificate from the Supervisor that the candidate has completed the course of study prescribed in his case.

17. The thesis shall be in double-spaced typescript. Two copies shall be bound in such manner as allows their transmission to the examiners without possibility of disarrangement, and the third copy shall be in accordance with the following specification:

Size of paper, quarto approximately 10 inches by 8 inches except for drawings and maps on which no restriction is placed. A margin of $1\frac{1}{2}$ inches to be left on the left-hand side of each page, the whole to be arranged in order for binding but to be unbound.

18. The candidate may also submit as separate supporting documents any work he has published, whether or not it bears on the subject of the thesis.

19. The Professorial Board shall appoint the examiners, one of whom shall normally be an external examiner.

20. After the examiners have read the thesis they may-

- (i) without further test recommend the candidate for rejection;
- (ii) request additional work on the thesis before proceeding further with the examination.

21. If the thesis reaches the required standard, the examiners shall arrange for the candidate to be examined orally, and, at their discretion, by written papers and/or practical examinations on the subject of the thesis and/or subjects relevant thereto.

22. If the thesis is adequate but the candidate fails to satisfy the examiners at the oral or other examinations, the examiners may recommend the University to permit the candidate to re-present the same thesis and submit to a further oral, practical or written examination within a period specified by them but not exceeding eighteen months.

23. At the conclusion of the examination, the examiners will submit to the Professorial Board a concise report on the merits of the thesis and on the examination results.

Fees.

24. The fee payable for an examination qualifying for registration shall be £5 5s.

25. An approved candidate shall pay-

(i) a registration fee of £2 2s.

(ii) a supervision fee of £30 per annum.

(iii) a fee of £21 on application for the examination.

26. Fees shall be paid in advance and no fees shall be refunded under any circumstances.

SYLLABUSES FOR UNDERGRADUATE COURSES.

For purposes of reference each school within the University, except the School of Humanities and Social Sciences, utilizes a Roman numeral to distinguish the undergraduate courses of study leading to a degree which it mainly provides. Similarly the subjects provided by the various schools are distinguished by an Arabic number, the first figure in which corresponds with the Roman numeral utilized by that school.

Subjects given by the School of Humanities and Social Sciences carry the letter G followed by a distinguishing number.

SCHOOL.	Dis	TINGUISHIN	Gł	Subje	ст N	UMF	BERS.
Dhurston	r	UMERAL.					
	••	I	••	••	1.01	to	1.94
Chemistry	• •	II			2.01	to	2.97
Chemical Engineering		III			3 01	to	3 95
Metallurgy		TV	••	••	4 01	+0	1 01
Mechanical Engineering	•••	T T	••	••	7.01	10	7.07
Electrical Engineering	••	V	••	••	5.01	to	5.94
Mining Englished Linghedering	••	V L	••	••	6.01	to	6.94
C. il E ingineering and Ge	ology	VII	••	••	7.001	to	7.94
Civil Engineering	••	\mathbf{VIII}	••		8.01	to	8.94
Wool Technology	••	IX			9.01	to	9 94
Mathematics		x		••	10.01	ta 1	0.04
Architecture		xī.	••	••	11 01	10 I	1 00
Humanitian and Social S :	••	A 1	••	••	11.01	L 03	1.90
frumanities and Social Scie	ences	••	••	••	G1 t	.o G	£99

The time given to each subject is shown in two parts, the first figure representing lecture hours per week, the second, laboratory tutorial or practical work in hours per week. These times represent the average distribution over the term or year, but may be varied from time to time according to the nature of the work. Lecture time may not always be used for formal instruction, but may be devoted to discussions, assignments in the library, film presentation, or other means of instruction.

SCHOOL OF APPLIED PHYSICS.

The course in Applied Physics is designed to equip students for research in industry and in the field of applied science generally. The course, which extends over four years, provides a thorough training in the fundamentals of physical science and in mathematics, and particular emphasis is placed on technological applications. The practical training includes courses in physical techniques (e.g., high vacuum, electronics, photometric photography) and courses in formal experimentation designed to develop the research outlook. The extramural training includes six months in industry in each of the second and third years. On the mathematical side, not only is particular attention given to the formal training required by a physicist, but special courses are given in the application of statistical methods of industrial experimentation.

In addition to the day course in Applied Physics, which leads to the degree of Bachelor of Science (Pass or Honours), Conversion Courses in Applied Physics and Optometrical Science are offered. Details of these courses are shown on pages 82 and 83 respectively.

COURSE I-APPLIED PHYSICS.

FIRST YEAR.

(34 weeks day course.)

		Hours per week.			
		Term 1	Term 2	Term 3	
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.	
1.11	Physics	3 — 3-1*	3 3-1*	3 — 3-1*	
1.21	Physical Techniques	0 - 2	0 - 4	0 - 0	
2.21	Chemical Techniques	0 3	0 - 0	0 — 0	
2.41A	General Chemistry	3 — 3	3 — 3	3 - 6	
5.101	Eng. Drawing and Materials	1 0	1 0	1 — 3	
10.11	Mathematics	4 — 2*	4 — 2 *	0 - 0	
10.11в	Mathematics	0 - 0	0 - 0	$2 - 2^*$	
G10	English	2 - 0	2 - 0	0 — 0	
G20.1	History	1 - 0	1 - 0	0 - 0	
	•	14 - 14	14 - 13	9 - 15	

• Tutorial.

SECOND YEAR.

(24 weeks day course.)

		Hours p	er week.
		Term 1	Term 2
		lee. lab./tut.	lec. lab./tut.
1.12	Physics	3 — 3-1*	3 - 3-1*
1.22	Physical Techniques	0 - 3	0 — 3
2.32A	Physical Chemistry	2 - 0	1 - 2
4.12	Metallurgy	1 - 2	1 - 0
5.211A	Workshop Processes and Practice	0 - 3	0 — 3
10.12	Mathematics	3 - 2*	3 - 2*
G20.2	History	2 - 0	0 - 0
Gl	Logic	0 0	2 - 0
	ů –	11 - 14	10 - 14
			<u> </u>
	* Tutorial. † Taken in 2nd year of	Course I.	

Tutorial.

THIRD YEAR.

(24 weeks day course.)

		Hours per week.	
		Term 1	Term 2
		lec. lab./tut.	lec. lab./tut.
1.13	Physics	6 3-1*	6 3-1*
1.23a	Physical Techniques	0 - 0	0 - 3
1.23в	Physical Techniques or	0 9	0 9
1.23σ	Physical Techniques	0 — 3	0 — 3
1.23d	Physical Techniques	0 - 2	0 - 2
6.83	Electrical Engineering	2 - 3	2 - 3
10.13	Mathematics	5 - 0	5 - 0
$\mathbf{G2}$	Philosophy	2 - 0	0 - 0
	Minor Elective (Humanities)	0 - 0	2 0
	· · · · · · · · · · · · · · · · · · ·	15 - 12	15 -15
		10	10

* Tutorial.

FOURTH YEAR.

(34 weeks day course.)

The fourth year is much more flexible in its time-table arrangements than the earlier years, and the formal instruction is interspersed with colloquia and study group work. The following time-table is representative:

		Hours per week.			
		Term 1	Term 2	Term 3	
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.	
1.14	Physics	5 — 9–2*	$5 - 9 - 2^*$	4 9-2*	
10.14	Mathematics	6 — 0	6 - 0	6 — 0	
	Major Elective (Humanities)	3 — 0	3 0	0 - 0	
			······		
		1411	1411	10	
			<u> </u>		
	• Tuto	orial.			

CONVERSION COURSE Ic1-APPLIED PHYSICS.

Holders of a diploma in Physics who have completed the course of study set out in the current Handbook of the N.S.W. Department of Technical Education may qualify for the degree of Bachelor of Science in Applied Physics by—

*(a) Full-time attendance and successful completion of the fourth year of the degree course, with the following variation—

Portion of the syllabus already taken in the diploma course to be omitted and replaced by Engineering Metallurgy (4.912), and Humanities fourth year degree to be replaced by conversion Humanities ((i) English, History or Philosophy and (ii) Government, Psychology or Economics.)

OR

†(b) Successful completion of a part-time course of two years' duration as follows—

	Hours	per week.
	lst year.	2nd year.
Physics—Lectures	$2\frac{1}{2}$	21
Physics-Laboratory	3	3
Mathematics	2	4
Metallurgy (or equivalent)	2 1	
Conversion Humanities-	-	
English, History or Philosophy	2	—
Government, Psychology or Economics	—	2
	113	111
		

^{*}Option (a) is available only to holders of the Physics diploma who have had at least one year's industrial experience in an occupation involving the application of physical principles, or who have equivalent occupational qualifications.

 $[\]dagger$ Option (b) is available only to holders of the Physics diploma whe, at the conclusion of the conversion course, will have had at least three years' experience of the type mentioned in connection with option (a).

Associates of the Sydney Technical College in Optometry may qualify for the award of the degree of Bachelor of Science (Optometrical Science) by satisfactorily completing the requirements as set out below. In general, the requirements fall into two main categories as shown hereunder, but these may be varied by the Professorial Board in individual cases according to the record of the student.

A. Conversion Course for holders of 5-year Diploma

(1952 and subsequently).

Subject.

Hours per week.

Advanced Visual Physiology and Physiological Optics	5
Advanced Chinear Optometry	э
Mathematics and Statistics	2
Conversion Humanities-English, History or Philosophy and	
Psychology, Economics or Government	4
	14
	**

To be taken in one year of full-time study, or two years of part-time study of approximately 7 hours per week.

B. Conversion Course for holders of 4-year Diploma

(1930-1951).

Subject.	Hours per week.
Optometry II	2 3
Theory of Optical Instruments Psychology II	$\begin{array}{cccc} \ldots & 1 \\ \ldots & 2 \end{array}$
Optometry III Advanced Visual Physiology and Physiological Optics	$\ldots 2 \\ \ldots 5$
Advanced Clinical Optometry Mathematics and Statistics	3 2
Conversion Humanities-English, History or Philosop Psychology, Economics or Government	hy, and 4
	$\overline{\underline{24}}$

To be taken in two or three years of part-time study, as elected by the student, of approximately 12 or 8 hours per week.

SCHOOL OF APPLIED CHEMISTRY.

The needs of the chemical industry for men competent to develop, design and operate new processes and to improve existing ones, make essential two different types of training. One need involves a general and fundamental education based on science for those who seek a career in some field in which a sound knowledge of chemistry is important; the other requires a similar training to which is added knowledge of the engineering principles basic to design, construction and operation of plant and equipment. Training of the first type is provided by the courses in Applied Chemistry, in which students receive instruction in the principles of inorganic, analytical, organic and physical chemistry, supplemented by instruction in mathematics and physics and other scientific subjects. In his final year the student is given the opportunity of electing certain subjects so as to enable him to extend his knowledge in fields of special interest.

Training of the second type is provided by the courses in Chemical Engineering, details of which are given on pages 97 to 107. It should be noted that the work in chemistry, physics and mathematics taken in the first year of the full-time course, and in the first and second years of the part-time course in Applied Chemistry is identical with that taken in the same years of the courses in Chemical Engineering and Metallurgy. Students in any of these courses may transfer from one to another without loss of standing up to the end of the first year full-time, or second year part-time.

In addition to the courses in Applied Chemistry, the School of Applied Chemistry offers courses in General Science, Leather Chemistry and Applied Biology.

COURSE II-APPLIED CHEMISTRY.

This course extends over four years. The first and fourth years of the course each require full-time day attendance at the University for 34 weeks. The second and third years are spent in combined academic study and works practice, students attending the University on two half days and two evenings per week over 34 weeks in each year.

As from 1954 a student at the end of third year may apply to take an Honours degree, the additional work for Honours being taken in the final year.

FIRST YEAR.

(34 weeks day course.)

• ·		Hours per week.			
- .		Term 1	Term 2	Term 3	
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.	
1.11a	Physics	3 — 3	3 — 3	3 - 3	
2.21	Chemical Techniques	0 3	0 <u> </u>	0 _ 0	
2.41	General Chemistry	3 - 3	3 — 9	3 — 6	
5.101	Eng. Drawing and Materials	1 0	1 — Ŏ	1 — 3	
5.211	Workshop Processes and Practice	0 — 3	0 - 0	0 - 0	
, 10.11	Mathematics	4 - 2*	4 - 2*	õ — õ	
'10.11в	Mathematics	0 — 0	$\bar{0} = \bar{0}$	2 - 2*	
GIO	English	2 - 0	2 - 0	ō — ō	
G29	History	1 0	Ī — 0	2 - 0	
· ·			<u> </u>	·	
,		1414	14 14	11-14	
<i>i</i> .					

* Tutorial.

SECOND YEAR.

(34 weeks of 2 half days and 2 evenings per week.)						
		Hours per week.				
		Term 1	Term 2	Term 3		
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.		
1.92	Physics	1 - 0	1 - 2	1 2		
2.32	Physical Chemistry	$1 - 2\frac{1}{2}$	1 — 0	1 - 0		
2.42	Inorganic Chemistry	ι — 0 ⁻	1 - 0	$1 - 2\frac{1}{2}$		
2.52	Quantitative Analysis	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{2}$	1 - 21		
2.62	Organic Chemistry	$1 - 0^{-1}$	$1 - 2\frac{1}{2}$	$1 - 0^{-1}$		
2.72	Mathematical Chemistry	1 0	$1 - 0^{-1}$	$1 \longrightarrow 0$		
Gl	Logie	2 - 0	0 — 0	0 - 0		
$\mathbf{G2}$	Philosophy	0 - 0	1 — 0	1 _ 0		
		·····	<u> </u>	<u></u>		
		8 - 5	7 — 7	7 — 7		

(34 weeks of 2 half days and 2 evenings per week.)

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THIRD YEAR.

(34 weeks of 2 half days and 2 evenings per week.)

		Hours per week.			
		Term 1	Term 2	Term 3	
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.	
2.33	Physical Chemistry	1 - 2	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{2}$	
2.53	Quantitative Analysis	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{2}$	$1 - 2^{-}$	
2.63	Organic Chemistry	$1 - 2\frac{1}{2}$	$1 - 2^{-}$	$1 - 2\frac{1}{2}$	
2.73	Mathematical Chemistry	$1 - 0^{-1}$	1 - 0	$1 - 0^{-1}$	
3.14*	Industrial Chemistry	2 - 0	2 - 0	2 - 0	
	Minor Elective (Humanities)	1 - 0	1 — 0	0 0	
		T - T	7 - 7	o — 7	

* Taken in third year of Course II.

FOURTH YEAR.

(34 weeks day course.)

			Hours per week			
			Term 1	Term 2	Term 3	
			lec. lab./tut.	lec. lab./tut.	lec. lab./tut.	
ť	2.34 2.44	Physical Chemistry Inorganic Chemistry	$1 - 4\frac{1}{2}$ $1 - 4\frac{1}{2}$	$1 - 4\frac{1}{2}$ $1 - 4\frac{1}{2}$ *	$1 - 4\frac{1}{2}$ 0 - 0	
	$2.54 \\ 2.64$	Quantitative Analysis Organio Chemistry	$\begin{array}{c} 0 - 0 \\ 1 - 4\frac{1}{2} \end{array}$	$1 - 4\frac{1}{2}^{\dagger}$ $1 - 4\frac{1}{2}$	$1 - 4\frac{1}{2}$ $1 - 4\frac{1}{2}$	
		Major Elective (Humanities)	3 — 0	3 — 0	0 _ 0	
			$6 - 13\frac{1}{2}$	$6 - 13\frac{1}{2}$	$3 - 13\frac{1}{2}$	
				•		

* First half of term.

† Second half of term.

Additional for Honours.

(Students desiring to take Honours must apply to the Professor of Applied Chemistry not later than 31st December in the year in which the third year is completed.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.84	Advanced Organic Analysis	2 - 3	2 - 3	2 - 3
	Research Project	0 — 7	0 — 7	0 — 7
		0 10	0 10	
		2 —10	210	z = 10
		,		

COURSE IIB1—APPLIED CHEMISTRY.

Course IIB1 has been designed for students employed in the chemical industry. The programme of study is equivalent to that of Course II, but Course IIB1 extends over six or seven part-time years, depending on whether a Pass or Honours degree is taken.

FIRST YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.11p	Physics, Part I	$2 - 1\frac{1}{4}$	$2 - 1\frac{1}{4}$	$2 - 1\frac{1}{4}$
2.21 2.41	General Chemistry, Part I (2 - 4	2 - 4	2 - 4
10.11-в	Mathematics, Part I	2 — 1*	2 - 1*	2 - 1*
		$6 - 6\frac{1}{4}$	6 - 61	6 - 61

* Tutorial.

SECOND YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut
1.11d	Physics, Part II	$1\frac{1}{2}$ $1\frac{1}{2}$	$1\frac{1}{2}$ $1\frac{1}{3}$	11-11
2.41	General Chemistry, Part II	$1^{-} - 2\frac{1}{2}$	$1^{} 2\frac{1}{2}$	1 4
5.101A	Eng. Drawing and Materials	2 0	0 — 3	0 — 0
10.11-в	Mathematics, Part II	2 - 2*	$1 - 2^*$	1 — 2*
		6 1 6	3 <u>‡</u> — 9	$3\frac{1}{2}$ 7 $\frac{1}{2}$

* Tutorial.

THIRD YEAR.

(34 weeks part-time course.)

		\mathbf{H}	ours per weel	ζ.
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut
1.92	Physics *	1 — 0	1 - 2	1 - 2
2.32	Physical Chemistry	1 — 0	1 - 0	$1 - 2\frac{1}{2}$
2.42	Inorganic Chemistry	$1 - 2\frac{1}{2}$	1 - 0	$1 - 0^{-}$
2 52	Quantitative Analysis	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{2}$
2.62	Organic Chemistry	1 - 0	$1 - 2\frac{1}{2}$	$1 - 0^{-1}$
2.72	Mathematical Chemistry	1 - 0	1 - 0	1 0
				0 7
		6 — 5	6 — 7	0 - 7
			ه به	

* Alternative Subjects.	Hours per week.		
-	Term 1	Term 2	Term 3
	lec. lab./tut.	lec. lab./tut.	lec. lab./tut
{ Chemical Instrumentation Fire Assaying	1 - 0 0 - 2	$1\frac{1}{2}$ 1 0 - 0	$1\frac{1}{2}$ 1 0 - 0

FOURTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.33 2.53 2.63 2.73 3.14A	Physical Chemistry Quantitative Analysis Organic Chemistry Mathematical Chemistry Industrial Chemistry*	$ \begin{array}{r} 1 & - & 2 \\ 1 & - & 2\frac{1}{2} \\ 1 & - & 2\frac{1}{2} \\ 1 & - & 0 \\ 1\frac{1}{2} & - & \frac{1}{2} \end{array} $	$ \begin{array}{r}1 & - & 2\frac{1}{2} \\ 1 & - & 2\frac{1}{2} \\ 1 & - & 2 \\ 1 & - & 0 \\ 1\frac{1}{2} & - & \frac{1}{2} \end{array} $	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
		$5\frac{1}{2}$ 7 $\frac{1}{2}$	5 <u>1</u> 7 <u>1</u>	5 <u>1</u> 7 <u>1</u>

* Includes Factory visits.

FIFTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
ELECTIV	E A-		1 0	1 9
2.34d	Physical Chemistry	1 - 3	1 - 3	1 3
2.44d	Inorganic Chemistry	1 - 3	$1 - 3^{+}$	v = v
2.54D	Quantitative Analysis	0 0	1 3†	1 3
2.64D	Organic Chemistry	1 — 3	1 — 3	1 — 3
	-			2 0
		3 9	3 - 9	3 — 8

* First half term.

† Second half term.

	Hours per week.		
T	Term 1	Term 2	Term 3
ELECTIVE B.—	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.34D Physical Chemistry	1 - 3	1 - 3	1 - 3
2.64A Organia Chemistry	1 — 3	1 — 3	ī — š
2.05 Applied Organic Chemistry	1 — 3	1 - 3	1 - 3
	3 9	3 — 9	3 - 9
	the second se		

SIXTH YEAR.

(34 weeks part-time course.)

	Hours per week.			
	Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.	
English, History or Philosophy and	2 — 1*	2 - 1*	2 - 1*	
Psychology, Economics or Government	2 - 1*	2 — 1*	2 1*	
	4 - 2	4 - 2	4 - 2	
* Tuto	rial.			

Additional for Honours.

(Students desiring to take Honours must apply to the Professor of Applied Chemistry not later than 31st December in the year in which the fifth year is completed. The full programme of study may be taken over two part-time years or one full-time year.)

		Hours per week.		
		Term 1	Term 2	Term 3
2 1 Am	Inorgania Chantister	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.54D	Quantitative Analysis } *	1 3	1 — 3	1 3
2.84	or Advanced Organic Analysis†	2 - 3	2 - 3	2 - 3
	Research Project	010	0 -10	0
	* Unless taken in Fi	fth Year Elect	ive A.	
† If 2.4	4D Inorganic Chemistry and 254	In Quantitati	na Analmaia	

Fifth Year Elective A.

COURSE IIB2—GENERAL SCIENCE.

. 1

This course aims to meet the requirements of students who desire to undertake a general course in science to degree level. No industrial experience is required. The course, which is at Pass standard only, extends over six part-time years. Two options are offered, one specialising in Physics and Chemistry (Option 1) and the other specialising in Biology and Geology (Option 2).

Or.

FIRST YEAR.

(34 weeks part-time course.)

		н	ours per weel	ζ.
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.11D 2 21	Physics, Part I	$2 - 1\frac{1}{4}$	2 - 1	2 - 11
2.41	General Chemistry, Part I	2 — 4	2 - 4	2 — 4
10.11-B Mathematics, Part I	2 - 1*	2 - 1*	2 - 1*	
		6 - 61	6 - 61	6 - 61
	* Tuta	orial.		

SECOND YEAR.

(34 weeks part-time courses.)

		н	ours per weel	ζ.
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.11D	Physics, Part II	$1\frac{1}{2}$ $- 1\frac{1}{2}$	$1\frac{1}{2}$ $1\frac{1}{2}$	11-11
2.41	General Chemistry, Part II	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{2}$	1 - 4
0.101A	Eng. Drawing and Materials	2 - 0	0 - 3	0 - 0
IU.11-B	Mathematics, Part II	$2 - 2^*$	$1 - 2^*$	1 - 2*
		0 <u>‡</u> — 6	3 1 9	3½— 7½

* Tutorial.

THIRD YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
. 1.92A	Physics (or Diploma Physics III)	1 - 0	1 - 2	1 - 2
2.32	Physical Chemistry	1 - 0	1 - 0	1 - 21
2.42	Inorganic Chemistry	$1 - 2\frac{1}{2}$	1 — 0	$1 - 0^{2}$
2.52	Quantitative Analysis	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{2}$	1 24
2,02	Organic Chemistry	1 - 0	$1 - 2\overline{1}$	$1 - 0^{-1}$
10.22	Mathematics	1 0	$1 - 0^{-1}$	1 — 0
			·	
		6 5	6 — 7	6 7

FOURTH YEAR.

(34 weeks part-time course.)

		н	ours per weel	κ.
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut
2.33	Physical Chemistry	1 - 2	$1 - 2\frac{1}{2}$	1 - 21
2.63	Organic Chemistry	$1 - 2\frac{1}{2}$	$1 - 2^{2}$	$\bar{1} - \bar{2}\bar{1}$
7.502	Geology	$1 - 1\frac{1}{2}$	1 11	1 1
7.513	Mineralogy and Crystallography	$1 - 1_{\frac{1}{2}}$	$1 - 1\frac{1}{2}$	$1 - 1\frac{1}{2}$
		$4 - 7\frac{1}{2}$	$4 - 7\frac{1}{2}$	4 - 8
• •			-	-

FIFTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.911	Biology (or a General Metal- lurgical subject)	2 - 4	2 — 4	2 - 4
3.14 7.573	Industrial Chemistry* Geology	$1\frac{1}{2}$ 2 $\frac{1}{2}$ 1 - 2	$1\frac{1}{2}$ $2\frac{1}{2}$ 1 $ 2$	$1\frac{1}{2}$ 2 $\frac{1}{2}$ 1 - 2
		$4\frac{1}{2}$ $8\frac{1}{2}$	$4\frac{1}{2}$ 8 $\frac{1}{2}$	$4\frac{1}{2}$ - $8\frac{1}{2}$

* Includes Factory visits.

SIXTH YEAR.

(34 weeks part-time course.)

	Hours per week.			
	Term 1	Term 2	Term 3	
	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.	
English, History or Philosophy and	2 - 1*	2 - 1*	2 - 1*	
Psychology, Economics or Government	2 - 1*	2 - 1*	2 — 1*	
	4 — 2	4 - 2	4 2	

* Tutorial.

Option 2 (BIOLOGY-GEOLOGY).

1

FIRST YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.11D	Physics, Part I	$2 - 1\frac{1}{4}$	$2 - 1\frac{1}{4}$	$2 - 1\frac{1}{4}$
2.21	Chemical Techniques	2 — 4	2 - 4	2 - 4
10.11-в	Mathematics, Part I	2 — 1*	2 - 1*	2 - 1*
		6 - 61	6 61	6 - 61

• Tutorial.

SECOND YEAR.

			Hours per we	eek.
		Term 1	Term ²	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.41	General Chemistry, Part II	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{2}$
2.911 7.502	Biology	2 - 4 $1 - 1\frac{1}{2}$	2 - 4 1 - 1 $\frac{1}{2}$	$2 - 4 1 - 1\frac{1}{2}$
	-	4 8	4 - 8	4 - 8

THIRD YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.32D	Physical Chemistry	$1 - 2\frac{1}{2}$	1 - 2	$1 - 2\frac{1}{2}$
2.52 ▲	Quantitative Analysis	$1 - 2\frac{1}{2}$	1 - 2	$1 - 2\frac{1}{2}$
2.91 2	Biology	$1 - 2 - \frac{1}{2} *$	1 - 2	$1 - 2 - \frac{1}{2} *$
7.513	Mineralogy and Crystallography	$1 - 1\frac{1}{2}$	$1 - 1\frac{1}{2}$	1 11
		4 - 9	$\frac{1}{4-7\frac{1}{8}}$	4 - 9
	A m .			<u>_</u>
	Tut-	orial.		

FOURTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2 .62	Organic Chemistry	1 - 0	$1 - 2\frac{1}{2}$	1 _ 0
7.564	Mineralogy and Petrology	1 - 2	1 - 2	1 - 2
7.573	Geology	1 - 2	1 - 2	$1 \rightarrow 2$
	One elective from-			
2.184	Botany)			
2 .194	Zoology	1 0	1 0	1 0
2.913	Physiology	1 - 2	1 2	1 2
2.924	Microbiology			
		4 - 6	$4 - 8\frac{1}{2}$	4 — 6

FIFTH YEAR.

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.6 2A	Organic Chemistry	$1 - 2\frac{1}{2}$	1 - 2	$1 - 2\frac{1}{2}$
7.574	Geology	$1 - 2^{-}$	1 - 2	1 2
	Two electives from-			
2.95	Biochemistry			
2.925	Microbiology	2 - 4	2 - 4	2 - 4
2.914	Physiology			
		$4 - 8\frac{1}{3}$	4 — 8	$4 - 8\frac{1}{2}$
		·	•	

SIXTH YEAR.

(34 weeks part-time course.)

	н	ours per weel	ζ.
	Term 1	Term 2	Term 3
	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
English, History, or Philosophy and	$2 - 1^*$	2 — 1*	2 - 1*
Psychology, Economics or Government	2 — 1*	2 1*	2 - 1*
	4-2	4 - 2	4 - 2
* Tut	orial.		

COURSE IIB3—LEATHER CHEMISTRY.

This part-time course provides advanced instruction in chemistry for persons employed in the Leather industry. The course may be taken over six years for a Bachelor of Science (Pass) degree, or over seven years for an Honours degree.

FIRST YEAR.

(34 weeks part-time course.)

		H	ours per weel	ς.
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.11D	Physics, Part I	$2 - 1\frac{1}{4}$	$2 - 1\frac{1}{4}$	$2 - 1\frac{1}{2}$
2.21 2.41	General Chemistry, Part I	2 4	2 - 4	2 4
10.11-в	Mathematics, Part I	2 - 1*	2 — 1*	2 - 1*
		6 - 61	6 - 61	6 - 61
		·····		·

Tutorial.

SECOND YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
	•	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.11в 2.41 10.11-в	Physics, Part II General Chemistry, Part II Mathematics, Part II Materials for Leather Manufacture	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
		5 <u>1</u> 7	41 8	41 71

+Tutorial.

THIRD YEAR.

(84 weeks part-time course.)

		Hours per week.			
		Term 1	Term 2	Term 3	
0.00		lec. lab./tut.	lec. lab./tut.	lec. lab./tnt.	
2.32	Physical Chemistry	1 = 0	1 - 0	$1 - 2\frac{1}{3}$	
Z.4Z	Inorganic Chemistry	$1 - 2\frac{1}{2}$	1 — 0	$1 - 0^{-1}$	
2.52	Quantitative Analysis	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{4}$	
2.72	Mathematical Chemistry	$1 = 0^{-}$	$1 - 0^{-1}$	1 - 0	
	Light and Heavy Leather Manu-				
	facture	$2 - \frac{1}{2}$	$1 - 1_{\frac{1}{2}}$	$1 - 1_{\frac{1}{2}}$	
		6 51	·E 4	F (1)	
		0 - 02	5 <u> </u>	o — 0∯	

FOURTH YEAR.

(34 weeks part-time course.)

		Hours per week.			
		Term 1	Term 2	Term 3	
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.	
2.33	Physical Chemistry	1 - 2	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{4}$	
2.53	Quantitative Analysis	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{4}$	
2.63	Organic Chemistry	$1 - 2\frac{1}{2}$	1 2	$1 - 2\frac{1}{4}$	
	Science of Leather Chemistry	$1 - 0^{-1}$	1 - 0	1 - 0	
	Analytical Chemistry of Leather			-	
	Manufacture	1 0	1 _ 0	1 — 0	
		5 — 7	5 - 7	5 - 71	

FIFTH YEAR.

(34 weeks part-time course.)

			Hours per week.		
			Term 1	Term 2	Term 3
2.34 D	Physical Chemistry	<u>ר</u>	lee. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.64 D	or Organic Chemistry	}	1 - 3	1 — 3	1 — 3
2.94d	Biochemistry Leather Laboratory	·····	$\begin{array}{c} 0 \ \ 0 \\ 0 \ \ 7\frac{1}{2} \end{array}$	2 - 3 0 - 3	2 - 3 0 - 3
			1 -101	3 — 9	3 — 9

SIXTH YEAR.

	Hours per week.			
	Term 1	Term 2	Term 3	
	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.	
English, History or Philosophy and	$2 - 1^*$	$2 - 1^*$	2 - 1*	
Psychology, Economics or				
Government	2 - 1*	2 - 1*	2 1*	
	4 — 2	4 - 2	4 - 2	
* Tuto	rial.			

Additional for Honours.

Students desiring to take Honours must apply to the Professor of Applied Chemistry not later than 31st December in the year in which the fifth year is completed. The programme of study will be taken over two part-time years.

		н	ours per weel	ζ.
		Term 1	Term 2	Term 2
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.34d	Physical Chemistry			
2.64d	Organic Chemistry, depending on the subject taken in the fifth year	$1 - 3\frac{1}{2}$	$1 - 3\frac{1}{2}$	$1 - 3\frac{1}{2}$
2.73	Mathematical Chemistry Microbiology Ia and the	1 — 0	1 - 0	1 0
	Leather Project	1 - 2 0 - 6	$1 - 2 \\ 0 - 6$	$ \begin{array}{r} 1 & - & 2 \\ 0 & - & 6 \end{array} $

COURSE IIB4—APPLIED BIOLOGY.

In order to meet the increasing demand in Australian industry for scientists trained to degree level in one or other of the biological sciences, a part-time course in Applied Biology is now offered. In this course, biochemistry and/or microbiology are taken as major subjects. The course extends over six years for a Bachelor of Science (Pass) degree, and over seven years for an Honours degree.

FIRST YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.11d 2.21	Physics, Part I Chemical Techniques	2 - 11 / 2 - 4	$2 - 1 \frac{1}{4}$ 2 - 4	$2 - 1\frac{1}{4}$ 2 - 4
2.41 1 0.11-в	General Chemistry, Part I	2 - 1*	2 - 1*	2 - 1*
		$6 - 6\frac{1}{4}$	$6 - 6\frac{1}{4}$	6 - 61

• Tutorial.

SECOND YEAR.

		Hours per week.		
•		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1 .11D 2.41 2.911	Physics, Part II General Chemistry, Part II Biology	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
		41-8	$\frac{1}{4\frac{1}{2}-8}$	41-8

THIRD YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lee. lab./tut.	lec. lab./tut.
2.32D 2.52 2.62 2.912	Physical Chemistry Quantitative Analysis† Organic Chemistry Biology	$ \begin{array}{r}1 & - & 2\frac{1}{2} \\ 1 & - & 2\frac{1}{2} \\ 1 & - & 0 \\ 1 & - & 2 - \frac{1}{2}* \end{array} $	$ \begin{array}{r}1 - 2 \\ 1 - 2\frac{1}{2} \\ 1 - 2\frac{1}{2} \\ 1 - 2 \end{array} $	$ \begin{array}{r}1 & - & 2\frac{1}{2} \\ 1 & - & 2\frac{1}{2} \\ 1 & - & 0 \\ 1 & - & 2\frac{-1}{2}* \end{array} $
		$4 - 7\frac{1}{2}$	4 - 9	$4 - 7\frac{1}{2}$

* Tutorial. † In special cases 10.11-B Mathematics, Part II, may be taken in place of 2.52 Quantitative Analysis.

FOURTH YEAR.

(34 weeks part-time course.)

	H	Hours per week.		
	Term 1	Term 2	Term 3	
	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.	
2.913 Physiology	1 - 2	1 - 2	1 - 2	
2.95 Biochemistry I	1 - 2	1 - 2	$1 \longrightarrow 2$	
Plus two electives from—				
2.184 Botany	1 - 2	1 - 2	1 - 2	
2.194 Zoology	1 2	1 - 2	1 - 2	
2.33 Physical Chemistry	1 - 2	$1 - 2\frac{1}{4}$	1 2 1	
2.63 or 2.63A Organic Chemistry	1 - 21	$1 - 2^{-1}$	$1 - 2\frac{1}{6}$	
2.924 Microbiology I	$1 - 2^{-1}$	1 - 2	$1 - 2^{-1}$	
	4 - 8-81/2	4 8-81/2	4 8-9	

FIFTH YEAR.

		\mathbf{H}	ours per weel	к.
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
Either_		•		•
2.925	Microbiology II and		0 4	0 4
2.926	Microbiology III	z — 4	2 4	2 - 4
2.96	Biochemistry II and]	2 - 4	2 - 4	2 4
2.97	Biochemistry III			
(Secor	nd and third stages of these			
subjects	are run in the first half and			
second h	alf of year respectively.)			
Or,				
2.925	Microbiology II and			
2.926	Microbiology III			
	or }	2 — 4	2 - 4	2 - 4
2.96	Biochemistry II and			
2.97	Biochemistry III			
	• •			

	•	н	ours per weel	k.
Plus tw	o of the following electives :	Term 1	Term 2	Term 3
	e e	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.34	Physical Chemistry	1 - 3	1 - 3	1 - 3
2.64	Organic Chemistry	1 — 3	1 - 3	1 - 3
2.914	Physiology	1 - 2	1 - 2	1 - 2
2.925	Microbiology II	1 - 2	1 - 2	1 - 2
2.96	Biochemistry II (1st half of year)	ר		
	Chemistry and Analysis of	2 - 4	2 - 4	2 - 4
	Foods (2nd half of year).	}		
		4 - 8-10	4 — 8-10	4 810

Elective subjects must be chosen with due regard to subjects already taken. SIXTH YEAR

	Hours per week.			
	Term 1	Term 2	Term 3	
	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.	
English, History, or Philosophy and	2 - 1*	2 — 1*	2 — 1*	
Psyschology, Economics or Government	2 - 1*	2 - 1*	2 — 1*	
	4 - 2	4 - 2	4 - 2	

* Tutorial.

Additional for Honours.

Students desiring to take Honours must apply to the Professor of Applied Chemistry not later than 31st December in the year in which the fifth year is completed. The programme of study will be taken over two part-time years.

The topic of the research project, upon which a thesis is required to be submitted, may be chosen from one of the following fields: Biochemistry, Microbiology, Physiology.

CONVERSION COURSE IIC-APPLIED CHEMISTRY.

HVu h	LO POL HO
Diploma Mathematics II	2
Diploma Physics II	3
Conversion Humanities-English, History or Pholosophy	2
and Psychology, Economics or Government	2
	9

Plus the presentation of a thesis which may involve advanced laboratory work, together with any special subjects prescribed in each case.

The student is required to attend full time for one academic year or for such other time as approved by the Professorial Board.

SCHOOL OF CHEMICAL ENGINEERING.

The courses in Chemical Engineering, Industrial Chemistry and Food Technology are planned to give students a broad training in the fundamentals of science, chemistry and engineering, and knowledge of the engineering principles basic to design, construction and operation of plant and equipment. The work in chemistry, physics and mathematics is the same as that given in the Applied Chemistry and the Metallurgy courses in the first year of the full-time courses and in the first and second years of the part-time courses. In subsequent years students in the School of Chemical Engineering take, in addition to the fundamental studies, courses in mechanical, electrical and chemical engineering and industrial chemistry.

COURSE III—CHEMICAL ENGINEERING.

This course may be taken at Pass or Honours standard. The Pass course extends over four years of 34 weeks each and the additional work for Honours may be taken in one full-time year or two part-time years as set out in Course IIIB1.

The course in Chemical Engineering is closely linked with practical training in industry. It is arranged so that the second and third years are spent in combined academic study and works practice. During these years students attend the University on two half days and two evenings per week.

FIRST YEAR.

(34 weeks day course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut
1.11A 2.21 2.41	Physics Chemical Techniques	3 - 3 0 - 3 3 - 3	3 3 0 0 3 9	3 3 0 0 3 16
5.211 10.11 10.11B	Materials Workshop Processes and Practice Mathematics	$ \begin{array}{r} 1 - 0 \\ 0 - 3 \\ 4 - 2^* \\ 0 - 0 \end{array} $	$ \begin{array}{c} 1 - 0 \\ 0 - 0 \\ 4 - 2^* \\ 0 - 0 \end{array} $	$ \begin{array}{c} 1 - 3 \\ 0 - 10 \\ 0 - 0 \\ .2 - 2^{*} \end{array} $
G10 G20	English History	$\frac{2 - 0}{1 - 0}$ $\frac{14 - 14}{14}$	$ \begin{array}{r} $	$\frac{10 - 10}{12 - 0}$

* Tutorial.

SECOND YEAR.

(34 weeks of 2 half days and 2 evenings per week.)

		н	ours per weel	k.
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.12A	Physics	3 — 21	3 — 0	0 - 2
2.32	Physical Chemistry	$1 - 0^{-1}$	1 - 21	1 — Õ
2.42	Inorganic Chemistry	1 0	1 0	1 - 21
2.62	Organic Chemistry	$1 - 2\frac{1}{2}$	1 - 0	$1 - 0^{-1}$
8.132	Materials and Structures	$0 - 0^{-}$	2 - 1	2 - 1
10.22	Mathematics	1 - 0	1 - 0	1 - 0
G9		2 - 0	0 — 0	0 — 0
GZ	Philosophy	0 — 0	1 0	1 — 0
				
		9 5	$10 - 3\frac{1}{2}$	7 — 5]

THIRD YEAR.

(34 weeks of 2 half days and 2 evenings per week.)

н	lours per weel	k.
Term 1	Term 2	Term 3
lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1 - 2	1 - 3	1 - 3
1 — 3	1 2	ī — Ŏ
1 2	1 2	1 - 3
2 - 0	2 - 0	2 - 0
1 — 0	1 — 0	0 — 0
6 — 7	6 — 7	5 - 6
	$\begin{array}{c} \text{H} \\ \text{Term 1} \\ \text{lec. lab./tut.} \\ \dots 1 & -2 \\ \dots 1 & -3 \\ \dots 1 & -2 \\ \dots 2 & -0 \\ \dots & 2 & -0 \\ \dots & 1 & -0 \\ \hline 6 & -7 \end{array}$	Hours per weel Term 1 Term 2 lec. lab./tut. lec. lab./tut. $1 - 2$ $1 - 3$ $1 - 2$ $1 - 2$ $1 - 2$ $1 - 2$ $2 - 0$ $2 - 0$ $1 - 0$ $1 - 0$ $1 - 0$ $1 - 0$

† Taken in third year of Course III.

FOURTH YEAR.

(34 weeks day course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
3.14	Industrial Chemistry*	11 21	1191	11 91
3.24	Chemical Engineering	3 - 3	3 - 3	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
3.34	Chemical Engineering Design	2 - 3	2 _ 3	0 - 0 0 - 0
3.44	Chemical Engineering		2 — 0	2 - 3
3.54	Chemical Engineering	z — 0	2 - 0	2 - 0
~ ~ .	Materials	2 - 0	2 - 0	2 - 0
5.94	Mechanical Engineering	2 - 1	2 - 1	2 - 1
6.94	Electrical Engineering	1 - 2	1 - 2	$\overline{1} - \overline{2}$
	Major Elective (Humanities)	3 - 0	$\overline{3} - \overline{0}$	$\tilde{0} = \tilde{0}$
		16 <u>1</u> -11 <u>1</u>	161-111	131-111

* Includes Factory visits.

Additional for Honours.

Students desiring to take Honours must apply to the Professor of Chemical Engineering not later than the 31st December of the year in which the fourth year is completed. The undermentioned additional courses must be taken.

FIFTH YEAR.

(34 weeks day course.)

		\mathbf{H}	ours per weel	k.
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
3.25	Chemical Engineering	2 - 3	2 - 3	2 - 3
3.25a	Chemical Engineering	2 - 0	2 - 0	2 - 0
3.35	Advanced Chemical Engineering	0 2	۶ <u> </u>	2 - 3
3.55	Chemical Engineering Materials	$\frac{2}{1} = \frac{3}{0}$	$\frac{2}{1} = \frac{3}{0}$	1 - 0
3.65	Chemical Engineering (Thermo- dynamics and Kinetics)	3 - 0	3 - 0	3 — 0
3.75	Chemical Engineering Project	0 - 7	0 - 7	0 - 7
6.95	Electrical Engineering	2 - 3	2 - 3	2 - 3
		12 -16	12 16	12 -16
		<u>•</u>		

The Honours year may be taken in two part-time years as set out under the part-time course, except that the Humanities subjects of the seventh year are not required, a design project being substituted. Four additional hours per week are required on the design project.

COURSE IIIB1—CHEMICAL ENGINEERING.

Course IIIB1 has been designed for students in appropriate employment in the chemical industry. The programme of study is equivalent to that of Course III but in Course IIIB1 attendance is required over seven part-time years for a Pass degree and over eight part-time years for an Honours degree.

FIRST YEAR.

(34 weeks part-time course.)

		н	ours per weel	c.
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut-
1.11D	Physics, Part I	$2 - 1\frac{1}{4}$	$2 - 1\frac{1}{4}$	$2 - 1\frac{1}{4}$
2.21 2.41	General Chemistry, Part I	2 4	2 — 4	2 - 4
10.11-в	Mathematics, Part I	2 - 1*	2 - 1*	2 - 1*
		6 - 61	6 - 61	6 61
				·

Tutorial.

100 -

SECOND YEAR,

(34 weeks part-time course.)

		Hours per weeks.		
		Term 1	Term 2.	Term 3
		lec. lab./tut.	lec. lab./tut.	lee. lab./tut.
1.115	Physics; Part IF'	1 <u>1</u> 11	11 - 11	18-18-
2.41	General Chemistry, Part II	1 - 2	1 2 1	1 4
5.101	Engineering Drawing and	-	- 2	
	Materials	0 - 0	1 - 3	2 - 0
5.211	Workshop Processes and Practice	0 - 3	<u>0</u> — 0	$\tilde{0} - \tilde{0}$
10.11-в	Mathematics, Part II	2 1*	1 — 1*	i — i*
		4 <u>1</u> 8	$4\frac{1}{2}-8$	5 <u>1</u> 6 <u>1</u>

• Tutorial.

THIRD YEAR!

(34 weeks part-time course.)

		Hours per week.			
		Term : 11.	Term 2	Term:3	
		lec. lab. /tut.	lecalab./tut:	lee. lab. /tuta.	
1.92A	Physics	1 - 2.	1 2	1 - 2	
2.32	Physical Chemistry	10ŀ	10	$1 - 2\frac{1}{2}$	
2.42	Inorganic Chemistry	$1 - 2\frac{1}{2}$	1	1 0	
2.62 .	Organic Chemistry.	1 - 0	$1 - 2\frac{1}{2}$	1 0	
8.132	Materials and Structures	0 - 0	$2 - 1^{-1}$	2 - 1	
10.22 .	Mathematics	1 — 0	1 — 0	1 - 0	
		·			
		$5 - 4\frac{1}{2}$,	$7 - 5\frac{1}{2}$	7 - 51	

FOURTH YEAR.

(34" weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.33	Physical Chemistry	1 — 2 :	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{4}$
2.52X.	Quantitative Analysis	1 - 3	1 - 2	$1 - 0^{-1}$
2.69	Organic Chemistry	$1 - 2\frac{1}{2}$	1 ' — 2 '	$1 - 2\frac{1}{2}$
10.23v	Mathematics	$2 - 0^{2}$	2! - 0 :	2°0
			······································	
		$5 - 7\frac{1}{2}$	$5 - 6\frac{1}{2}$	5 - 5

FIFTH YEAR. .

(34 weeks part-time course.)

		Hours per week.			
		Term 1	Term 2	Term 3	
· · · · ·		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.	
3.14.	Industrial Chemistry*	$1\frac{1}{2}$ 2 $\frac{1}{2}$	11-21	11 - 21	
3.44	Chemical Engineering				
	Calculations	2 - 0	2 - 0	20	
5.94	Mechanical Engineering	2 - 1	2 - 1	$\frac{1}{2}$ - 1	
6.94	Electrical Engineering	$1 \rightarrow 2^{+}$	1 - 2	ī. — 2.	
		$6\frac{1}{2}$ $5\frac{1}{2}$	$6\frac{1}{2}$ $5\frac{1}{2}$	61- 51	
			·	<u> </u>	

Includes Factory visits.

101)

SIXTH YEAR ...

(34' weeks part-time course.)

				Hours per week.		
				Term 1	Term 2	Term 3 '
				lec. lab./tut.	lec. lab./tut	lec. labi/tut
3.24D	Chemical Chemical	Engineering	Design	$3 - 2\frac{1}{2}$ 2 - 21	$3 - 2\frac{1}{2}$ 2 - 21	$3 - 2\frac{1}{2}$
3 .54	Chemical	Engineering	Materials	$2 - 0^2$	$\frac{2}{2} - \frac{2}{0}^{2}$	$\frac{1}{2} - \frac{1}{0}^{2}$
				7 — 5	7 — 5	7 — 5

SEVENTH YEAR.

(34 weeks part-time course.)

	Hours per week.			
•	Term 1	Term 2	Term 3	
	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.	
English, History or Philosophy and	2 2—1*	2 - 1*	2 - 1*	
Psychology, Economics or Government	2 - 1*	2 - 1*	2 — 1*	
	4 — 2	4 - 2	4 — 2	

* Tutorial.

ADDITIONAL FOR HONOURS.

Students desiring to take Honours must apply to the Professor of Chemical Engineering not later than 31st December of the year in which the sixth year is completed. The undermentioned additional courses must be taken. The first year of the additional work may be combined with the normal seventh year or taken separately. In either case two years' part-time attendance is required.

		Hours per week.		
		Term (1)	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec.lab./tut.
3.25	Chemical Engineering	2 - 3	2 - 3	2 - 3
3.25A.	Chemical Engineering	2 - 0	2 - 0	2 - 0
3.35	Advanced Chemical Engineering	-)		
	Design	}2 . → 3	2 - 3	2 - 3
3.7 5	Chemical Engineering Project	J		
3.55	Chemical Engineering Materials	1 - 0	1 0	1 0
3.65	Chemical Engineering Thermo-			
	dynamics and Kinetics	3 — 0	3 - 0	$3 \rightarrow 0$
6.95	Electrical Engineering	2 - 3	2 - 3	2 3

COURSE IIIB2-INDUSTRIAL CHEMISTRY.

This course provides part-time instruction for students in appropriate employment in the chemical industry. Students are given a sound general background of fundamental sciences, with particular emphasis on analytical chemistry, and are then trained in the broad aspects of plant and process development. The course may be taken at Pass or Honours standard. Students taking a Pass degree may complete the course in six years, while those attempting Honours take additional work in the sixth year and are required to complete a seventh year.

FIRST YEAR. ŧ, (34 weeks part-time course.) Hours per week. Term 1 Term 3 Term 2 lec. lab./tut. lec. lab./tut. lec. lab./tut. I.IID Physics, Part I $2 - 1_{1}$ $2 - 1\frac{1}{4}$ $2 - 1\frac{1}{4}$ 2.21Chemical Techniques 2 - 4 2 - 4 2.41 General Chemistry, Part I ... } 2 - 42 - 1* 10.11-в Mathematics, Part I 2 - 1* $2 - 1^*$ 6 -- 61 6 - 61 6 - 61

* Tutorial.

SECOND YEAR.

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(34 weeks part-time course.)

	Hours per wcek.		
	Term 1	Term 2	Term 3
	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.11D Physics, Part II	11 11	1 1 1 1	11 . 11
2.41 General Chemistry, Part II	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{2}$	1 4
5.101A Engineering Drawing and	-	-	
Materials	2 - 0	0 - 3	0 — 0
10.11-в Mathematics, Part II	2 2*	$1 - 2^*$	1 2*
•			
	6 1 6	$3\frac{1}{2}$ 9	$3\frac{1}{2}$ 7 $\frac{1}{3}$
* Tuto	rial.	<u> </u>	m

THIRD YEAR.

F" • •

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		н	ours per weel	k.
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut
1.92	Physics *	1 - 0	1 - 2	1 - 2
2.32	Physical Chemistry	1 - 0	1 0	$1 - 2\frac{1}{2}$
2.42	Inorganic Chemistry	$1 - 2\frac{1}{2}$	1 0	$1 - 0^{-}$
2.52	Quantitative Analysis	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{2}$
2.62	Organic Chemistry	1 0	$1 - 2\frac{1}{2}$	1 0
2.72	Mathematical Chemistry	1 — 0	1 0	1 0
	·			
		6 5	6 — 7	6 — 7
				<u> </u>

	Hours per week.		
Alternative Subjects.	Term 1	Term 2	Term 3
· •	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
Chemical Instrumentation	1 — 0	1 <u>1</u> 1	1 <u>1</u> 1
J Fire Assaying	0 - 2	0 - 0	0 0

FOURTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.33 2.53 2.73 3.14	Physical Chemistry Quantitative Analysis Mathematical Chemistry Industrial Chemistry	$ \begin{array}{r} 1 - 2 \\ 1 - 2\frac{1}{2} \\ 1 - 0 \\ 1\frac{1}{2} - 2\frac{1}{2} \end{array} $	$ \begin{array}{r}1 & - & 2\frac{1}{2} \\ 1 & - & 2\frac{1}{2} \\ 1 & - & 0 \\ 1\frac{1}{2} & 2\frac{1}{2} \end{array} $	$ \begin{array}{r}1 - 2\frac{1}{2} \\ 1 - 2 \\ 1 - 0 \\ 1\frac{1}{2} - 2\frac{1}{2} \end{array} $
		$\frac{41}{2}$ 7	$4\frac{1}{2}$ - $7\frac{1}{2}$	$4\frac{1}{2}$ 7

FIFTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.34 р	Physical Chemistry	1 3	1 3	1 3
3.15	Industrial Chemistry	1 — 3	1 — 3	1 — 3
3.44	Chemical Engineering Calculations	2 - 0	2 - 0	2 — 0
3.54	Chemical Engineering Materials	2-0	2 0	2 — 0
		6 - 6	6 - 6	6 - 6

SIXTH YEAR.

(34 weeks part-time course.)

	Hours per week.			
	Term 1	Term 2	Term 3	
	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.	
English, History or Philosophy and	2 - 1*	2 — 1*	2 — 1*	
Psychology, Economics or Government	2 — 1*	2 — 1*	!— 1*	
	4 - 2	4 - 2	4 - 2	
* Tut	orial.		•	

Additional for Honours.

Students desiring to take Honours must apply to the Professor of Chemical Engineering not later than 31st December of the year in which the fifth year is completed. The undermentioned additional courses must be taken. Portion of the additional work may be combined with the normal sixth year and the remainder completed in the seventh year.

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	'lec. lab./tut.	lec. lab./tut.
3 .55	Chemical Engineering Materials	1 - 0	1 0	1 - 0
	Industrial Safety (General)	$1\frac{1}{2}$ 0	$1\frac{1}{2}$ 0	$\frac{1}{1}$ 0
	Advanced Industrial Chemistry	3 — 0	3 — 0	3 - 0
	Industrial Chemistry Project	0 - 12	0 - 12	:0 —12

COURSE IIIB3-FOOD TECHNOLOGY.

This course has been designed for students already gaining practical experience in a related occupation in the food industry. The course extends over seven years for a Pass degree and over eight years for an Honours degree.

Students in Food Technology follow the same course as Chemical Engineers for the first three years and thereafter specialise in methods of food preservation. A study is also made of the biological sciences, a knowledge of which is necessary for the successful plant control of a food industry.

FIRST YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.11D	Physics, Part I	$2 - 1\frac{1}{4}$	$2 - 1\frac{1}{4}$	2 - 1
2.21	General Chemistry, Part I	2 4	2 4	2 4
10.11-B Mathematics, Part I	*2 — 1*	2 — 1*	2 1*	
		6 - 61	6 - 61	6 - 61
	* Tutz	orial.		

SECOND YEAR.

(34 weeks, part-time course.)

	Hours per week.		
	Term 1	Term 2	Term 3
	lec. lab./tut.	lec. lab./tut.	lec. lab./tut
I.11D Physics, Part II	11-11	11-11	11-1
2.41 General Chemistry, Part II	1 - 21	1 - 21	1 1
.5.101 Engineering Drawing and	-	2	
. Materials	70 — 0	1 - 3	2)
^{5.211} Workshop Processes and Practice	·0 — 3	·'0''0	÷ō)
910)11-BMathematics, Part II	12 1*	:1 11*	a
н — — — — — — — — — — — — — — — — — — —		~~···	-
	418	4 <u>1</u> 8	5 <u>1</u> - 6 <u>1</u>

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* Tutorial.

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THIRD YEAR.

(34 weeks part-time course.)

		H	ours per weel	ς.
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.32	Physical Chemistry	1 — 0	1 0	$1 - 2\frac{1}{2}$
2.42	Inorganic Chemistry	$1 - 2\frac{1}{2}$	1 0	1 - 0
2.52A	Quantitative Analysis	1 - 3	1 - 2	1 0
2.62	Organic Chemistry	1 — 0	$1 - 2\frac{1}{2}$	1 — 0
10.22	Mathematics	1 — 0	$1 - 0^{-1}$	1 — 0
	and Statistics	1 — 1	$1 - 2\frac{1}{2}$	1 - 2
		$6 - 6\frac{1}{2}$	6 - 7	6 - 41

FOURTH YEAR.

r

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.33	Physical Chemistry	1 2	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{2}$
2.63a	Organic Chemistry	$1 - 2\frac{1}{2}$	$1 - 2^{-1}$	$1 - 2\frac{1}{2}$
2.9 24	Microbiology	$1 - 2^{-}$	1 — 2.	$1 - 2^{-}$
2.95	Biochemistry	1 - 2	1 - 2	1 - 2
			·	
		$4 - 8\frac{1}{2}$	$4 - 8\frac{1}{2}$	4 9
			•	·

FIFTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lee. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.925	Microbiology	2 - 4	$2 - 4 (\frac{1}{2} \text{te})$	rm) 0 — C
5.94	Mechanical Engineering	2 - 1	2 - 1	2 - 1
6.94 ·	Electrical Engineering	1 - 2	1 - 2	1 - 2
	Chemistry and Analysis of Foods	0 0	$2 - 4 (\frac{1}{2} \text{ te})$	rm) 2 — 4
		5 - 7	5 - 7	5 - 7
		<u> </u>		

SIXTH YEAR.

		Hours per week:		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
3.3 4d	Chemical Engineering Food Technology I and II	$3 - 2\frac{1}{2}$ 2 - 4	$3 - 2\frac{1}{2}$ 2 - 4	$ \frac{3}{2} - \frac{21}{2} \\ \frac{3}{2} - \frac{21}{4} $
		5 61	5 61	$5 - 6\frac{1}{2}$

SEVENTH YEAR.

1.

(34 weeks part-	-time course	.)		
	Hours per week.			
	Term 1	Term 2	Term 3	
	lec. lab./tut.	lec. lab./tut.	lec. lab./tut	
English, History or Philosophy and	2 - 1*	2 - 1*	2 - 1*	
Psychology, Economics or				
Government	2 - 1*	2 1*	2 1*	
	4 - 2	4 - 2	4 - 2	
* Tutorial.				

ADDITIONAL FOR HONOURS.

Students desiring to take Honours must apply to the Professor of Chemical Engineering not later than 31st December of the year in which the sixth year is completed. The undermentioned additional courses must be taken. Portion of the additional work may be combined with the normal seventh year and the remainder completed in the eighth year.

			Hours per week.		
		Term 1	Term 2	Term 2	3
3.54	Chemical Engineering Materials	2	2	2	
	Advanced Food Technology	8	8	8	
	Food Technology Project	10	10	10	

CONVERSION COURSE IIIC-CHEMICAL ENGINEERING.

Holders of a diploma in Chemical Engineering who have completed the course of study set out in the current Handbook of the N.S.W. Department of Technical Education are required to complete the following additional work in order to qualify for the degree of Bachelor of Science.

	Hours per	week.
Diploma Mathematics II	••	2
Conversion Physics (or Diploma Physics II)	••	3
Conversion Humanities-English, History or Philosoph	У	2
and Psychology, Economics or Government	••	2
		9

Plus advanced laboratory work on a specified project and the presentation of a thesis, together with such special subjects as are prescribed in each case.

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The student is required to attend either for one full-time academic year in accordance with the dates prescribed for the normal final year of the undergraduate course, or for such other time as approved by the Professorial Board.

SCHOOL OF METALLURGY.

The courses in Metallurgy have been designed to prepare students for employment in metallurgical industries and research institutions and involve a general training in basic sciences and engineering. These fundamental principles are then applied to problems relating to the extraction, refining, working, fabrication and use of metals.

Two main courses in Metallurgy are available. In Course IV, which leads to the degree of Bachelor of Science (Pass or Honours), students study full-time during the day and may complete the course in four years. Between the third and fourth years they are expected to obtain a full-time position in industry. Course IVB, which leads to the degree of Bachelor of Science, is primarily for students employed in metallurgical industries and instruction is given mainly in the evenings.

The first year of the full-time course and the first and second years of the part-time course are identical with those of the Applied Chemistry and Chemical Engineering courses.

COURSE IV—METALLURGY.

This course extends over four years and students study full-time during the day as follows:----

- First Three Years.—34 weeks over three terms from late February to November (excluding examinations and vacations) fulltime study, five days per week.
- Fourth Year.—22 weeks over two terms from early June (excluding examinations and vacations) full-time day study, five days per week.

The degree of Bachelor of Science, Pass or Honours, is awarded depending on the degree of success of the student during the course. As will be seen above, the fourth year of the course commences at the beginning of the second University term so as to provide a six-months period between the third and fourth years in which
avotudent must obtain industrial experience. Letture and laboratory work during this period cease completely so that students may travel to other centres for their industrial training.

Provision is made in the course for a limited amount of specialisation of the student's own choice in the final year.

FIRST YEAR.

(34 weeks day course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.11	Physics	3 — 3	3 — 3	3 3
-2.21	Chemical Techniques	.03	0 - 0	0 - 0
2.4 1	"General Chemistry	3 - 3	°3 — 9	···3 — 6
ol0.41	Mathematics	4 : 2	14 2	iõ õ
.10.11в	Mathematics	0 0	, 0 '0	2 - 2
.5.101	Engineering Drawing and			
	Materials	1 - 0	1 - 0	·1 — 3
'5.211	"Workshop Processes and Practice	0 3	0 - 0	00
G10	. English	2 - 0	2 :0	0 0
G2 0	History	1 - 0	1 - 0	2 - 0
			······································	
		14 — 14	1414	II14

'SECOND'YEAR.

(34 weeks day course.)

	н	ours per weel	κ.
	Term 1	Term 2	Term 3
	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
.1.92 . Physics	.10	1 - 2	$2 \rightarrow 1$
2.32 Physical Chemistry	1 — 0	1 - 0	1 - 21
2.42 Inorganic Chemistry	1 '0	1 60	1 0
2.52 .Quantitative Analysis	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{2}$	1 - 21
"2:72 Mathematical Chemistry	1 - 0	1 - 0	¹ – 0 [*]
14.12 General Metallurgy	· 1··0	1 0	1 0
4.22 Metallurgical Engineering	1 3†-1*	3 2-1*	2 - 2-1*
4.32 Physical Metallurgy I	1 - 3	2 - 3	2 - 5
7.513A Mineralogy and Crystallography	1. — .1 <u>1</u>	÷1,₁}	~ 1~ — 0
8.112 Strength of Materials [†]	ີ 🗋		0 0
'8.92c 'Properties of Materials [†]	ە ەج	.2	z — z
G1 Logic	0 - 0	2 - 0	0 0
G2 Philosophy	0 - 0	1 — 0	1 — 0
,	·		· · · · · · · · · · · · · · · · · · ·
	.9	17 14	1516

* Tutorial.

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† Includes one hour report writing. t These courses begin in the 8th week of 1st term.

THIRD YEAR.

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(34 weeks day course.)

		Hours per week.		
		Term 1	Term 2	Ferm 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.33	Physical Chemistry	1 - 2	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{2}$
2.73	Mathematical Chemistry	1 0	1 - 0	1 - 0
4.23	Metallurgical Engineering	1 3	1 - 3	2 - 6
4.33	Physical Metallurgy	2 - 3	2 - 3	2 - 3
4.54	Metallurgy Seminar, Part I	0 1*	0 — 0	0 - 0
5.94	Mechanical Engineering	2 - 1	2 - 1	2 - 1
6.94	Electrical Engineering	1 - 2	1 - 2	1 - 2
7.034	Preparation of Minerals	2 - 3	2 - 3	0 0
	Minor Elective (Humanities)	1 - 0	. 1 /−−− 0	⊴i00
		· · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	·
		11 - 15	$11 \rightarrow 14\frac{1}{2}$	·9·141

•** Discussion on report and paper presentation. Seminars will be conducted jointly by *part-time* -students in sixth year and *full-time* students in fourth year.

FOURTH YEAR.

(22 weeks day course.)

2nd and 3rd terms only-Vacation and 1st term in industry.

		Hoursper week.	
		Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.
4.24	Metallurgical Engineering	2 - 0	.1 - 0
4.34	'Physical Metallurgy	1 - 6	``1 —``3
4.44	Industrial Metallurgy	2 - 3	2 - 3
4.64	Metallurgical Thermodynamics	1 0	1 - 0
4.54	Metallurgy Seminar, Part II	0 - 2*	0 2†
	Major Elective (Humanities)	3 — 0	3 0
	Experimental Project (Metallurgy)	0 - 6 +	0 - 12 +
		9 - 17 +	8 -20+

* Taken jointly with sixth year students in part-time course.

+ Portion of this period will be used for discussion of "industrial experience" reports.

During the second, third and fourth years of the course, excursions will be made to various metallurgical works. Detailed reports of some of these visits will be required.

'A detailed report of the student's activities during his six months' period in industry after the third year will be required—it will be taken_into consideration during classification for the honours list.

COURSE IVB-METALLURGY.

The part-time course, which leads to the degree of Bachelor of Science, extends over seven years of three terms each. Students are required to have at least three years' experience in a metallurgical industry or institution before completing the course.

FIRST YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.11р 2.21 2.41 10.11-в	Physics, Part I Chemical Techniques General Chemistry, Part I Mathematics, Part I	$ \begin{array}{r} 2 - 1 \\ 0 - 3 \\ 3 - 0 \\ 2 - 1^* \end{array} $	$ \begin{array}{r} 2 - 1 \\ 0 - 0 \\ 2 - 4 \\ 2 - 1^* \end{array} $	$2 - 1\frac{1}{2} \\ 0 - 0 \\ 1 - 5 \\ 2 - 1^*$
		7 - 51	6 - 61	$5 - 7\frac{1}{4}$
	• • •	· · ·		

* Tutorial.

SECOND YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.11d	Physics, Part II	11-11	11-11	11-11
2.41	General Chemistry, Part II	1 - 21	$1^{-2^{+}}$	1 — 4
5.101	Engineering Drawing and	-		
	Materials	0 0	1 3	2 0
5.211	Workshop Processes and Practice	0 — 3	0 — 0	0 - 0
10.11-в	Mathematics, Part II	2 1*	1 _ 1*	1 - 1*
		41 0		
		4 <u>4</u> 8	44 8	5 1 6 1
	* Tuto	orial.		

THIRD YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.92	Physics	1 - 0	1 2	2 - 1
2.32	Physical Chemistry	$1 - 2\frac{1}{2}$	1 — 0	1 - 0
2.52	Quantitative Analysis	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{2}$	$1 - 2\frac{1}{2}$
2.72	Mathematical Chemistry	1 - 0	1 - 0	1 - 0
4.12	General Metallurgy	1 - 0	1 0	1 - 0
8.920	lent time)	$1 - 1\frac{1}{2}$	1 - 11	0 0
		$6 - 6\frac{1}{2}$	6 6	$6 - 3\frac{1}{2}$

FOURTH YEAR.

(34 weeks part-time course.)

..

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.33	Physical Chemistry	1 1	1 - 1	1 - 1
2.42	Inorganic Chemistry (lecture			
	course)	1 0	1 - 0	1 0
2.73	Mathematical Chemistry	1 - 0	1 - 0	1 0
4.32	Physical Metallurgy	1 3	2 - 3	2 - 5
7.513 A	Mineralogy and Crystallography	$1 - 1\frac{1}{2}$	$1 - 1\frac{1}{2}$	1 — 0
		$5 - 5\frac{1}{2}$	$6 - 5\frac{1}{2}$	6 - 6
		······	Construction of the local division of the lo	

FIFTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
4.22 4.33	Metallurgical Engineering Physical Metallurgy	$2 - 3^{\dagger - 1*}$ 2 - 3	$2 - 2 - 1^*$ 2 - 3	$2 - 2 - 1^*$ 2 - 3
		4 — 7	4 6	4 - 6

* Tutorial. † Includes one hour report writing.

SIXTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
4.23	Metallurgical Engineering and	1 9	19	9 <u> </u>
4.44A	Industrial Metallurgy*	$\frac{1}{2} - \frac{1}{1}$	$\frac{1}{2} - \frac{1}{1}$	1 - 0
4.54	Metallurgy Seminar [†]	1 - 0	0 2	0 - 0
5.94	Mechanical Engineering I	2 - 1	2 - 1	2 — 1
6.94	Electrical Engineering I	1 - 2	1 - 2	1 - 2
		5-6-5-6	4-5-7-8	4-5-7-8

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* Includes Factory visits. † Report and paper presentation covered in first term then joint seminar in second term with full-time students.

SEVENTH YEARI'

(34 weeks part-time course.)

	Hours per week.		
	Term 1	Term 2	Term 3
x	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
English, History or Philosophy and	, 2 — 1*	2 - 1*	2 - 1*
•Psychology, Economics or			
Government	2*1*	2	27 1* :
	4 2	4 2"	42
* Tuto	rial.		······

CONVERSION COURSES-METALLURGY.

Students who hold current diplomas of the Sydney Technical College in Metallurgy or Secondary Metallurgy may apply for permission to take a conversion course which will enable them to qualify for the degree of Bachelor of Science. Details of the conversion courses are as shown below.

CONVERSION COURSE IVc1-METALLURGY.

Conversion course to Bachelor of Science (Pass) from current Secondary Metallurgy diplomaticourse (Sydney).

		Hours per week
1.92	Physics **	. 21/3
2.72	Mathematical Chemistry	. 1
2.73	Mathematical Chemistry Conversion Humanities	. 1
	English, History or Philosophy	. 2
	and Psychology, Economics or Government	. 2
4.54	Metallurgy Seminar	. 1
		9 1

Together with any special subjects prescribed.

CONVERSION COURSE IVc2-METALLURGY.

Conversione course to Bachelor of Science (Pass) from current Metallurgy diploma: course (Newcastle and Wollongong).

		Hours per	week.
2.7	2 Mathematical Chemistry	1	
2.7	3- Mathematical Chemistry	1.	
	Conversion Physics	1.	
		3:	
	Conversion Humanities—		
	English, History or Philosophy	9.	
	and Psychology Foonemics on Commission		
4.0	The Martin Stranger, Economics of Government .	2	
4.0	4 Metallurgy Seminar.	1	
			-
		10t.	

Together with any special subjects prescribed.

SCHOOL OF MECHANICAL ENGINEERING.

The courses in Mechanical Engineering are planned to provide a sufficient foundation of basic science applied to engineering methods and techniques to prepare the graduate to enter any industry dealing; with heat; power; materials and machinery. The course does not: attempt to teach current commercial practice nor specialised knowledge of the product of any one industry. On the contrary, undergraduates are expected to obtain their practical experience by direct service in industry.

In general, instruction by lectures is paralleled by laboratory work in which the student is given opportunity, not only to familiarise himself with materials, engines and machinery, but also to develop his ability to apply theory to the analysis of their characteristics.

Three courses are provided leading to the degree of Bachelor of Engineering (Pass or Honours): Course V, a four years day course; Course Vi, a part-time course extending over seven years; and Conversion Course Vc, to enable Associates of Sydney Technical'. College in Mechanical Engineering to qualify for the degree.

COURSE V-MECHANICAL ENGINEERING*

Course V is of four years duration. The first three years of the course each require attendance at the University for twenty-four weeks. For the remainder of each of these years the student gains practical experience in industry. The fourth year requires full-time day attendance for thirty-four weeks.

During the first two years the fundamental subjects which are the basis of the student's later professional work are studied, viz., mathematics, chemistry, physics and applied mechanics, a thorough knowledge of which is essential in all branches of mechanical engineering. The student is also trained in elements of the more important mechanical processes in order that he may acquire the knowledge of modern machine tools, foundry practice, forging and welding, necessary for the successful designer of machinery. This knowledge is further enlarged by five month periods in industry between the various academic sessions.

The professional work of the third and fourth years includes the study of the mechanics of fluids and of rigid and elastic bodies with applications to design. The study of thermodynamics is applied to heat engineering, and to the analysis and design of power plants; turbines, steam and internal combustion engines, industrial heating, and to refrigeration and air conditioning systems. Engineering processes are considered in relation to design for production; and

^{*}Course V was revised in 1953. The first and second years of the revised course, set out below, will operate in 1954 and later stages will be progressively introduced. Students in the third and fourth years of Course V in 1954 will follow the course described in the 1953 Calendar.

work on metrology, gauges and fixtures, tool design, tolerances and inspection is introduced.

The professional elective subjects in the fourth year permit students to choose a broad phase of mechanical engineering as a special study. In this way the student learns to use libraries and technical journals, and is made to realise how fully the knowledge he has gained during his course is used in engineering development and practice. The preparation of a thesis provides a training in report-writing and in technical exposition.

FIRST YEAR.

(24 weeks day course.)

		Hours per week.	
		Term 1	Term 2
		lec. lab./tut.	lec. lab./tut.
1.41	Physics	3 — 3	3 — 3.
2.111	Chemistry	3 3	3 0
5.11	Engineering Drawing	0 3*	0 3*
5.21	Mechanical Technology	2 1 0	21 - 0
5.41	Descriptive Geometry	1 24*	1 21*
8.11	Engineering Mechanics	1 1*	1 1*
10.11	Mathematics	4 — 2*	4 — 2*
G10	English	2 - 0	2 - 0
G20.1	History	1 _ 0	1 - 0
		$17\frac{1}{2}$ 14 $\frac{1}{2}$	17 1 —111

* Tutorial.

SECOND YEAR.

(24 weeks day course.)

		Hours	per week.
		Term 1	Term 2
		lec. lab./tut.	lec. lab./tut.
1.42	Physics	$2 - 1\frac{1}{2} - 1^*$	2 - 11-1*
2.122	Engineering Chemistry	م ال	110
4.912	Engineering Metallurgy	<u><u><u></u></u></u>	1 2 2
5.22	Mechanical Technology	3 0	3 0
5.32	Engineering Mechanics	$1 - \frac{1}{2}$ *	$1 - 1\frac{1}{2}$ *
5.52	Fluid Mechanics	1	1
5.72	Thermodynamics	1 11*	1 - 1-1*
8.112	Theory of Structures	11 1*	11-1*
8.92	Properties of Materials	0 — 0	1 - 2
10.12	Mathematics	3 2*	3 — 2*
i G1	Logie	0 0	2 - 0
G20.2	History	2 0	0 0
		$\frac{16}{16}$ -12	17 -14

* Tutorial.

THIRD YEAR.

(24 weeks day course.)

	•	Hours	per week.
		Term 1	Term 2
		lec. lab./tut.	lec. lab./tut.
5.13	Mechanical Engineering Design	$0 \rightarrow 6^*$	0 — 6*
5.23	Mechanical Technology	$1\frac{1}{2} - 0$	· 11 - 0
5.33	Theory of Machines	1 - 112*	$1 - 1\frac{1}{2}$
5.53	Fluid Mechanics	$1 - \frac{1}{2} - \frac{1}{2} + \frac{1}{2}$	<u>1</u>
5.73	Thermodynamics	$1 - 1_{\frac{1}{2} - \frac{1}{2}}^*$	$1 - \frac{1}{2} - \frac{1}{2} + \frac{1}{2}$
5.83	Mathematical Engineering	1 1*	1 — 1*
6.83	Electrical Engineering	1 3-1*	1 3-1*
8.123	Structures (Theory and Design)	$2 - 3^*$	2 3*
G2	Philosophy	2 - 0	0 - 0
	Minor Elective (Humanities)	0 - 0	2 - 0
			·
		10 1 191	$10\frac{1}{2}$ 19 $\frac{1}{2}$

Norg.—Students must attend a survey camp of one week's duration between Third Year and Fourth Year.

* Tutorial.

FOURTH YEAR.

(34 weeks day course.)

		· H Term 1 lec. lab./tut.	ours per weel Term 2 lec. lab./tut.	r. Term 3 lec. lab./tut.
5.14 5.34 5.54 5.74 6.84	Mechanical Engineering Design Theory of Machines Fluid Mechanics Thermodynamics Electrical Engineering Professional Elective I Professional Elective I Seminar Thesis Work Major Elective (Humanities)	$\begin{array}{c} 0 & 6^{*} \\ 1 & 2^{*} \\ 1 & 1^{1}_{2} - 1^{1}_{2} \\ 1^{1}_{2} & 1^{1}_{2} \\ 1^{1}_{2} - 1^{2}_{2} - 1^{2}_{1} \\ 1 & 2^{2}_{2} - 2^{1}_{2} \\ 1 & 2 \\ 0 & 0 \\ 0 & 0 \\ 0 & 0 \\ 3 & 0 \\ \hline 9^{1}_{2} - 20^{1}_{2} \end{array}$	$\begin{array}{c} 0 & - & 6^{*} \\ 1 & - & 2^{*} \\ 1 & - & 1\frac{1}{2} - 1\frac{1}{2} \\ 1\frac{1}{2} - & 1\frac{1}{2} - 1^{*} \\ 0 & - & 0 \\ 1 & - & 2 \\ 1 & - & 2 \\ 1 & - & 2 \\ 0 & - & 0 \\ 1 & - & 2 \\ 0 & - & 0 \\ 0 & - & 0 \\ 3 & - & 0 \\ \hline \hline \\ 8\frac{1}{2} - 17\frac{1}{2} \end{array}$	$ \begin{array}{c} 2 = 0 \\ 0 = -26 \\ \hline 2 = -26 \end{array} $
	* Tuta	orial.		

COURSE VB-MECHANICAL ENGINEERING.

Course VB has been designed for students employed in an appropriate position in industry. The work undertaken is equivalent to that covered in Course V, but Course VB extends over seven parttime years, satisfactory completion of which, together with the necessary occupational experience, qualifies for the degree of Bachelor of Engineering (Pass or Honours).

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FIRST YEAR.

(34 weeks part-time scourse.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.41 D	Physics	11-11-11-11	11-11-1*	11-11-1+
2.111	Chemistry	2 - 1	2 - 1	2 - 1
5.11D 5.41D	Engineering Drawing } +	0 — 3*	0 3*	0 3*
10.11	Mathematics, Part I	$1\frac{1}{2}$ $\frac{1}{2}$ *	11- 1*	11 - 1*
010	English, Part I (Language)	1 0	1 0	· 1 ·0
		5 <u>3</u> — 6 <u>1</u>	53-61	5 <u>3</u> 61

* Tutorial.

† 1st Half Year-Descriptive Geometry. 2nd Half Year-Engineering Drawing

SECOND YEAR.

(34 weeks part-time course.)

	H	ours per wee	k.
	Term 1	Term 2	Term 3
	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.122D Engineering Chemistry 4.912D Engineering Metallurgy	$1 - 1\frac{1}{2}$	$1 - 1\frac{1}{2}$	$1 - 1\frac{1}{2}$
5.21D Mechanical Technology	1 — 0	1 0	1 - 0
5.22D Mechanical Technology	$1\frac{1}{2} - 0$	11-0	11 - 0
8.11D Engineering Mechanics	13-11+	0 - 0	0 - 0
8.112D. Theory of Structures	0 — 0	2 - 1 + *	1 — Ö
8.92D Properties of Materials	0 - 0	$\bar{0} - \bar{0}^{*}$	1 - 2
10.11 Mathematics. Part II	14		s11
G10 English, Part II (Literature)	1 [*] 0 [*]	$-\hat{0}^{2} - 0^{2}$	
G20B History	0 — 0	$1\frac{1}{2}$ 0	'1 1 -'0
	71-31	81-31	¹ 8 <u>1</u> ,4
	·		

* * Tutorial.

THIRD YEAR.

(34 weeks part-time course.)

	Hours per week.		
	Term 1	Term 2	Term 3
	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
5.13D Mechanical Engineering Design	0 - 3*	0 - 3*	0 - 3*
5.23D Mechanical Technology	11-0	11-0	11-0
5.32D Engineering Mechanics	1 - +*	1 +*	1
5.72D Thermodynamics	`1 1 [‡]	1 1*	·0 2
AB.83D Electrical Engineering	1	1 11	1 11
10.12 Mathematics, Part I	.1 1/2*	.1 — <u>_</u> *	1 1
	$5\frac{1}{2} - 6\frac{1}{2}$	05 <u>1</u> 081	941
	· · · · · · · · · · · · · · · · · · ·		- Contraction of the local system of the local

'FOURTH YEAR.

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(34 weeks part-time course.)

	Hours per week.		
	Term 1	Term 2	Term 3
	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
5.33D Theory of Machines	··1 1*	°1 — '1*	∃1 —‴1*
5.52 'Fluid Mechanics	<u> 1 — '∄–</u> ≩*	1 1-1*	0 — 0
5.73 Thermedynamics	1 - 0	1 _ 14*	$0 - 2\frac{1}{2}$
6.84D Electrical Engineering	<u>↓</u> 1- <u>↓</u> *	<u>↓</u> ' 1 <u>↓</u> *	; 1 11*
8.123D Structures (Theory and Design)	11 11*	1 <u>1</u> — 11*	''lījlį
8.42 Surveying	0 - 0	0 - 0	1 _ 0
	<u> </u>	5 61	4 61
	J J	<u> </u>	4 01

† Includes four six-hour periods on Saturdays for fieldwork. * Tutorial.

FIFTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
5.14 D	Mechanical Engineering Design	0 3*	0:3*	0 - 3*
5.53D	Fluid Mechanics	1 - 11-1*	1 11-1*	0 - 0
5.74d	Thermodynamics	1 1*	$1 - 1^{\tilde{*}}$	$1 - 2\frac{1}{2}$
	Seminar	$1\frac{1}{2}$ 0	$1\frac{1}{2} - 0$	0 - 0
		$3\frac{1}{2}-6\frac{1}{2}$	3 1 61	1 — 5 1
	* Tuto	orial.	· · · · · · · · · · · · · · · · · · ·	· ····································

SIXTH YEAR.

(34 weeks part-time course.)

	Hours per week.		
	Term 1	Term 2	.Term 3
	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.42D Physics		$1\frac{1}{2}$ $1\frac{1}{2}$	$2\frac{1}{2} - 1\frac{1}{2}$
1583 Mathematical Engineering	- 11 1 3 *	, i · , ž*	$1 - \frac{2}{4}*$
10.12 Mathematics, Part II	<u></u> <u></u> _} [‡] *	·1 , <u>∔</u> *	1 — ¹ / ₂ *
G8 Philosophy	120	<u>1</u> <u>4</u> 0	$1_{\frac{1}{2}} = 0$
	$\frac{1}{6-3}$.6 - 3	7 - 3
	and the second se	·	·· ———

* Tutorial.

SEVENTH YEAR.

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(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
5 .54d	Fluid Mechanics	$1 - 2^*$	1 - 2	1 1*
	Professional Elective I	1 - 2	1 - 2	0 - 0
	Professional Elective II ·	1 🛔	1 🛔	0 - 3
	Thesis Work	0 0	0 0	0 - 3
	Major Elective (Humanities)	2 - 0	2 - 0	2 - 0
		·	<u> </u>	<u> </u>
		$5 - 4\frac{1}{2}$	$5 - 4\frac{1}{2}$	$3 - 6\frac{1}{2}$

* Tutorial.

CONVERSION COURSE VC-MECHANICAL ENGINEERING.

Holders of a diploma in Mechanical Engineering who have completed the course of study set out in the current Handbook of the N.S.W. Department of Technical Education are required to complete the following additional work in order to qualify for the Bachelor of Engineering degree.

1. Satisfactorily complete the following subjects in the evening as one year courses over three terms.

	Hours per week.
Conversion Mathematics	3
Conversion Physics	3
Conversion Strength of Materials Conversion Humanities—	1
English, History or Philosophy	. 2
and/or Psychology, Economics or Government	2
	9–11

2. On completion of the work prescribed under (1) above, the student may-

- (a) enrol for the fourth year of the normal degree course less the Humanities subject and with the substitution of 8.33 Engineering Computations for 5.14 Mechanical Engineering Design or
- (b) enrol for the following programme of part-time study over two years.

FIRST YEAR.

Hours per week.

Fluid Mechanics	3
*Engineering Surveying I	ĩ
* <u>Engineering</u> , Surveying I	ŝ
TAutomatic Control Engineering	1
Engineering Computations	-
Conversion Humanities—	•
English, History or Philosophy	2
and/or Psychology, Economics or Government	2
	9-11

* Plus seven periods of six hours spent in Surveying Fieldwork.

† Subjects marked thus will be given in special evening classes for conversion students.

‡ Unless otherwise taken.

SECOND YEAR.

Hours per week.

One Professional Elective Subject	3
*Production Engineering Design	3
*Electrical Engineering	1 1
Seminars	2
	9 <u>1</u>

* Subjects marked thus will be given in special evening classes for conversion students.

Note.—A thesis will be required of conversion students. In determining its nature and content the student's diploma thesis will be taken into consideration.

SCHOOL OF ELECTRICAL ENGINEERING.

In preparation for a career in any branch of electrical engineering the student must develop a working mastery of the basic sciences of mathematics and physics. Students should realise that electrical engineering, perhaps more than most other branches of engineering, is closely linked with the pure sciences, and requires a scientific outlook and approach for a proper understanding of the problems met in electrical engineering.

There are three main branches of electrical engineering, viz:—(a) Electric Power—concerned mainly with electrical machinery, power generation, transmission and distribution and public power utilities; (b) Electronics and High Frequency—concerned mainly with radio communications, radar and other navigational devices, television, and a growing range of industrial applications and measuring instruments; (c) Line Communications—concerned with telegraph and telephone public utilities. By allowing advanced students to choose, with the approval of the Professor, two major elective subjects from a range of five, covering all three branches, the curriculum has been made flexible enough to meet the growing demands resulting from modern technological advance and to meet the student's individual needs. However, the early years of the course allow no choice, thus ensuring that all students receive a grounding in the fundamentals of circuit work, electric power work and electronics.

Further, the subject Industrial Electronics and Control is compulsory for all students. This subject is a link between electronics and electric power work covering, motor controls, servomechanisms, special machines such as amplidynes, special electronic devices such as polyphase mercury arc rectifiers, and other common subjects such as regulators, speed control, welding control, etc.

Each student is given an individual project which he studies with guidance from the staff and on which he prepares a thesis. He is encouraged to set up his own experimental apparatus and carry out his own tests. The aim is to allow the student to take responsibility for a particular job of work as he will do later in industry, and to throw upon him the necessity of designing and building a working unit. In some larger projects a number of students work as a team, individual responsibilities being allocated for each portion of the work.

Five courses are provided leading to the degree of Bachelor of Engineering (Pass or Honours):---

Course VI, a four years day course.

Course VIB, a part-time course extending over seven years.

- Conversion Course VIc1 for Associates of Sydney Technical College in both Electrical and Radio Engineering.
- Conversion Course VIc2 for Associates of Sydney Technical College in Electrical Engineering.

Conversion Course VIc3 for Associates of Sydney Technical College in Radio Engineering.

(The Conversion courses allow the completion of requirements for the degree of Bachelor of Engineering.)

COURSE VI-ELECTRICAL ENGINEERING.*

Course VI is of four years duration. The first three years of the course each require attendance at the University for twenty-four weeks. For the remainder of each of these years the student gains

^{*}Course VI was revised in 1953. The first and second years of the revised course, set out below; will operate in 1954 and later stages will be progressively introduced. Students in the third and fourth years of Course VI in 1954 will follow the course described in the 1953 Calendar.

practical experience in industry. The fourth year requires full-time day attendance for thirty-four weeks.

FIRST YEAR.

(24 weeks days course.)

		Hours per week.	
		Term 1	Term 2
		lec. lab./tut.	lec. lab./tut.
1.41	Physics	3 - 3	3 3
2.111	Chemistry	3 3	3 - 0
5.11	Engineering Drawing	0 - 3*	0 - 3*
5.21	Mechanical Technology	$2\frac{1}{2}$ 0	2 1 0
5.41	Descriptive Geometry	$1 - 2\frac{1}{4}$ *	1 — 2 1 *
8.11	Engineering Mechanics	1 1*	.1 — .1 [≆]
10.11	Mathematics	4 2*	4 — 2*
G10	English	2 - 0	2 - 0
G20.1	History	1 — 0	1 — 0
		17 <u>§</u> 14 §	$17\frac{1}{2}$ 11 $\frac{1}{2}$

* Tutorial.

SECOND .YEAR.

(24 weeks day course.)

		Hours per week.	
		Term 1	Term 2
		lec. lab./tut.	lec. lab./tut.
1.12	Physics	4 — 3	4 3
2.122	Engineering Chemistry	<u> 1 ዓ. 2</u>	$1\frac{1}{2}$ 2
4.912	Engineering Metallurgy	- 3	-
5.32	Engineering Mechanics	1 1 <u>1</u> *	$1 - 1\frac{1}{2}$ *
5.72	Thermodynamics	1 1-1*	1 - 1+1*
6.12	Electric Circuit Theory	$1\frac{1}{2} = 0$	$1\frac{1}{2}$ 2
8.112	Theory of Structures	,1 1 1*	141*
8.92	Properties of Materials	ā — 1	i — 1
10.12	Mathematics	3 – 2*	3 — 2*
G20.2	History	2 - 0	0 — 0
Gl	Logic	°0 0	2 - 0
		$16 - 12\frac{1}{2}$	$16 - 14\frac{1}{6}$

* Tutorial.

THIRD YEAR.

(24 weeks day course.)

		Hours per week.		
		Term 1	Term 2	
		lec. lab./tut.	lec. lab./tut.	
5.52	Fluid Mechanics	1 ½½*	$1 - \frac{1}{2} - \frac{1}{2}$ *	
5.73	Thermodynamics	1 1 1 - *	1 11-1*	
6.13	Electric Circuit Theory	3 - 3	3 — 0	
6.23	Electric Power Engineering	3 3	3 - 6	
6.303	Electronics	3 3	3 — 3	
10.33	Mathematics	2 - 0	2 - 0	
G2	Philosophy	2 - 0	0 0	
42	Minor Elective (Humanities)	0 — 0	2 — 0	
		15 19	15 19	
		10 -12	1012	

* Tutorial.

NOTE .- A survey camp of one week's duration will be held after the examinations at the beginning of third term.

FOURTH YEAR.

(34 weeks day course.)

First Two Terms.

Hours per week.

6.304	Two Major Elective Subjects Industrial Electronics and Control One Professional Elective Subject Major Elective (Humanities)	3 3	$\frac{14}{3}$	4 0
	-		27	

Third Term.

This term is mainly devoted to directed laboratory and research work on an approved subject, with special reading and study associated with the preparation of a thesis.

Some special lectures are given by senior engineers from the utilities or industry on problems met in practice.

Major Elective Subjects.

	• •	Hours	per week.
		lec.	lab./tut.
6.214	Electric Power Engineering A	3	4
6.224	Electric Power Engineering B	3	4
6.314	High Frequency Engineering A	4	4
6.324	High Frequency Engineering B	3	4
6.334	Line Communication Engineering	3	4

Professional Elective Subjects.

Specialised subjects will be offered as found desirable. In 1954 Electrical Measurements will be given.

Note.-Opportunity is given to final year students to attend practical wiring classes towards qualifying for an Electrician's Licence. Course VIB has been designed for students employed in appropriate positions in industry. The work undertaken is equivalent to that covered in Course VI, but Course VIB extends over seven part-time years, satisfactory completion of which, together with the necessary occupational experience, qualifies for the degree of Bachelor of Engineering (Pass or Honours).

FIRST YEAR.

(34 weeks part-time course.)

			Hours per week.		
	•		Term 1	Term 2	Term 3
			lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.41d 2.111	Physics Chemistry		$1\frac{1}{4}$ $1\frac{1}{2}$ $-\frac{1}{2}$ * 2 - 1	$1\frac{1}{2}$ $1\frac{1}{2}$ $-\frac{1}{2}$ * 2 -1	$1\frac{1}{2} - 1\frac{1}{2} - \frac{1}{3}$ *
5.11D 5.41D	Engineering Drawing Descriptive Geometry	•••••	}0 — 3 ∗	0 — 3*	0 — 3*
10.11	Mathematics, Part I	•••••••	11 <u>1</u> 1 <u>1</u> *	$1\frac{1}{2}$ $\frac{1}{2}$ *	12- 12*
			$4\frac{3}{4} \rightarrow 6\frac{1}{2}$	43-61	$4\frac{3}{4}-6\frac{1}{2}$

SECOND YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.42D 6.12 8.132D 10.11	Physics Electric Circuit Theory Materials and Structures Mathematics, Part II	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 2 & - & 1\frac{1}{2} - \frac{1}{2} * \\ 1 & - & 1 * \\ 1 & - & 1 \\ 1\frac{1}{2} - & \frac{1}{2} * \end{array}$
		$\frac{41}{2}$ 6	$4\frac{1}{2}$ 6	$5\frac{1}{2}$ $4\frac{1}{2}$

THIRD YEAR.

(34 weeks part-time course.)

		$\mathbf{H}_{\mathbf{c}}$	ours per weel	ζ.
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
5.32D	Engineering Mechanics	$1 - \frac{1}{2}$	1 - 1*	$1 - \frac{1}{1}$
0.13A 6 23A	Electric Circuit Theory	J	1 13-3	1 - 13-3
6.303A	Electronics	<u>לן – 1</u>	1 - 11-1*	1 1-1*
10.12D	Mathematics	2 - 1*	$2 - 1^*$	$2 - 1^*$
G10	English, Part I (Language)	1 — 0	1 — 0	1 - 0
		$6 - 5\frac{1}{2}$	$6 - 5\frac{1}{2}$	$6 - 5\frac{1}{3}$
	* Tut	orial.		<u></u>

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FOURTH YEARI

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(34 weeks part-time course.),

• •

		Hours, per week.		
		Term _c L	Term 2	Term 3
		lec.lab./tut.:	lee lab./tut.	lee; lab./tutn
6.13в.	Electric Circuit Theory	1 1*	1,1*	1,1*
6.23в	Electric Power Engineering	1 11-1*	1 11-1	1 - 1 - 1 - 1 * -
6.303в	Electronics	_1' 1 }i* *	° 1` 1 <u>∔</u> -∔*	1'
10.33	Mathematics	$1 - 1^{-2}$	$1 - 1^{-1}$	$1 - 1^{-1}$
G10	English, Part II (Literature)	1 0	0 — 0	0 - 0
G20b	History	0 — 0,	1 1 0	$1\frac{1}{2} - 0$
		5 - 6	5 <u>1</u> - 6	51-6

FIFTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.122D 4.912D	Engineering Chemistry Engineering Metallurgy	$1 - 1\frac{1}{2}$	$1 - 1\frac{1}{2}$	1 - 11
5.72	Thermodynamics	1 1*	1 - 1*	1 1*
6.304A	Industrial Electronics and Control	1 - 1-1*	1 1-1*	<u>ī</u> <u> </u> ī–1*
	Major Elective— (a) Power	า		
	(b) Radio	1 - 2	1 - 2	1 - 2
G8:	Philosophy	$1\frac{1}{2}-0$	$1\frac{1}{2} - 0$	1 <u>1</u> 0
		5 <u>1</u> 6 <u>1</u>	5 1	$5\frac{1}{2} - 6\frac{1}{2}$
		_	-	

SIXTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lee. lab./tut.	lec. lab./tut.	lec. lab./tut.
5.52	Fluid Mechanics	1	1	0 0
5.33d.	Theory of Machines	$0 - 0^{-1}$	1 — į̇́*́	1 — 1*
6.304в	Industrial Electronics and Control	1 - 1*	1 1*	1 - 1*
	Major Elective—			
	(a) Power	ר		
	(b) Radio	1 - 2	1 - 2	1 - 2
	(c) Line Communication.].		
	Professional Elective	1-1	1 — 1	1 1
	Major Elective (Humanities)	2 . — 0	2 — 0	2 0
				-
		6 — 5	$7 - 5\frac{1}{2}$	6 — 5

SEVENTH YEAR.

(34 weeks. part-time. course.)

	Hours per week		
	Term 1	Term 2:	Term 3
	lec. lab./tut.	lee. lab./tut.	lec. lab./tute.
Major Electives		•••	•
$(a) Power \dots$	$3 - 3 - 2^*$	332*-	3 3-2*
(a) Line Communication	3 - 4-1*	3:	3 - 4-1*
Professional Floating (Thesis)	3 3-2*	3 - 3-2*	3 - 3-2*
Toressional Elective (Inesis)	0 - 4	0 - 4	0 - 4
	3 _ 0	2. 0	2 0
	<u> </u>	9:8	3 : 9

* Tutorial.

CONVERSION COURSES—ELECTRICAL ENGINEERING.

COURSE VIc1-(For diplomates in both Electrical and Radio-Engineering).

Holders of diplomas in both Electrical and Radio Engineering; who have completed the courses of study set out in the current Handbook of the N.S.W. Department of Technical Education are required to complete the following subjects in order to qualify for the degree. of Bachelor of Engineering.

	H	ours per week
	1	or 34 weeks.
5.33 5.52	Theory of Machines Fluid Mechanics	1 <u>1</u> 1 <u>1</u>
0.0044	Industrial Electronics.	3
6.304B	Industrial Electronics.	21
G.10	English, Part I (Language)	1
G.10	English: Part II (Literature)	1 (Terran 1)
G20 b	History	11 (Torms 9 & 98)
G 8	Philosophy	11
	Major Elective (Humanities)	$\hat{2}^2$
	Professional Elective	
	Thesis	4
		19 2 20

This work would normally be completed in two years, but could be spread over a longer period.

COURSE VIc2-(For diplomates in Electrical Engineering).

Holders of a diploma in Electrical Engineering who have completed the course of study set out in the current Handbook of the N.S.W. Department of Technical Education are required to complete the following additional work for the degree of Bachelor of Engineering.

	He	ours per week
	. fo	or 34 weeks.
1.42 5.33 5.52 6.13B '6.304A 6.304B 10.33 G.10 G 10	Physics (if not already completed) fi Theory of Machines	or 34 weeks. $3\frac{1}{2}$ $1\frac{1}{2}$ 2 3 2 2 1 1 (Term 1)
G.20в	History	$1\frac{1}{2}$ (Terms 2 & 3)
G8	Philosophy	11
	Major Elective (Humanities)	2
	Professional Elective	. 2
	Thesis	. 4
		$27-27\frac{1}{2}$

This work would normally be completed in three years, but could be spread over a longer period.

COURSE VIc3-(For diplomates in Radio Engineering).

Holders of a diploma in Radio Engineering who have completed the course of study set out in the current Handbook of the N.S.W. Department of Technical Education are required to complete the following additional work for the degree of Bachelor of Engineering. Hours per week

	110	urs por wook
	fo	r 34 weeks.
2.122 4.912 5.32 5.33 5.52 6.23B 6.304A 6.304B (G.10 (G.10 (G.20B (G.8) (G.8)	Engineering Chemistry Engineering Metallurgy Engineering Mechanics Theory of Machines Fluid Mechanics Fluid Mechanics Electric Power Engineering Industrial Electronics English, Part I (Language) English, Part II (Literature) History Philosophy Major Elective (Humanities) Professional Elective	$\begin{cases} 2\frac{1}{2} \\ 2\frac{1}{2} \\ 1\frac{1}{2} \\ 1\frac{1}{2} \\ 3 \\ 2 \\ 1 \\ 1 (Term 1) \\ 1\frac{1}{2} (Terms 2 \& 3) \\ 1\frac{1}{2} \\ 2 \\ 2 \\ 4 \\ \end{cases}$
		27-272

This work would normally be completed in three years, but could be spread over a longer period.

SCHOOL OF MINING ENGINEERING AND GEOLOGY.

Four courses leading to the degree of Bachelor of Engineering (Pass or Honours) are offered in the School of Mining Engineering and Geology. The courses provided are:--

Course VII—Mining Engineering, a four years day course. Course VIIA—Applied Geology, a four years day course. Course VIIB-Applied Geology, a part-time course extending over seven years.

Conversion Course VIIC-Mining Engineering, for Associates of Sydney Technical College in Metalliferous Mining Engineering who desire to qualify for the degree of Bachelor of Engineering.

COURSE VII-MINING ENGINEERING.*

Technical developments in the mining industry are such as to demand increasing engineering proficiency from various grades of mining officials. These developments require that those who are being trained for the management of the industry shall receive firstly, a sound training in mechanical, electrical and some branches of civil engineering, and secondly, the application of these developments to the mining of coal and other minerals. A knowledge of the basic subjects, mathematics, physics, chemistry, etc., is also essential in order that such auxiliary subjects as coal cleaning, preparation of minerals, gases and atmospheric conditions in mines, etc., may be properly understood. Hence in the construction of the Mining Engineering course the object has been to produce mining engineers having a sound training in engineering subjects and well versed in the application of engineering principles in the mining industry.

In the first two years of the course, the subjects taught are the basic science subjects, together with the primary engineering subjects. Mining subjects are introduced in the second year, and are developed in the third and fourth years of the course, concurrently with the engineering subjects. Subjects which are important to mining engineers, such as surveying, preparation of minerals and geology are given their proper place in the course.

The training in mining is aimed at giving students a thorough foundation in such subjects as mine ventilation; mine drainage; mine lighting; winding, haulage and transport; these subjects being common to practically all branches of mining work. The specialised application of these subjects to coal and metalliferous mining is dealt with in the final year of the course. Thus, although the course is designed to give students a sound training in mining, it also permits them to specialise in either coal or metalliferous mining.

Specialisation is taken a stage further in the fourth year of the course by the provision of elective subjects for the preparation of theses. Preparatory work for the theses will commence during the practical training period following the third year of academic studies and will be continued by reading in the first and second

^{*}Course VII was revised in 1953. The first and second years of the revised course, set out below, will operate in 1954 and later stages will be progressively introduced. Students in the third and fourth years of Course VII in 1954 will follow the course described in the 1953 Calendar.

terms of the fourth year. The whole of the third term in the fourth year will be spent on further practical investigations and in the preparation of theses.

The students in the Mining Engineering course are required to spend five months of each year in obtaining practical experience at mines, this training being based on a prepared programme designed to provide a comprehensive training in many aspects of mining work. This training is important in its relation to the academic training and in relation to the Mines Department's requirements of practical training for candidates for Statutory Certificates of Competency.

FIRST YEAR.

(24 weeks day course.)

		Hours per week.	
		Term 1	Term 2
		lec. lab./tut.	lec. lab./tut.
1:41	Physics	3 - 3	3 3
2.111	Chemistry	3 - 3	3 0
5.11	Engineering Drawing	0 : 3*	'0 ·: 3 *
5.41	Descriptive Geometry	$1 - 2\frac{1}{2}$	$.1 - 2\frac{1}{3}$ *
7.001	Mining Processes and Practice	1 - 0	$1 - 1^{-1}$
· 8.11	Engineering Mechanics	1'1*	1 - 1*
10.11	Mathematics	4 2*	∞4 [•] 2*
G10	English	2 - 0	2 - 0
G20.1	History	1 0	1 — 0
			· • • • • • • • • • • • • • • • • • • •
		$16 - 14\frac{1}{2}$	16 12]

Note.—A survey camp of one week's duration will be conducted immediately after the examinations at the beginning of third term.

SECOND YEAR.

(24 weeks day course.)

		Hours per week.	
		'Term 1	Term 2
		lec. lab./tut.	leci lab.//tut.
.1:42	Physics	$2 - \frac{1}{2} + 1^*$	2
2.122	Engineering Chemistry	$1\frac{1}{2}-2$	$1\frac{1}{2}$ 2
4.912	Engineering Metallurgy	<u>م</u>	
5.32	Engineering Mechanics	$1 - 1\frac{1}{2}$ *	1 12*
5.72	Thermodynamics	∴ 1 1 ≁ 1 *	1 - 1-1*
7.002	Mining	3 0	· 3· · 0
7.502	Geology	2 - 1	2 - 1
8.112	Theory of Structures	1 1 1*	1 <u>1</u> 1*
. 8.92	Properties of Materials	•0 0	1 - 2
.10.12	Mathematics	·3 — .2*	$3 \rightarrow .2^*$
G20.2	History	2 - 0	0 - 0
- G1	Logic	··0 —·0	2 - 0
	0		
		17 - 12	18
8.112 8.92 10.12 G20.2 G1	Properties of Materials Mathematics	$ \begin{array}{c} 2^{2} - 0 \\ 3 - 2^{*} \\ 2 - 0 \\ 0 - 0 \\ \overline{} \\ 17 - 12 \end{array} $	$ \begin{array}{c} 1^{2} - 2 \\ 3 - 2^{*} \\ 0 - 0 \\ 2 - 0 \\ \hline 18 - 14 \end{array} $

Nore.—Field excursions will be arranged on several Saturdays in connection with the instruction in Geology.

. THIRD YEAR.

(24 weeks day course.)

		Hours per week. lec. lab./tut.		
5.52 6.83 7.003 7.013 7.553 8.122 8.43 G2	Fluid Mechanics Electrical Engineering Mining Metalliferous Mining Geology. Structures Surveying Philosophy Minor Elective (Humanities). First Aid	$\begin{array}{c} 1 - 1 \\ 2 - 3 \\ 2 \\ 2 \\ 2 \\ - 3 \\ - 2 \\ - 3 \\ - 1 - 2 \\ - 3 \\ - 1 - 2 \\ - 2 \\ - 0 \\ - 2 - 0 \\ - 2 - 0 \\ - 2 - 0 \\ - 1 - 0 \\ \hline 14\frac{1}{2} - 14 \end{array}$	(Term 1) (Term 2)	

NOTE: A survey camp of one week's duration will be conducted immediately after the examinations at the beginning of third term and will be followed by a Geology excursion also of one week's duration.

FOURTH YEAR.

(36 weeks day course.)

		Hours per week.	
		Term 1	Term 2
		lec. lab./tut.	lec. lab./tut.
7.004	Mining	$3\frac{1}{2}$ - $2\frac{1}{2}$	3 — 0
7.014	Coal Mining	2 - 3	2 - 3
7.024	Metalliferous Mining]	2 3
7.034	Coology	$\frac{2}{1} - \frac{3}{2}$	$\frac{2}{1} - \frac{3}{2}$
7.554 8.44	Surveying	2 - 2	2 - 2
	Major Elective (Humanities)	3 - 0	3 — 0
	2. Fr. •	$13\frac{1}{2}$ $-12\frac{1}{2}$	13 -10
			<u> </u>
		• •	

Note: A survey camp of one week's duration will be conducted between second and third terms. Practical work connected with Astronomy and Geodesy will be conducted on several evenings during the course. A Geology excursion will be conducted during the third term.

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COURSE VIIA-APPLIED GEOLOGY.

The development of natural resources and the allied engineering activities make essential a type of training for geologists which embraces basic geological instruction and various features of its application in practice. The structure and syllabus of this course is designed so as to enable the graduates to enter immediately upon various aspects of applied geology and to play an effective part in associated engineering practice.

In the early part of the course students receive instruction in the allied fundamental sciences and basic engineering subjects as well as introductory geology. Later geological instruction is developed and emphasis is placed progressively on engineering application and on economic aspects of geology.

The applied nature of the course is indicated by the inclusion of descriptive geometry, drawing and design, strength of materials, civil and mining engineering practice, soil mechanics, etc. Detailed treatment is given to various aspects of applied geology—engineering geology, mining geology, photogeology and geochemistry. Surveying and geophysics are also included.

Attendance at the University for students taking the full-time course is for two terms during the first three years and for three terms during the fourth year. All students will be required to complete satisfactorily a course of approved practical training during vacations. The part-time course (Course VIIB) is of six years duration and is designed for students already engaged on work allied to the subject matter of the course.

FIRST YEAR.

(24 weeks day course.)

		Hours per week.	
		Term 1	Term 2
		lec. lab./tut.	lec. lab./tut.
1.41	Physics	3 - 3	3 3
2.111	Chemistry	3 - 3	3 - 0
5.11	Engineering Drawing and Materials	0 3*	0 3*
5.41	Descriptive Geometry	1 - 2	1 - 23*
7.001	Mining Processes and Practice	$0 - 0^{\circ}$	$0 - 2\frac{1}{4}$
10.11	Mathematics	4 - 2*	$4 - 2^{*}$
G10	English	2 - 0	2 - 0
G20.1	History	1 - 0	1 0
			<u> </u>
		$14 - 13\frac{1}{2}$	14 -13

*Tutorial.

SECOND YEAR.

(24 weeks day course.)

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		Hours per week.	
		Term 1	Term 2
		lec. lab./tut.	lec. lab./tut.
1.42	Physics	$2 - 1\frac{1}{2} - 1^*$	$2 - \frac{11}{2} - 1^*$
2.32A	Physical Chemistry	2 - 0	1 - 2
2.52	Quantitative Analysis	1 3	1 - 3
7.052	Mining Engineering Practice	2 - 0	2 - 0
7 502	Geology	2 - 1	2 - 1
0 19	Quaraving	$1\frac{1}{2}$ 2	$1\frac{1}{2}$ 2
0.40	Mathematica	3 - 2*	3 2*
10.12	Mathematics	0 <u> </u>	$\bar{2} - \bar{0}$
GI	Log10	2 0	ā — ð
G20.2	History	2 0	0-0
		$15\frac{1}{2}-10\frac{1}{2}$	$14\frac{1}{2}$ 12 $\frac{1}{2}$

NOTE: Six geological excursions will be held on Saturdays during first and second terms.

A survey camp of one week's duration will be conducted after the examinations at the end of second term.

THIRD YEAR.

(24 weeks day course.)

		Hours pe	er week.
		Term 1	Term 2
		lec. lab./tut.	lec. lab./tut.
7.034	Preparation of Minerals	$\frac{2}{2} - \frac{2}{2}$	$\frac{1}{2} - \frac{3}{2}$
7.503	Petrology	2 - 3	4 - 3
7.513	Mineralogy and Crystallography	1 - 3	1 - 3
7.523	Stratigraphy and Palaentology	1 - 3	1 3
7.533	Economic Geology	2 - 2	2 - 2
7.543	Geophysics and Geotectonics	1 - 2	1 - 2
8.634	Engineering Construction	1 - 0	1 - 0
8 731	Soil Mechanics and Hydrology	$1 - 1\frac{1}{2}$	1 — 0
G 2	Philosophy	2 - 0	0 - 0
Q2	Minor Elective (Humanities)	0 - 0	2 - 0
		$13 - 16\frac{1}{2}$	12 - 16

Field Instruction.

(i) One week of general surveying will be taken with the Mining and Civil Engineering III students.

- (ii) One week of geological surveying.
- (iii) Week-end field work on geophysical surveying.

* Tutorial.

FOURTH YEAR.

(34 weeks day course.)

	· ·	Hours per week.	
	·	Term 1	Term 2
		lec. lab./tut.	lec. lab./tut.
7.504	Advanced Mineralogy and Petrology	1 - 2	0 0
7.514	Mining Geology	<u>ן</u> ב	
	Mineral Economics	2 - 2	3 — 3
	Mine Valuation	1	
7.524	Photogrammetry, Photogeology and Military		
	Geology	1 - 3	0 - 0
7.534	Advanced Engineering Geology	2 - 2	0 0
7.544	Geology of Fuels	2 - 2	0 <u> </u>
8.641	Engineering Administration	1 0	0 0
	Elective Subjects	0 - 0	2 - 6
	Major Elective (Humanities)	3 — 0	3 - 0
		·	
		12	8 — 9
			-

THIRD TERM.

Mainly devoted to advanced study in Professional Elective subjects and to the preparation of a thesis.

Field Work: Excursions to mining centres, dam sites, etc.

Seminars: To be arranged during the course of the year.

Professional Elective Subjects: The formal lectures and laboratory hours included in the fourth year will be supplemented by a study of some selected phase of the course to an advanced stage, and the preparation of a thesis.

Elective subjects include:

- 1. Industrial Mineralogy and Petrology.
- 2. Structural Geology and Geophysics.
- 3. Mining and Economic Geology.
- 4. Engineering Geology.

COURSE VIIB-APPLIED GEOLOGY.

Course VIIB has been designed for students already employed in an appropriate position in industry. The work undertaken is equivalent to that covered in Course VIIA, but Course VIIB extends over six part-time years, satisfactory completion of which, together with the necessary occupational experience, qualifies for the degree of Bachelor of Engineering.

FIRST YEAR.

(34 weeks part-time course.)

2

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut
1.41D 2.111 5.11D 5.41D 10.11 G10	Physics Chemistry Engineering Drawing Descriptive Geometry Mathematics, Part I English, Part I (Language)	$\begin{array}{c} 1\frac{1}{2} - 1\frac{1}{2} - \frac{1}{2} \\ 2 - 1 \\ 0 - 1\frac{1}{2} \\ 0 - 1\frac{1}{2} \\ 1\frac{1}{2} \\ 1\frac{1}{2} \\ 1 - 0 \\ \hline 5\frac{1}{2} - 6\frac{1}{2} \end{array}$	$\begin{array}{c} 1\frac{1}{4} - 1\frac{1}{2} - \frac{1}{2} \\ 2 - 1 \\ 0 - 1\frac{1}{2} \\ 1\frac{1}{2} - \frac{1}{2} \\ 1\frac{1}{2} - \frac{1}{2} \\ 1 - 0 \\ \hline 5\frac{1}{2} - 6\frac{1}{2} \end{array}$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
			the second s	

SECOND YEAR.

(34 weeks part-time course.)

<i>*</i> .		Ho Term 1 lec. lab./tut.	ours per week Term 2 lec. lab./tut.	Term 3 lec. lab./tut _.
2.32 2.52 7.502 8.43D 10.11 G10 G20B	Physical Chemistry Quantitative Analysis Geology Surveying Mathematics, Part II English, Part II (Literature) History	$\begin{cases} 2 - 2\frac{1}{2} \\ 1 - 1 \\ 1 - 0 \\ 1\frac{1}{2} - \frac{1}{2} \\ 1 - 0 \\ 0 - 0 \\ \hline \frac{6\frac{1}{2} - 4}{6\frac{1}{2} - 4} \end{cases}$	$\begin{array}{c} 2 - 2\frac{1}{2} \\ 1 - 1 \\ 1 - 0 \\ 1\frac{1}{2} - \frac{1}{2} \\ 0 - 0 \\ 1\frac{1}{2} - 0 \\ 1\frac{1}{2} - 0 \\ \hline 7 - 4 \end{array}$	$\begin{array}{c} 2 - 2\frac{1}{2} \\ 2 - 0 \\ 1 - 0 \\ 1\frac{1}{2} - \frac{1}{2} \\ 0 - 0 \\ 1\frac{1}{2} - 0 \\ \hline 8 - 3 \end{array}$

NOTE: Six geological excursions will be held on Saturdays during first and second terms.

A survey camp of one week's duration will be conducted after the examinations at the end of second term.

THIRD YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
•		lec. lab./tut.	1ec. 1ab./tut.	1 11.1*
1.42D	Physics	$1 - 1_{2-2}$	$1 - 1_{2-2}$	$1 - 1_{2-2}$ 1 - 0
7.21 7.503A	Petrology	$1^{\tilde{1}-2}$	1 — 2	1 - 2
7.523▲	Stratigraphy and Palaeontology	ر ا ــــ ا	1 - 2	1 - 2
7.513	Mathematics, Part I	$1 - \frac{1}{2}*$	$1 - \frac{1}{2}*$	$1 - \frac{1}{2}^*$
		5 - 6	5 - 61	$5 - 6\frac{1}{4}$
		U = U	2	

· * Tutorial.

FOURTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut
7.052	Mining Engineering Practice	1 - 0	1 - 1	0 - 1
7.503в	Petrology	ົ້		• •
7.504	Advanced Mineralogy and	1 - 2	1 2	1 - 2
_	Petrology			
7.523в	Stratigraphy and Palaeontology	í 1 — 3	0 - 0	0 0
7.533⊾	Economic Geology	0 - 0	0 <u> </u>	1 <u> </u>
7.543∡	Geophysics and Geotectonics	0 0	1 - 2	ō — ō
7.544	Geology of Fuels	0 - 0	$\overline{1} - \overline{1}$	1 — 1
10.12	Mathematics, Part II	$1 - \frac{1}{2}*$	$1 - \frac{1}{2}*$	1 — ½*
		$4 - 5\frac{1}{2}$	$5 - 6\frac{1}{2}$	$4 - 5\frac{1}{2}$

* Tutorial.

FIFTH YEAR.

(34 weeks part-time course.)

		H	ours per weel	k.
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
7.524	Photogrammetry	ר ר		
	Photogeology	>0 - 0	1 1	1 - 1
	Military geology)		
7.533в	Economic Geology	2 - 2	1 - 1	0 - 0
7.543в	Geophysics and Geotectonics	0 - 0	0 - 0	1 - 2
7.64	Preparation of Minerals	1 - 2	1 - 2	1 - 2
8.63⊾	Engineering Construction	1 - 0	1 - 0	1 - 0
8.641	Engineering Administration	1 0	0 - 0	0 — 0
8.73D	Soil Mechanics	1 - 0	1 - 0	1 — 0
∽. G 8	Philosophy	$1\frac{1}{2} - 0$	$1\frac{1}{2} - 0$	$1\frac{1}{2} = 0$
		71 4	61 4	<u>e1</u>
		12 4	U <u>ĝ</u> 4	0 <u>‡</u> — 0

SIXTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
7.514	Mining Geology	ר	-	•
	Mineral Economics	2 - 2	2 - 2	1 1
7.534	Advanced Engineering Coology	J , ,	, ,	0 0
	Major Electives (Humanities)	1 = 1 2 = 0	1 = 1 2 = 0	
	Electives and Thesis†	ī ž	$\tilde{1} = \tilde{2}$	8
		<u> </u>		
		0 — 0	v — 5	12

For details see page 132.

CONVERSION COURSE VIIC-MINING ENGINEERING.

Holders of a diploma in Metalliferous Mining Engineering who have completed the course of study given at Broken Hill as set out in the 1953 Handbook of the New South Wales Department of Technical Education are required to complete the following additional work:-

Satisfactorily complete-

Diploma Mathematics II, after which they will be permitted to enter a two-year full-time course under the Professor of Mining Engineering at Sydney.

This requires attendance in Sydney full-time from March to September in the first year, after which they will return to work in the mines till the following March. The second year requires full-time attendance in Sydney from March to November.

The syllabus of work for the first year of this two-year course will consist of some of the normal degree course second-year

Hours per week.

1.42	Physics (Exemption may be granted if the student has com- pleted Diploma Physics II.)	4½ 3
8.122	Structures	3
5.53	Fluid Mechanics	2
7.002	Mining	5
7.003	Mining	5
10.12	Mathematics	
	Conversion Humanities—	2
	English, History or Philosophy	2
	and Psychology, Economics or Government	
		$26\frac{1}{2}$

The second year syllabus will be the normal course set out for the fourth year of the degree course, less the Humanities subject.

SCHOOL OF CIVIL ENGINEERING.

Three courses leading to the degree of Bachelor of Engineering (Pass or Honours) are offered in the School of Civil Engineering. The courses provided are:

- COURSE VIII, requiring four years' day attendance at the University, and including three periods of practical training in industry.
- COURSE VIIIB, requiring seven years' part-time attendance, together with at least three years of satisfactory experience in industry.
- COURSE VIIIc, for Associates of Sydney Technical College in Civil Engineering. This course may be completed by three years' part-time study, or by one year's part-time and one year's full-time study.

Satisfactory practical experience in industry, concurrent with academic training, is a feature of all courses, and detailed reports of such experience must be submitted by all degree students.

COURSE VIII-CIVIL ENGINEERING*

Civil Engineering is broad in its scope, utilizing other specialised branches of engineering in planning, co-ordinating and constructing national works such as water supply and conservation projects, hydro-electric development, roads, railways, bridges, tunnels, large buildings, and irrigation, sewerage and harbour and river development. The Civil Engineer adapts the forces of nature for the use and convenience of mankind. His academic training must include a study of science and of engineering practice. He must combine this with experience and judgment and the knowledge and personality necessary to control large organisations of workers. This profession offers to a young man a considerable variety of types of work, ranging from specialised research and investigations, through routine design and construction work to higher positions which are often largely managerial and organizational in their nature.

The course in Civil Engineering is arranged so that all students receive training in the basic principles of mathematics and science, and in the fundamentals of engineering applications of such work to surveying, hydraulics, foundation engineering, structural design, and constructional work in the field. Ancillary subjects from other branches of engineering are also included, such as electrical engineering, mechanical engineering, engineering chemistry and the like.

Included in the final year is provision for the student to carry out further work adapted to his special interests by electing one of the following options:--

OPTION I.-Civil Engineering Design.

Emphasis is given to the design aspects of civil engineering works which follow upon the initial survey and investigation and precede the actual construction of the project.

OPTION II.-Civil Engineering Construction and Administration.

The attention of the student is directed to the problems associated with the actual construction of major civil engineering projects of all types such as the planning of construction methods and the study of administrative, social and economic aspects of major projects.

^{*}Course VIII was revised in 1953. The first and second years of the revised course, set out below, will operate in 1954 and later stages will be progressively introduced. Students in the third and fourth years of Course VIII in 1954 will follow the course described in the 1953 Calendar.

OPTION III.-Surveys and Investigations.

Stress is laid in this option upon the preliminary investigation necessary for large civil engineering projects with special study of such subjects as photogrammetry, hydrology, soil mechanics and geology.

OPTION IV.-Materials.

The study of both the fundamentals of material behaviour and the experimental analysis of engineering materials and structures is a rapidly expanding branch of applied science. This option deals with the civil engineering aspects of this field.

FIRST YEAR.

(24 weeks day course.)

		Hours pe	er week.
		Term 1	Term 2
		lec. lab./tut.	lec. lab./tut.
1.41	Physics	3 3	3 — 3
2.111	Chemistry	3 — 3	3 - 0
5.11	Engineering Drawing	0 3*	0 — 3*
5.41	Descriptive Geometry	1 - 23*	1 - 21*
8.11	Engineering Mechanics	1 - 1*	1 1*
10.11	Mathematics	4 - 2*	4 - 2*
G10	English	2 - 0	2 - 0
G20.1	History	1 - 0	1 - 0
		<u> </u>	······································
		$15 - 14\frac{1}{2}$	$15 - 11\frac{1}{2}$

* Tutorial.

NOTE:—A survey camp of one week's duration must be attended after the examinations at the end of the second term and before the student commences his practical experience. Cadets in permanent employment may be exempted from the camp.

	Second	YEAR.	
101			`

	(24 weeks day course.))	1
		Hours p	er week.
		Term 1	Term 2
		lec. lab./tut.	lec. lab./tut.
1.42	Physics	$2 - 1 - 1^*$	2 - 1 - 1 + 1 + 1
2.122	Engineering Chemistry		11 0
4.912	Engineering Metallurgy	$\int 1^{\frac{1}{2}} - 4$	1 <u>2</u> — 2
5.12	Mechanical Engineering Design	1 2	1 - 2
5.72	Thermodynamics	1 1-1*	1 - 1-1*
7.502	Geology.	2 - 1	2 - 1
8.112	Theory of Structures	11-1*	11-1*
8.122	Structures	1 - 2	1_2
8.92 ·	Properties of Materials	1 - 2	0 - 0
l0.12	Mathematics	3 - 2*	3 - 2*
GI	Logic	0 - 0	$2 - \bar{0}$
G20.2	History	2 - 0	0 - 0
	•	<u> </u>	
		16 - 161	15141

* Tutorial.

Note:-Field excursions will be arranged on several Saturdays in connection with the instruction in Geology.

THIRD YEAR.

(24 weeks day course.)

.

		Hours pe	er week.
		Term 1	Term 2
		lec. lab./tut.	lec. lab./tut.
6.83	Electrical Engineering	1 — 3-1*	1 3-1*
8.113	Structures	$1\frac{1}{2}$ 2	$1\frac{1}{2}$ - 2
8.23	Materials of Construction	2 - 2	2 - 2
8.33	Engineering Computations	$1\frac{1}{2} - 0$	$1\frac{1}{2} = 0$
8.43	Surveying	$1\frac{1}{2} - 2$	$1\frac{1}{2}-2$
8.53	Fluid Mechanics	2^{-1}_{2}	$2 - 1\frac{1}{2}$
8.63A	Engineering Construction	$1 - 0^{-}$	1 - 0
8.63B	Hydrology	$1\frac{1}{2} = 0$	0 - 0
8.73	Soil Mechanics	$1 - 1\frac{1}{2}$	$1 - 1\frac{1}{2}$
8.93	Properties of Materials	0 0	$1 - 2^{-}$
10.43	Mathematics	$1\frac{1}{2} = 0$	$1\frac{1}{2} - 0$
G2	Philosophy	2 - 0	00
u 2	Minor Elective (Humanities)	0 — 0	2 - 0
			<u> </u>
		$16\frac{1}{2}$ —13	16 - 15
			····

* Tutorial.

NOTE:—A survey camp and geology camp, each of one week's duration, must be attended at the end of first or second term.

FOURTH YEAR.

(34 weeks day course.)

		Hours p	er week.
		Term 1	Term 2
		lec. lab./tut.	lec. lab./tut.
8.114	Structures	2 - 3	2 - 3
8.44	Surveying	2 - 2	2 - 2
8.54	Applied Hydraulics	1 1*	$1 - 1^*$
8.64a	Public Health Engineering	1 0	1 - 0
8.64p	Road Engineering	1 - 0	1 - 0
8.64E	Railway Engineering	1 - 0	0 - 0
8.64F	Harbours and Rivers Engineering	0 — 0	1 0
8.640	Irrigation Engineering	1 — 0	0 0
8.64H	Hydro-Electric Engineering	0 0	1 - 0
8.64T	Engineering Administration	1 - 0	0 0
8.84	Town and Country Planning	2 - 0	0 - 2
11.82A	Theory of Architecture	One hour	per week 3rd
		term.	1
		Six hours	per week for
	Flective A	3 terms	consisting of
	Elective R	2 hours	lecture and
		1 4 hours	laboratory.
		drawing	office or
		tutorial	011100 01
	Major Floating (Humanitica)	3 - 0	3 — 0
	major Elective (Irumannies)	0 = 0	<u> </u>
		1710	14 _12
		110	

* Tutorial.

Note:---A survey camp of one week's duration must be attended between second and third term.

THIRD TERM.

Mainly devoted to directed laboratory and research work on Professional Elective Subjects, with special reading and study associated with the preparation of a thesis. Each student will also read a paper in a seminar session.

Professional Elective Subjects.

Throughout fourth year each student is required to pursue work adapted to his special interest and abilities by electing to take one of the following options. Within each option the student is required to select two subjects with the approval of the Head of the School. The work in these electives will be mainly carried out on the tutor system. Students may be instructed to attend certain lectures given by learned societies and other educational authorities during the year. The electives within each option are as follows:—

Option 1-Civil Engineering Design.

- (a) Theory and Design of Structures.
- (b) Soil Mechanics and Foundation Engineering.
- (c) Hydrology and Hydraulics.
- (d) Advanced Mathematics.
- (e) Modern Foreign Language.

Option 2-Civil Engineering Construction and Administration.

- (a) Construction Equipment and Methods.
- (b) Geology.
- (c) Management.
- (d) Road Engineering.
- (e) Public Health Engineering.

Option 3—Surveys and Investigations.

- (a) Astronomy and Geodesy.
- (b) Topographical Surveying, Aerial Surveying and Photogrammetry.
- (c) Soil Mechanics.
- (d) Hydrology and Hydraulics.
- (e) Geology.

Option 4—Materials.

- (a) Soil Mechanics.
- (b) Concrete Technology.
- (c) Advanced Mechanics of Materials.
- (d) Photoelasticity and Experimental Stress Analysis.
- (e) Advanced Mathematics.
- (f) Modern Foreign Language.

COURSE VILLB-CIVIL ENGINEERING.

This course provides students who are suitably employed during the day with the opportunity of obtaining the degree of Bachelor of Engineering by seven years of evening study.

The total content of the course is the same as that of the day course except that slightly less formal class time is provided in certain subjects in which the student's study is supplemented by his practical experience in industry.

FIRST YEAR.

1

(34 weeks part-time course.)

Hours per week.			ζ.	
		Term 1	Term 2	Term 3
•		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.41D 2.111	Physics Chemistry	$1\frac{1}{4} - 1\frac{1}{2} - \frac{1}{2}^*$ 2 - 1	$1\frac{1}{2} - 1\frac{1}{2} - \frac{1}{2}$ *	$1\frac{1}{2}$ - $1\frac{1}{2}$ - $\frac{1}{2}$ * 2 - 1
5.11p 5.41p	Engineering Drawing Descriptive Geometryt	}0 — 3*⊡	0 3*	0 3*
10.11 G10	Mathematics, Part I English, Part I (Language)	$1\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	$1\frac{1}{2}$ $ \frac{1}{2}$ * 1 $ 0$	$1\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
		5 <u>3</u> — 6 <u>1</u>	53-61	$5\frac{3}{4}$ - $6\frac{1}{2}$

† First half year—Descriptive Geometry. Second half year—Engineering Drawing.

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SECOND YEAR.

(34 weeks part-time course.)

	Hours per week.		
	Term 1	Term 2	Term 3
	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.122b Engineering Chemistry	\ I I]	$1 - 1\frac{1}{2}$	$1 - 1\frac{1}{2}$
4.912p Engineering Metallurgy		•	
7.502 Geology	2 - 0	1 1	1 - 1
8.11p Engineering Mechanics	11 11*	0 — 0	0 - 0
8.112p Theory of Structures	0 – 0	$2 - 1\frac{1}{2}$ *	1 - 0
10 11 Mathematics. Part II	11- 1*	1i ĩ*	1 1 - 1 +
G10 English, Part II (Literature)	1 - 0	0 0	0 - 0
G20B History	0 - 0	$1\frac{1}{2} - 0$	$1\frac{1}{2}-0$
	7 91	7 41	6 - 3
	$1 - 3\frac{1}{2}$	7 42	0-0

NOTE:-Field excursions will be arranged on several Saturdays in connection with instruction in Geology.

THIRD YEAR. (34 weeks part-time course.)

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	1 () () () () () () () () () (11 IS IS 1 I S AND	1	
		H	ours per weel	۲.
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
5.12n	Mechanical Engineering Design	0 - 3	$0 - 3(\frac{1}{2}$ te	rm) 0 — 0
5 72n	Thermodynamics	1 1	1 - 1	0 - 2
8,122	Structures	1 1	1 — 1	1 - 1
8.43n	Surveying	1 — 0	1 - 0	1 0
8.92n	Properties of Materials	0 - 0	0 — 0	1 - 2
10.12	Mathematics. Part I	1 ½*	$1 - \frac{1}{2}^*$	$1 - \frac{1}{2}$ *
G8	Philosophy	$1\frac{1}{2}$ 0 ⁻	$1\frac{1}{2}$ 0	$1\frac{1}{2} - 0$
		<u> </u>	<u>51 91 51</u>	51 - 51
		0 <u>∲</u> — 0 <u>†</u>	0 <u>2</u> -2 <u>2</u> -0 <u>7</u>	

NOTE:-Seven Saturdays (a total of 42 hours) will be devoted to Surveying field work. Alternatively, the survey camp of one week's duration to be held between second and third term may be attended.

FOURTH YEAR.

(34 weeks part-time course.)

		\mathbf{H}	ours per weel	κ.
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
8 1 1 3	Structures	$1 - 1\frac{1}{2}$	$1 - 1\frac{1}{2}$	$1 - 1\frac{1}{2}$
8 93n	Materials of Construction	1 1	$1 - 1\frac{1}{2}$	$1 - 1\frac{1}{2}$
8 53	Fluid Mechanics	$2\frac{1}{2} - 0$	$2 - 1\frac{1}{2}$	$0 - 1\frac{1}{2}$
8 63	Engineering Construction	1 - 0	1 - 0	0 - 0
8 73n	Soil Mechanics	1 - 0	1 - 0	0 - 3
10 43	Mathematics	1 0	1 — 0	1 - 0
10.10				_
		$7\frac{1}{2}$ - 3	$7 - 4\frac{1}{2}$	$3 - 7\frac{1}{2}$

FIFTH YEAR.

(34 weeks part-time course.)

		He	ours per week	ς.
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
6.83D	Electrical Engineering	1 11	$1 - 1\frac{1}{2}$	$1 - 1\frac{1}{2}$
8.63B	Hvdrology	1 <u>1</u> 0	0 - 0	0 - 0
8 640	Public Health Engineering	0 0	1 0	1 0
8 64 n	Road Engineering	0 - 0	1 — 0	1 - 0
8 64 F	Railway Engineering	1 0	0 - 0	0 = 0
8 64 m	Harbours and Rivers Engineering	1 - 0	0 - 0	0 0
8 64 a	Irrigation Engineering	0 - 0	0 0	1 0
8 64m	Hydro-Floetrie Engineering	1 - 0	0 - 0	0 = 0
0.041	Engineering Administration	0 - 0	1 — 0	0 — 0
0.041	Town and Country Planning	2 - 0	0 - 2	0 - 0
0.04	Demontion of Materiala	õ õ	0 — 0	1 - 2
8.93D	Properties of Materials	1 0	1 <u>0</u>	1 - 0
	Seminar	1		
		$8\frac{1}{2} - 1\frac{1}{2}$	$5 - 3\frac{1}{2}$	$6 - 3\frac{1}{2}$
•				

* Tutorial.

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SIXIH YEAR.

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(34 weeks part-time course.)

		H	ours per weel	k.
		Term 1	Term 2	Term 3.
		lec. lab./tut.	lec. lab./tut.	lec. lab. tut.
1.42D	Physics	1 - 2	1 - 2'	2 - 2
8.44d	Surveying] <u>}</u> — 0	$1\frac{1}{2} - 0$	11-0
8.54	Applied Hydraulics	$l_{\frac{1}{2}} = 0$	1 1*	1 0
10.12	Mathematics, Part II	1 ½*]{i*	1 1/2*
	Major Elective (Humanities)	2 - 0	$2 - 0^{-}$	2 - 0
		$7 - 2\frac{1}{2}$	$6_{2}^{\prime} - 3_{2}^{\prime}$	$7\frac{1}{2}$ 2 $\frac{1}{2}$

NOTE:—Seven Saturdays (a total of 42 hours) will be devoted to Surveying field work. In addition, the survey camp of one week's duration to be held between second and third terms must be attended.

SEVENTII YEAR.

(34 weeks part-time course.)

		nours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
8.114	Structures	2 - 1	2 - 1	$2 - 1'_{1}$
8.33	Engineering Computations	$1 - 0^{-1}$	1 0	1 - 0
	Elective A	1 2	1 - 2	1 - 2
	Elective B	1 - 2	1 - 2	1 - 2
	Thesis	0 3	0 3	0 - 3
		о — 8 1	$5 - \frac{81}{2}$	$5 - 8\frac{1}{2}$

* Tutorial.

CONVERSION COURSE VIIIc1-CIVIL ENGINEERING.

Holders of the diploma in Civil Engineering granted by the N.S.W. Department of Technical Education, who wish to proceed to the degree of Bachelor of Engineering may qualify upon satisfactory completion of the following conversion course.

FIRST YEAR.

(34 weeks evening course.)

Hours per week.		
Term 1	Term 2	Term 3
len. lab./tut.	lee. lab./tut.	lec. lab./tut.
11-11	11-11	11- 11
1 0	1 0	$1^{2} - 0^{2}$
0 - 3	0 — 0	$\overline{0} - 0$
0 - 0	0 - 2	0 - 2
3 0	3 - 0	3 - 0
2 - 0	2 - 0	2 - 0
•		
$6\frac{1}{2}-7\frac{1}{2}-4\frac{1}{2}$	$6\frac{1}{2}$ 7 $\frac{1}{2}$ 3 $\frac{1}{2}$	$6\frac{1}{2}-7\frac{1}{2}-3\frac{1}{2}$
	H Term 1 lec. lab./tut. $1\frac{1}{2} - 1\frac{1}{2}$ 1 - 0 0 - 3 0 - 0 3 - 0 2 - 0 $6\frac{1}{2} - 7\frac{1}{2} - 4\frac{1}{2}$	Hours per weel Term 1 Term 2 lec. lab./tut. lec. lab./tut. $1\frac{1}{2} - 1\frac{1}{2}$ $1\frac{1}{2} - 1\frac{1}{2}$ 1 - 0 $1 - 00 - 3$ $0 - 00 - 23 - 0$ $3 - 0\frac{2 - 0}{6\frac{1}{2} - 7\frac{1}{2} - 4\frac{1}{2}} \frac{2 - 0}{6\frac{1}{2} - 7\frac{1}{2} - 3\frac{1}{2}}$

† Students may be exempted from this subject on the basis of their performance in the subject of Engineering Design, provided such subject was taken under the revised syllabus (1947 and subsequently).

SECOND YEAR.

(34 weeks evening course.)

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	н	ours per weel	Κ.
	Term 1	Term 2	Term 3
	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
The sine computations	1 0	1 0	1 - 0
Applied Hydraulics	$\bar{1} - 0$	1 0	1 0
Railways, Irrigation and Harbours and Rivers	$1\frac{1}{2} = 0$	$1\frac{1}{2}-0$	$1\frac{1}{2}$ 0
Public Health Engineering and Hydrology*	$1\frac{1}{2} - 0$	$1\frac{1}{2} - 0$	11 - 0 11 - 0
Road Engineering	$\frac{1}{2} = 0$	$\hat{0}^2 - 2$	0 _ 0
Town Planning	0 - 0	1 - 0	0 0
Engineering Administration	1 - 0	0 0	0 0
Mathematics	1 0	1 - 0	1 - 0
Conversion Humanities (Psy-			
chology, Economics or Govern- ment)	2 - 0	2 - 0	2 - 0
	9 0	9	8 0
	0 0	-	

* Students will be exempted from corresponding subjects completed in the diploma course. The total of hours shown is based upon 50 per cent. exemption. In addition to the above, students will be required to attend certain lectures and carry out certain assignments in 8.44 Surveying and 9.114 Structures.

THIRD YEAR.

(34 weeks evening course.)

	Hours per week.		
	Term 1	Term 2	Term 3
	lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
The set Materials	1 2	0 - 0	0 — 0
Properties of Maserials	1 - 2	1 - 2	1 - 2
Flective B	1 2	1 - 2	1 - 2
Thesis	0 - 3	0 - 3	0 - 3
	<u> </u>		
	3 - 9	2 - 7	2 - 7
			······

NOTE:--Students who have completed the first year of the evening conversion course may attend for 34 weeks full-time in the following year and complete in one year of day study the work of the second and third years of the evening conversion course.

SCHOOL OF WOOL TECHNOLOGY.

To meet a potential threat from cheaply produced man-made fibres, wool producers, by the implementation of the Wool Use Promotion Act of 1945 and subsequent legislation, have taken decisive action to change from the empirical development of Australia's pastoral resources. A programme of planned improvement of efficiency
through research, increased extension services, and adequate publicity for wool is already under way. The full development of this plan will require specialist personnel trained to give service to the pastoral industry.

In the past, research workers, teachers, extension workers, agricultural journalists, valuers, managers of estates and other professional workers for the pastoral industry, have been in part drawn from university courses in traditional subjects such as Pure Science, Engineering, Agriculture and Veterinary Science. More often, their training has been at Diploma and Certificate level in agricultural and technical colleges without matriculation standard of entry. In far too many cases senior workers have had no opportunity for tertiary education, and their knowledge, usually highly specialised, comes from long practical experience and from personal contacts inthe industry. This is especially true in the field of Wool Commerce, where men aspiring to the highest positions in wool broking and wool buying must get a substantial part of their training outside of formal instruction, or spend a year or more in an overseas wool centre such as Bradford, Leeds or Boston.

The course aims to provide a pool of graduates in whom has been inculcated a liberal scientific outlook, and the habit of exact and logical thought. These men will be familiar with the latest developments in fields relating to wool production, wool commerce, and wool utilisation. They will also be good practical wool men, capable of handling wool and recognising its technical characteristics, through facility in the use of subjective appraisal on which the whole wool trade is based. A recent report, prepared by an expert of the Australian Wool Realisation Commission, emphasises the lack of sufficient liaison between experts in wool growing, the selling of wool and wool manufacture, and personnel of scientific organisations. One broad aim of this course is to link producers, buyers and users of wool. Trainees, for example, will be given opportunity, on machines of the Textile Department, of following particular lots of wool through all processing operations, and observing for themselves the effect in manufacture of characteristics apparent in the raw material.

The course consists of four years full-time study, but the second and third years each provide for a period of approximately six months approved work in the industry to gain practical experience.

The first year of the course consists of a basic training in general science; vocational subjects essential to all branches of the wool industry are given in the second and third years, and in the final year provision is made for students who wish to specialise in either wool production or wool commerce. The fourth year work will include a project which will give each student opportunity to express initiative and originality. By association with lecturers and teachers who are engaged in research already under way in this School, we aim to provoke both curiosity and interest in students who will themselves spend effort in contributing to the advance of efficiency. The greater part of the first and second year work will be common to the degree in Textile Technology when this is established.

Requirements for Industrial Training.

Each student is required to complete satisfactorily twelve months^{*} practical work on approved sheep properties. The twelve months need not necessarily be consecutive, and in the case of a student who has done practical work before entering the course this may be taken into consideration in determining any further time required.

In order to obtain recognition of practical work carried out, students shall:---

1. Make application for the approval of properties where they intend to carry out the required practical work, such application to contain a brief description of the property and to be in the hands of the Head of the School at the earliest possible date. Students should endeavour to obtain experience on extensive, marginal and intensive properties.

2. At the conclusion of the work, produce certificates from employers stating periods of employment and reporting on the quality of the student's work.

3. Supply reports as hereunder:

- (i) On work carried out in the long vacation—
 - (a) Monthly interim reports setting out briefly the nature of work engaged in, with any notes of topical interest. The first interim report shall include a description of the property, including details of farm buildings, dip and yards, plant and equipment, stock numbers (in age and sex groups), and such features as water supplies, improved pastures, crops, etc. A sketch plan of the property should also be included.
 - (b) A final report to be submitted within a month of resumption of lectures. The final report should embody a report on a district basis in general and the property on which the student has worked in particular. The development of farming practices, the salient features of management in relation

to the environment, pasturage, rainfall and distribution, water supplies, types of stock and breeding policies, statistics, etc., should receive consideration. The size and capacity of the farm buildings should be given particular note, and sketch plans with the principal measurements will be of value. Photographs will also be of value in illustrating features. Where applicable, details of pasture mixtures, rate of sowing for crops and manurial treatment should be recorded, as should also labour performances (both manual and with machines) and costs.

(ii) On work carried out in short vacations—A brief report to be submitted within one week of the resumption of the term.

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- (iii) By students who carry out twelve consecutive months on a property or properties—
 - (a) Interim reports to be submitted every two months.
 - (b) Final reports to be submitted by 31st March in the year of resumption of studies. The nature of the interim and final reports shall be as required for work carried out in the long vacation.

Note: Students will find that a loose-leaf notebook suitably indexed will be of great value for recording factual material, costs, material requirements for various jobs, etc.

Students are also encouraged to submit questions relating to any problems they may meet with in the course of their practical work.

Houng non mool

COURSE IX-WOOL TECHNOLOGY.

FIRST YEAR.

(34 weeks day course.)

		itouis po	I WOOK.
		Terms 1 and 2	Term 3
		lec. lab./tut.	lee. lab./tut.
1.41	Physics	3 3	0 — 0
2.41в	General Chemistry	. 3 — ს	3 6
2.911	Biology	2 - 3	2 - 3
2.91	Biochemistry	0 — 0	2 - 4
10.91	Mathematics	4 — 2*	$2 - 2^*$
G10	English	2 - 0	0 - 0
G20.1	History	1 - 0	0 0
	-	•	
		15 - 14	9 - 15

* Tutorial.

SECOND YEAR.

(24 weeks day course.)

		Hours per w	
		Terms 1 and	2.
		lec. lab./tut	•
2.912	Biology (Physiology)	2 - 3	
2.92	Biochemistry	2 - 3	
9.12	Sheep Husbandry (Breeds and Management)	3 0	
9.22	Agronomy	3 0	
9.42	General Textiles (Yarns)	1 - 2	
9.52	Wool	1 6	
10.92	Mathematics	1 1*	
G20.2	History	2 - 0	(Term 1)
Gl	Logie	2 - 0	(Term 2)
		15 15	
		15 -15	

* Tutorial.

21 weeks for remainder of year to be spent in activities concerned with wool production.

THIRD YEAR,

(24 weeks day course.)

	Н	Hours per week. Terms L and ?		
		lec. lab./tu	t.	
2.913 9 13	Physiology	2 - 3		
0.10	(a) Sheep Production	3 - 0		
9.33	Economics	3 = 0 2 = 0		
9.43 9.53	Wool	$1 - 3 \\ 0 - 9$		
G2	Philosophy Minor Elective (Humanities)	$2 - 0 \\ 2 - 0$	(Term 1) (Term 2)	
		13 -15		

21 weeks for remainder of year to be spent in activities concerned with wool production.

FOURTH YEAR.

Plus elective subjects of either Option I or Option II.

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Option I:

	1	Iours per week. lec. lab./tut.
9.94 9 104	Genetics	$\begin{array}{ccc} & 2 & - 1 \\ & 3 & - 2 \end{array}$
9.114	Farm Livestock	2 - 0
9.24	Pastoral Agronomy	$\begin{array}{ccc} & 2 & - & 2 \\ & 3 & - & 0 \end{array}$
9.124	rarm management and meenamsavon	$\frac{1}{12-5}$

Option II:

Hours ner week.

	1	ec. and lab./tut
9.134 9.34 9.144 9.44 9.54 9.154	Accountancy Banking, Currency, Foreign Exchange Commercial Law Yarn Manufacture (Wool) Wool Synthetic Fibres	2 11 12 6 5 1
	-	17

SCHOOL OF ARCHITECTURE AND BUILDING.

The architect is occupying an increasingly important position in the development of Australia. His contribution to society is primarily that of a planner; it includes understanding of the building needs of communities and individuals, skill in the effective and orderly disposition of interior space and communication and the design of economic and durable structures. In this he is concerned with research into functional needs and the best methods of construction. His main work as an artist is to fuse functional planning and scientific structure into an aesthetic unity which gives lasting pleasure. In architecture, science and art are one: they are absolutely inter-dependent and complementary. These ideas have been kept in mind in planning the syllabus of work. The special feature of this course is that the three main essentials —architecture as an art, architecture as a science, and architecture as a practical profession—are all given prominence.

The early stages provide a fundamental training in the basic sciences underlying building technology. This is a feature of the course which is most important for modern architects who are called upon to use new materials and new building methods and express new ideas in the present scientific age. Instruction in the principles of chemistry and physics as they affect the architect is included as a foundation to the studies in building science. All students receive and undertake a certain amount of theoretical and practical training in the building trades and crafts. A further feature of the course is a basic training in modern structures—with the relevant amount of mathematics—followed by further optional study in advanced structures in the later years for those students who wish to concentrate more on structural design in steel and reinforced concrete.

Concurrently with these scientific and structural subjects, the aesthetic sensibilities and creative abilities of the student are developed from the beginning with visual design and colour (included in Architectural Studies and Design) and later with more advanced work on architectural design and construction, civic design, etc.

Further, two principles established by the University of Technology as relating to all courses have been applied, viz, that practical experience in employment of a planned nature is to be a feature of all courses, and secondly that social and cultural needs must be catered for if a professional man is to take his rightful place in the community. Practical employment is included during the third term of first year, and throughout all the subsequent years, and the lectures in the Humanities and the Fine Arts are an integral part of the course.

COURSE XI-ARCHITECTURE.

The course in Architecture was revised as from 1952. The revised course will replace the original course stage by stage commencing with the first year in 1952. Details of the original course may be found in the 1951 Calendar.

FIRST YEAR.

(24 weeks full-time course covering first and second terms and 12 weeks part-time course of two half days and two or three evenings per week covering third term.)

		H	lours per wee	k.
		Term 1	Term 2	Term 3
		Lect. Pract.	Lect. Pract.	Lect. Pract.
11.81	A series of lectures by the			
	Professor of Architecture			
	entitled "Introduction to			
	Architecture and Building."			
11.11	Descriptive Geometry	0 - 2	0 - 2	0 - 2
11.21	Freehand Drawing and			· 2
	Presentation I	0 - 51	0 - 51	0 - 21
11.31	Architectural Studies and	2	· · · · · · · · · · · · · · · · · · ·	0 - 22
	Design I	0 - 11	0 - 0	0 11
11.41	History of Architecture I	1 — 0 [*]	ľ — Ň	1 _ 0
11.51	Building Science I	0 — 0	ī — Ŏ	$\tilde{0} = \tilde{0}$
11.61	Building Trades and Crafts	• •	• •	0 0
	(Equiv. time)	0 - 1	0 11	0 - 11
11.71	Building Construction I	1 - 4	1 - 3	1 - 2
11.101	Theory of Structures I	$\tilde{1} - \tilde{0}$	$\hat{1} \rightarrow \hat{0}$	1 _ 0
1.91	Physics	2 - 2	$\frac{1}{2} - \frac{1}{2}$	ō ŏ
2.131	Chemistry	$\bar{2} - \bar{2}$	$\bar{2} - \bar{2}$	0 - 0
10.51	Mathematics	$\bar{2} - \bar{0}$	$\frac{1}{2} - \frac{1}{2}$	$\overset{\circ}{\overset{\circ}}$ $\overset{-}{\overset{\circ}}$ $\overset{\circ}{\overset{\circ}}$
G20.1	History	ī — Ŏ	1 - 0	0 0
G10	English	$\tilde{2} - \tilde{0}$	$\hat{2} - \hat{0}$	0 - 0
				0 0
		12 - 181	13 -16	3 01
		102	10 -10	0 07

For the subject "Building Trades and Crafts," groups of students will be formed, studying for the equivalent time stated.

SECOND YEAR.

(34 weeks part-time course over three terms requiring attendance for two half days or one full day and three evenings per week.)

			Hours per wee	ek.
		Term 1	Term 2	Term 3
	I	ect. Pract.	Lect. Pract.	Lect. Pract.
11.22	Freehand Drawing and			
	Presentation II	$0 - 2\frac{1}{2}$	$0 - 2\frac{1}{2}$	$0 - 2\frac{1}{2}$
11.32	Architectural Studies and		-	-
	Design II	1 1	$\frac{1}{2}$ 1] — 1
11.42	History of Architecture II	1 — 0	$1 \rightarrow 0$	1 - 0
11.52	Building Science II	1 0	0 - 0	0 - 0
11.72	Building Construction II	1 - 1	1 - 2	1 - 2
11.82	Theory of Architecture A	1 - 0	1 - 0	1 - 0
11.102	Theory of Structures II	1 - 0	1 — 0	1 0
8.22	Materials of Construction	0 - 2	0 - 2	0 - 2
8.42	Land Surveying (Equiv. time)	1 - 0	0 - 1	0 - 1
G20.2	History	2 - 0	0 — 0	0 - 0
Gl	Logic	0 0	2 - 0	0 - 0
				<u> </u>
		$8\frac{1}{2}$ $6\frac{1}{2}$	$6\frac{1}{2}$ - $8\frac{1}{2}$	4 <u>1</u> 8 <u>1</u>

For the subject "Land Surveying," groups of students will be formed, studying for 12 hours theory in the school and 24 hours practical outdoor on Saturday mornings. Time stated is equivalent time per week.

THIRD YEAR.

(34 weeks part-time course requiring attendance for two half days or one full day and three evenings per week.)

01	•	Term 1 Lect. Pract.	Term 2 Lect. Pract.	Term 3 Lect. Pract.
$11.43 \\ 11.73 \\ 11.83$	History of Architecture III Building Construction III Theory of Architecture B	1 - 0 1 - 1 1 - 0	1 - 0 1 - 1 1 - 0	1 - 0 1 - 1 1 - 0
11.93 11.103	Architectural Design and Construction A Theory of Structures III	0 - 5 1 - 0	$\begin{array}{c} 0 \ - \ 5 \\ 1 \ - \ 0 \end{array}$	$ \begin{array}{r} 0 - 5 \\ 1 - 0 \end{array} $
11.203 7.502 G2	Building Services and Equip- ment A Geology* Philosophy	$ \begin{array}{c} 1 - 0 \\ 1 - 0 \\ 2 - 0 \end{array} $	$1 - 0 \\ 1 - 0 \\ 0 - 0$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
<u>C</u> 60	Painting, Sculpture and Allied Arts	$\begin{array}{c}1\\ 1-0\\ 9-6\end{array}$	$\frac{1-0}{7-6}$	$\begin{array}{r} 0 - 0 \\ \hline 5 - 10 \end{array}$

* Taken in third year of Course XI.

FOURTH YEAR.

(34 weeks part-time course requiring attendance for one half day and three evenings per week in terms 1 and 2 and three evenings per week in term 3.)

		н	ours per wee	k.
		Term 1	Term 2	Term 3
		Lect. Pract.	Lect. Pract.	Lect. Pract.
11.94	Architectural Design and Construction B	0 - 3	0 — 3	0 - 3
11.114	Architectural Research	0 - 2	0 - 2	0 - 2
8.124	Structures	J		
11.154	Interior Furnishing and Decoration	0 - 0	0 - 0	1 - 0
11.164	Acoustics and Sound Insulation	1 0	0 - 0	0 - 0
11.204	Building Services and Equip- ment B Major Elective (Humanities)	2 - 0 3 - 0	$2 - 0 \\ 3 - 0$	$2 = 0 \\ 0 = 0$
	•	6 - 5	5 - 5	3 - 5

FIFTH YEAR.

(34 weeks part-time course requiring attendance for three evenings per week.)

•		Hours per week.		
		Term 1	Term 2	Term 3
11.05	Anabitantum I Duit	Lect. Pract.	Lect. Pract.	Lect. Fract.
11.95	Construction C	0 0		
11 195	Declarging 1 Decetion	0 - 3	0 - 3	0 3
11.120	Protessional Practice	1 - 0	1 - 0	1 0
11.135	Specifications	1 0	1 - 0	1 0
11.215	Estimating	1 - 0	1 Ň	Î Ó
11.115	Planning Research	ר ^ב ר		1 0
	or	> 0 - 2	0 - 2	0 2
8.125	Structural Design		• -	V - 4
11.144	Building Research Review	0 - 0	1 0	0 - 0
		3 - 5	4 - 5	3 — 5

SIXTH YEAR.

(34 weeks course requiring attendance for twelve weeks full-time for one term, and part-time attendance for two evenings for two terms.)

The hours given are for normal attendance at the school. They do not give the total hours involved on the research or design projects.

		Hours per week.		
		Term 1	Term 2	Term 3
11.00		Lect. Pract.	Lect. Pract.	Lect. Pract.
11.96	Architectural Design and			
	Construction D	0 - 3	0 - 0	0 - 0
11.176	Architectural Science and			•
	Research Thesis	1 - 24	0 - 0	0 0
11.186	Civic Architecture	0 — 0	0 - 3	<u>0</u> — 0
11.196	Town Planning	2 - 0	$\dot{0}$ – $\ddot{2}$	· õ — õ
11.126	Professional Practice (Advanced)	0 _ 0	0 — 0	2 - 0
		0 07		
		3 -27	0 - 5	2 - 0

CONVERSION COURSE XIC-ARCHITECTURE.

Holders of the diploma in Architecture are required to complete the following additional work in order to qualify for the degree of Bachelor of Architecture.

	Hor	irs per w	eek.
1.	Conversion Humanities—English, History or	-	
	Philosophy	2	
3	and Psychology, Economics or Government	2	
2.	11.176 Architectural Science and Research		
	Thesis*	24	(Term 1)
	 See overleaf for note. 		

3. Ang	y t wo o	f the following :	-	
	1.91	Physics	4	(Terns Land 9)
	2.131	Chemistry		(Torma 1 and 2)
	10.51	Mathematics	, T	(Terms I and 2)
	8.22	Materials of Construction	4	(1 terms 1 and z)
	7.502	Geology	2	(Tamma 1 - 1 0)
	7.502	Geology	4	(Term 3)

* In special circumstances a student may apply to complete this subject by part-time study over three terms. The holder of a diploma with Credit or Honours of three or more years' standing may apply to be exempted from this subject, provided that—

- (a) he gained the Architecture diploma prior to 1950;
- (b) he gained a Credit or Distinction for the research or design thesis in the diploma course;
- (c) he provides evidence to the Faculty that in his professional career he has pursued some aspect of study in Architectural Science and Research which, together with the diploma thesis, is regarded as equivalent to the subject of 11.176 Architectural Science and Research thesis.

SCHOOL OF HUMANITIES AND SOCIAL SCIENCES.

All undergraduates of the University must take several courses in the fields of Humanities and Social Sciences. Courses in English, History and Philosophy are required to be taken by all undergraduates; in addition, there is offered a range of elective subjects which includes those just mentioned, together with Government, Economics and Psychology. Progression by undergraduates from year to year of their courses, and the final award of a degree, depend upon successful completion of the subjects prescribed in this field.

The detailed requirements for students in the several Schools are set out hereunder; fuller descriptions of the several courses will be found on page 250 and the succeeding pages. The complete programme in the Humanities and Social Sciences is similar for all undergraduate courses, except for conversion students. The programme in the different years of the respective courses is as follows:

GROUP A-APPLIED PHYSICS; ENGINEERING (MECHANICAL, ELECTRICAL, MINING, CIVIL); APPLIED GEOLOGY; WOOL TECHNOLOGY; ARCHI-TECTURE.

		Hours per week,		
		Term 1.	Term 2.	Term 3.
	FIRST YEAR.			
G10	English	2	2	. 0
G20.1	History	1	1	0
	SECOND YEAR.			
G20.2	History	2	0	0
Gl	Logic	0	2	Ó

Hours per week. Term J. Term 2. Term 3.

		THIRD YEAR				
	Co	Philosophy		2	0	0
62		Minor Electivet*		υ	2	0
		FOURTH YEAT	R.			
		Major Elective [†]	• • • • • • • • • •	3	3	0
ŧ	The ful	l range of Minor Electives is :				
•	G3	Philosophy of Science.	G30	Government.		
	G5	Philosophy-Logic.	G40	Psychology.		
	GII	English.	G41	Psychology.		
	G21.1	History.	G50	Economics.		
	G21.2	History.				
	G21.3	History.				
t	The ful	l range of Major Electives is :				
+	G6	Philosophy.	G31	Government.		
	G12	English.	G42	Psychology.		
	G22	History.	G51	Economics.		

* In the third year of Course XI Architecture, G60 Painting, Sculpture and Allied Arts is taken in lieu of Humanities Minor Elective.

GROUP B-APPLIED CHEMISTRY; CHEMICAL ENGINEERING; METALLURGY.

	•	Hours per week.		
		Term 1.	Term 2.	Term 3.
	FIRST YEAR.			
C10	English	2	2	0
G20	History	1	1	2
	SECOND YEAR.			
GI	Logic	2	0	0
G2	Philosophy	0	1	1
•	THIRD YEAR.			
	Minor Elective*	1	1	0
	FOURTH YEAR.			
	FOOMIN IMAN	9	2	۵
	Major Elective †	3	J	v
GROUP	C: CONVERSION-ALL COURSES.			
		Ho	urs per w	eck.
		Term 1.	Term 2.	Term 3.
Stu	idents must take two courses, one t	o be cl	losen fr	om the
follov	ving three:—			
C7a	Philosophy	. 2	2	2
Glad	Fnglish	. 2	2	· 2
G23c	History	. 2	2	2
1	we also to be chosen from the followi	ng thre	e:	
and	one also to be chosen from the following	ng thre	<u>.</u>	9
G31c	Government	· 2	Z	2
G42c	Psychology	. 2	2	Z
G51c	Economics	. 2	2	Z
${ m Th}$	e two courses chosen may be taken con-	current	y or in (different

years.

* A list of these is given in Group A above.

† A list of these is given in Group A above.

GROUP D-PART-TIME COURSES.

(i) Faculty of Science.—Students will take Humanities in the final, or final two stages of the part-time course: two courses of three hours per week for three terms, one to be chosen from the following subjects:—

English, History, Philosophy;

and one from Economics, Psychology, Government.

(ii) Faculty of Engineering.—Students will take four courses of Humanities in the part-time course in engineering. The pattern varies somewhat between schools, but all the schools will take the courses in the following order:

G10—English. G20B—History. G8—Philosophy.

One Major Elective from the following:

English, History, Philosophy, Economics, Psychology, Government.

DESCRIPTION OF SUBJECTS OF INSTRUCTION.

The description of subjects given below is meant to indicate the nature of the work dealt with in the individual subjects comprising the various courses.

The list as given below is subject to change without notice.

Physics.

:

Subjects 1.01 to 1.94.

1.11, 1.11A AND 1.11D PHYSICS.

Mechanics and properties of matter.

Mass, length, time, derived units. Elementary statics. Elementary dynamics of a particle, circular motion, simple pendulum. Elementary rigid dynamics. Friction. Stress, strain, moduli. Elements of hydrostatics, surface tension, dapillarity, viscosity, Bernoulli's theorem. Periodic motion and propagation of waves.

Light.

Elements of geometrical optics, simple optical instruments, the eye. Elements of physical optics, absorption, dispersion, interference, diffraction. Photometry.

Magnetism and electricity.

Elementary magnetism. The earth as a magnet. Electric currents, magnetic, thermal, mechanical and chemical effects of currents. Elementary circuits and measurements. Electro-magnetic induction. Introduction to electrostatics: potential, capacity, dielectrics.

Heat.

Temperature, thermometry. Expansion. Gas laws. Calorimetry. Mechanical equivalent of heat. Vapour pressure, humidity, hygrometry. Heat transference. Introductory kinetic theory.

Advanced mechanics and properties of matter.

Elements of dimensional analysis. Surface tension. Viscosity: Poiseuille's and Stokes' laws. Bending and torsion. Rigid dynamics. Gyroscopic motion, precession. Newton's law of gravitation, elements of planetary motion. Rockets. Elementary stress analysis, and measurements of strain.

Sound.

Vibration of strings, rods, columns or air. Velocity of sound. Resonance. Pitch. Generation, transmission and reception of sound. Doppler effect. Beats and interference.

1.12 AND 1.12A PHYSICS.

Electricity and magnetism.

Gauss' theorem in electrostatics and applications. Systems of conductors and condensers. Properties of dielectrics. Ferromagnetism and magnetic hysteresis. The magnetic circuit. Magnetic effect of currents. Galvanometers. Kirchhoff's laws and Thévénin's theorem. Resistivity and temperature coefficient of resistance. Self and mutual induction. Theory of transient currents. Alternating current theory.

Light.

Wave theory and Huyghens' principle. Interference. Elementary interferometry. Diffraction by slit. Diffraction grating. Polarised light. Circular and elliptical polarisation. Strain birefringence. Rotation of the plane of polarisation.

Introduction to atomic physics.

Elementary particles, conduction through gases, charge and mass of electron. Ions. Cathode and positive rays. Isotopes, mass spectrograph. Quanta. Thermo- and photo-electricity. Rutherford-Bohr atom and radiation. X-rays. Radioactivity.

Heat.

Elementary kinetic theory. First law of thermodynamics. Specific heats of gases. Second law: efficiency of heat engines, thermodynamic scale of temperature, entropy. Radiant heat and radiation pyrometry.

1.13 PHYSICS.

Electric circuit theory and electrical measurements.

Fundamental notions of response. Superposition, operational methods. Transformation theorems. Iterative network, resonance, electro-mechanical circuits. A.C. bridges, transformers, valve circuits. Non-linear elements. Fundamental electrical standards.

Electronics.

Phenomena and laws of electronic emission. Diode, triode, tube characteristics. Amplification. Multielectrode tubes, oscillators, voltmeters. CRO multiplier tubes, X-ray tubes, betatron, cyclotron, electron microscope. Gas-discharge devices. Elementary noise theory.

Advanced wave motion and radiation.

Analytical treatment of plane and spherical waves. Velocity of propagation. Waves in elastic media. Genesis and propagation of electromagnetic waves. Reflexion, refraction, dispersion, group velocity.

Light.

Interference, multiple reflexions, thin films, coated surfaces, interferometry. Fraunhofer and Fresnel diffraction phenomena. Diffraction by circular and rectangular apertures. Babinet's principle, .coronas. Resolving powers. Brewster's law, double refraction. Stressed media, optical rotation.

Advanced thermodynamics and radiation.

Thermodynamic functions of state. Joule-Thomson experiment. Application of thermodynamic principles. The phase rule. Stefan-Boltzmann and Wien's laws of radiation. Quantum theory. Introduction to statistical theory.

Introduction to physics of solid state.

Fundamentals of crystallography. Stereographic projection. X-ray diffraction. Determination of structure and texture. Constitution of metals and alloys. Elastic and plastic properties of crystals and aggregates.

1.14 PHYSICS.

Subdivisions marked (E) are electives of which the student will take two only.

Instrumentation and techniques.

Elements of metrology. Strain gauges, photoelastic techniques, elements of stress analysis. Introduction to servo theory. Physicochemical apparatus. Colorimetry. Radiographic and crystallographic X-ray and gamma-ray techniques. Electron diffraction and microscopy. R.F. heating. Non-destructive testing. Supersonics. Isotope application.

Structure of matter and radiation.

Atomic (electron and nuclear) theory. Spectra, conductivity, super- and semi-conductivity, electron theory of metals. Fission.

Acoustics. (E)

Radiation from point sources, pistons, horns. Theory of transducers. Reciprocity. Measurements in sound field. Reflection and absorption of sound. Acoustics of buildings.

Theory and application of ferromagnetism. (E)

Langevin-Weiss and Heisenberg theories. Gyromagnetic effects. ferromagnetic resonance. Domains. Bloch zones, anisotropy, magnetostriction. Theory of initial permeability, hysteresis and other losses. Ferromagnetics in communication and power engineering. Magnetic measurements.

Introduction to relativity.

Michelson-Morley experiment. Lorenz transformation and applications. Modified concepts of mass, momentum and energy. Quantum aspects. Applications to optics, astronomy, particle accelerators.. Description of general theory of relativity.

Theory and application of dielectrics. (E)

Theories of permittivity and loss. Piezoelectricity, ferroelectrics. Dielectrics in communication and power engineering. Measurements.

The solid state.

Deformation. Slip, fracture, plastic flow. Anelasticity. Dislocation theory. Diffusion.

Physics of h.f. electromagnetic propagation. (E)

V.H.F., C.W. and pulse transmission. Pulse shaping, trigger circuits. Magnetron, klystron, transmission lines. Wave guides, receivers. Aerials, aerial arrays. Noise. Ground, tropospheric and ionospheric propagation. Radar, navigation, radio astronomy.

1.21 Physical Techniques I: Laboratory Glass-blowing.

Physical factors involved in glass working, basic operations, types of glass, graded seals, annealing, devitrification, glass-metal seals.

1.22 PHYSICAL TECHNIQUES II: HIGH VACUUM TECHNIQUE.

General survey, pumping systems, gauges, use of glass in high vacuum work, degassing and pretreatment, gas absorbents and getters, miscellaneous techniques.

1.23A PHYSICAL TECHNIQUES III: ELECTRONIC WORKSHOP PRACTICE.

Valve characteristics, power supplies, amplifiers, oscillators. Valvevoltmeters, mixing circuits, CRO.

1.23B PHYSICAL TECHNIQUES IV: OPTICAL DESIGN AND WORKSHOP PRACTICE.

Paraxial theory of optical instruments. Stops and photometry of optical instruments, aberrations (chromatic, spherical and off-axis) and tests for same. Design of simple optical instruments. Theory and practice of making lenses, flats and prisms. Cementing, blooming, and assembly. Testing of finished optical components.

1.23c Physical Techniques V: Photometry, Photography and Colorimetry.

Light sources, the photographic spectrum, visual, photographic and photoelectric detection of radiation. Photometry, spectrophotometry and colorimetry. Description and theory of photographic processes and materials. Colour photography.

1.23D PHYSICAL TECHNIQUES VI: INSTRUMENT DESIGN.

Difference between instruments and machines. Accuracy, errors, kinematic principles of design. Degrees of freedom and constraint. Semi-kinematical and non-kinematical design. Practical design problems.

1.34 MATHEMATICAL PHYSICS.

Selected topics in Mathematical Physics including some of the following: tensors, elasticity, boundary value problems, hydrodynamics, calculus of variations, numerical methods.

1.41 AND 1.41D PHYSICS.

Mechanics and properties of matter.

Mass, length, time, derived units. Elementary statics. Elementary dynamics of a particle, circular motion, simple pendulum. Elementary rigid dynamics. Friction. Stress, strain, moduli. Elements of hydrostatics, surface tension, capillarity, viscosity, Bernoulli's theorem. Periodic motion and propagation of waves.

Light.

Elements of geometrical optics, simple optical instruments, the eye. Elements of physical optics, absorption, dispersion, interference, diffraction. Photometry.

Magnetism and electricity.

Elementary magnetism. The earth as a magnet. Electric currents, magnetic, thermal, mechanical and chemical effects of currents. Elementary circuits and measurements. Electromagnetic induction. Introduction to electrostatics: potential, capacity, dielectrics.

Heat.

Temperature, thermometry. Expansion. Gas laws. Calorimetry. Mechanical equivalent of heat. Vapour pressure, humidity, hygrometry. Heat transference. Introductory kinetic theory.

1.42 AND 1.42D PHYSICS.

Electricity and magnetism.

Gauss' theorem in electrostatics and applications. Systems of conductors and condensers. Properties of dielectrics. Ferro-magnetism and magnetic hysteresis. The magnetic circuit. Magnetic effect of currents. Galvanometers. Kirchhoff's laws and Thévénin's theorem. Resistivity and temperature coefficient of resistance. Self and mutual induction. Theory of transient currents. Alternating current theory.

Light.

Wave theory and Huyghens' principle. Interference. Elementary interferometry. Diffraction by slit. Diffraction grating. Polarised light. Circular and elliptical polarisation. Strain birefringence. Rotation of the plane of polarisation.

Heat.

Elementary kinetic theory. First law of thermodynamics. Specific heats of gases. Second law: efficiency of heat engines, thermodynamic scale of temperature, entropy. Radiant heat and radiation pyrometry.

1.91 PHYSICS.

Mechanics and properties of matter.

States of matter. Elementary principles of statics and dynamics. Elasticity, simple moduli, bending moments. Periodic motion. Principles of hydrostatics, surface tension.

Heat.

Temperature, thermal expansion of matter. Change of state. Calorimetry. Evaporation and condensation, hygrometry. Transference of heat, convection, conduction, radiation. Mechanical equivalent of heat.

Wave motion.

Progressive, longitudinal and transverse waves. Reflection, refraction and interference of waves.

Sound.

. Velocity, pitch, intensity, and quality. Resonance. Measurement of sound intensity. Reflection and absorption. Limits of audibility.

Light.

Nature and sources of light. Effect of radiant energy on the eye. Colour. Photometry. Reflection, refraction and absorption. Application of laws of reflection and refraction in simple optical devices.

Electricity and magnetism.

Qualitative treatment of the following:-

Elements of static electricity. Conductors and insulators. Potential. Discharge from points. Electric shielding, lightning arrestors. Elementary magnetism. Electric currents. Magnetic heating and chemical effects of electric currents. Ohm's law.

1.92 AND 1.92A PHYSICS.

Light.

Wave theory and Huyghens' principle. Interference. Elementary interferometry. Diffraction by slit. Diffraction grating. Polarised *28148-6 K 137 light. Circular and elliptical polarisation. Strain birefringence. Rotation of the plane of polarisation.

Radiation.

Electromagnetic radiation. Electromagnetic spectrum surveyed. Absorption and emission of radiation. Stefan-Boltzmann law. Emission of a black body. Wien law, Planck's law (without proofs). Elements of pyrometry.

Electricity and magnetism.

- (a) Magnetic effects of currents; self and mutual induction, the transformer, units of inductance; capacitance, units of capacitance; measurement of capacitance and inductance (briefly).
- (b) Alternating current; vector representation of A.C.; current and voltage relations in simple L, C, R circuits; power in A.C. circuits.
- (c) Galvanometers; characteristics of moving coil types only.
- (d) Thermoelectricity; Seebeck effect; thermocouples and their application to temperature measurement; changes in resistance with temperatures; the platinum resistance thermometer.

Electronics.

- (a) Thermionic emission. Characteristics of the diode valve. Rectification. Characteristics of the triode valve. Amplification. Vacuum tube voltmeters (D.C. only). Electrometer tubes, pH meters. Multielectrode tubes (briefly).
- (b) Photo cells (photoemissive and photovoltaic).

Optometrical Science Conversion Course Subjects.

ADVANCED VISUAL PHYSIOLOGY AND PHYSIOLOGICAL OPTICS.

This course will be divided into two sections, each comprising 2¹/₄ hours of lectures and demonstrations per week for one year. The two sections may be taken concurrently in one year or in any sequence in different years.

Section 1.

A. Visual Physiology.

A study of the advanced literature on—The anatomy and physiology of the retina and visual pathways. The retinal image and visual acuity. The dioptric constants of the eye and the aetiology of refractive errors. The perception of light and brightness. The electrophysiology of vision. Dark- and light-adaptation, night vision. Accommodation. Mechanisms of the pupil. The ocular circulation and intra-ocular pressure. The applications of visual physiology to visual problems in industry, aviation, etc.

B. Photometry and Colorimetry.

(For this section, given during Second Term, students will join the class in Laboratory Arts IV conducted by the School of Applied Physics).

Photometric concepts. Visual photometric measurements. Photoelectric photometry. Spectrophotometry. Principles of colour measurements. C.I.E. colour system, colour atlases.

C. Colour and Colour Vision.

A study of the advanced literature on-Physics and chemistry of colour. Phyisology of colour vision. Psychology of colour vision. Colour vision theories. Defective colour vision. Colour vision tests.

Section II.

Ocular Motility and Binocular Vision.

A study of the advanced literature on—The physiology and control of ocular movements. Retinal correspondence, Horopter studies, Binocular coordination. Fusion. Stereopsis. Ocular dominance. Aniseikonia. The analysis and perception of three-dimensional visual space. Theories of space perception. Heterophoria and squint. Orthoptic diagnosis and treatment. Visual training.

Advanced Clinical Optometry.

Advanced clinical work in-Industrial Optometry. Contact lens fitting. Remedial reading training. Orthoptics and visual training. Aniseikonia.

Students taking this course will partake in research projects and the preparation of research reports.

MATHEMATICS AND STATISTICS.

Elementary analytical geometry. Elementary differentiation and integration. The elements of statistical theory, including significance tests and an introduction to the analysis of variants.

Throughout this course, examples of the application of these topics to optometric and allied problems will be given wherever possible.

T Chemistry.

Subjects 2.01 to 2.97.

2.111 CHEMISTRY, GENERAL.

Inorganic Chemistry.—A review of fundamentals, the elements and their classification, preparation and reactions. Atoms, melecules, formulae, valency and variable valency. Oxides, acids, bases and salts, their classification, methods of preparations and general properties. Hydracids and oxyacids, action of acids on metals. Stability of oxides, bases, and salts. Gas laws and calculations. Oxidation and reduction.

Atomic structure, number, weight, and mass number. Isotopes. Periodic classification. Electronic theory of bonds, valency. Electrovalent, covalent, and co-ordinate bonds in simple compounds. ⁴ Correlation with physical chemical evidence.

States of aggregation with special emphasis to metallic state. Properties of metal. Review of metals and physical properties in relation to structure and periodic table.

Brief discussion of groups O, 1A, 4B, 7B and transition elements in periodic system.

Physical Chemistry.—A review of the kinetic theory of gases, reference to liquids and solids, diffusion, etc. Solutions, colloidal solutions, osmotic pressure and other properties, vapour pressure.

Electrolytes and non-electrolytes. Ionic and covalent compounds. Strength of acids and bases. Electrolysis of acids, bases and salts.

Law of mass action. Equilibrium and dissociation constants. Indicators and pH. Hydrolysis. Buffer solutions. Le Chatelier's principle. Catalysis. Common ion effect. Solubility product. Applications.

Thermodynamics.—First law of thermodynamics, Hess's law of , heat-summation.

Organic Chemistry.-Oharacteristics of the carbon atom and general introduction to organic chemistry, qualitative and quantiitative analysis of organic compounds. Molecular and graphic formulae.

Paraffin, olefine and acetylene hydrocarbons, alcohols, ethers, aldehydes, ketones, acids, amines, esters, halogen derivatives.

Oils, fats, carbohydrates. Polymerisation. Coal tar derivatives. Aromatic hydrocarbons.

2.122 AND 2.122D ENGINEERING CHEMISTRY.

For Engineering students who have completed first year chemistry. A general description of the applications of chemistry to engineering. Corrosion, electrochemical theory, stray current corrosion and its prevention. Hydrogen evolution and oxygen absorption types. Heated metal surfaces and metals in neutral solutions. Differential aeration effect, pitting, pickling of steel, rust protection, paint, lacquer, corrosion resisting surfaces, etc. Corrosion resisting alloys, stainless steels, monel metal, etc.

Refractory materials, properties, acids, neutral and basic types. Insulating bricks.

Paints and varnishes, components. Paints for special purposes, acid proof, heat resisting, rubber-base paints, cement and concrete paint, marine paint.

Fuels, ignition temperatures, flash point, spontaneous combustion. Calorific value and its measurement. Types, solid, liquid, gaseous. Charcoal, coal, coke, powdered coal. Petroleum, and its products. Shale oil and tar products. Alcohol. Natural gas, coal and coke oven gas, water and carburetted water gas, producer gas and blast furnace gas. Gas works and coke oven practice. Method of controlling quality.

Lubricating oils, laws of solid, fluid and boundary friction, wedge theory of oil film. Mineral, vegetable and animal oils. Semi-fluid lubricants, greases. Solid lubricants, graphite, talc, white lead. Properties of lubricants, specific gravity, flash and fire points, viscosity. Spheres of application.

Building and insulating materials. Limes, cements, ceramics, rubber, compressed fibres, plastics, bitumen, oils for insulation.

2.131 CHEMISTRY FOR ARCHITECTS.

Elements, compounds and mixtures. Chemical changes and their laws. Symbols, direction of chemical change, valency, formulae and equations. Properties of metals and non-metals.

Basic chemical compounds, acids, bases and salts. Occurrence preparation and properties.

States of matter, solubility, solvent action. Evaporation. Crystallisation. Deliquescence and efflorescence.

Oxidation and reduction.

Hydrolysis, ionisation, electrolysis.

Properties of gases from the chemical point of view. Atomic theory.

Combustion and respiration.

General treatment of acids, bases and salts with particular reference to properties as such and as oxidising and reducing agents. Special applications of chemistry to architecture. The properties of various metals, ferrous and non-ferrous. Alloys, brasses and bronzes, solders. Properties of oxides and salts, carbonates, sulphates and chlorides.

The chemical constitution and properties of the important building materials. Lime, hard and soft waters, cement, plasters, clays and bricks, pigments, etc.

2.184 BOTANY.

A study of the major groups of the plants, with special emphasis on-

(a) Outline classification.

(b) Morphology.

.(c) Anatomy.

a(d) Life-history.

All studies to be comparative and illustrated by Australian examples

A more advanced study of genetics and ecology based upon that -taken in 2.912 Biology.

2.194 ZOOLOGY.

An outline classification of the major groups of animals, illustrated by Australian examples wherever possible. Comparative morphology and anatomy.

The embryology of characteristic invertebrates and vertebrates.

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2.21 CHEMICAL TECHNIQUES.

The course is intended to prepare all students entering the Chemistry Department for the work that lies ahead. Safety and laboratory rules, the handling of reagent bottles and the technique common to most branches of chemistry will be introduced and demonstrated. The student will carry out a series of experiments in order to obtain practice in the techniques illustrated.

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2.32 AND 2.32A PHYSICAL CHEMISTRY.

An introduction to the interpretation of the physico-chemical properties of systems in terms of intra- and inter-molecular forces, molecular architecture and energy distribution.

Kinetic Theory of Gases.—Ideal gases, real gases, elementary quantum theory, thermal properties of gases.

The Solid State.—Ionic solids, covalent solids, metals, van der Waals solids, heat capacity of solids.

The Liquid State.--Structure of liquids, vapour pressure, surface tension, viscosity.

The Phase Rule .-- Systems of one, two, and three components.

Solutions.—Ideal solutions, liquids in liquids, solids in liquids, gases in liquids.

Surface Chemistry and Colloids .- Elementary introduction.

2.32D PHYSICAL CHEMISTRY.

This course is based on 2.32 Physical Chemistry, with variations in emphasis and content matter to render it more appropriate for students specialising in biological sciences.

2.33 PHYSICAL CHEMISTRY.

A study of the basic principles of the following subjects:-

- (i) Chemical thermodynamics; the first, second and third laws and their application to physical and chemical equilibria.
- (ii) Electrolytic conductance and the modern theory of electrolytes.
- (iii) Electrode processes and the thermodynamics of electrolytic cells.
- (iv) Chemical kinetics, the collision theory and energy of activation, catalysis.

2.34 AND 2.34D PHYSICAL CHEMISTRY.

A more detailed study of certain subjects.

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- (i) Surface chemistry and colloidal systems.
- (ii) Thermodynamics, with reference to systems which depart from ideal behaviour.
- (iii) Chemical spectroscopy; a review of atomic and molecular spectra.
- (iv) Chemical kinetics and other rate processes.

Seminars are conducted in the latter part of the year on physicochemical topics.

2.41, 2.41A AND 2.41B GENERAL CHEMISTRY.

This course of 102 lecture hours is given in first year to full-time students as an integrated whole. The division into Part 1 (68 lectures in first year) and Part II (34 lectures in second year) is for part-time degree courses. The aim of the course is to give the student an appreciation of chemistry as a whole before it is treated in its usual sections. For that reason an introductory rather than a detailed treatment of the theoretical topics is required.

Part I.

States of matter. Classification of substances. General methods, preparation and properties of metals and non-metals. Classification, general methods of preparation and properties of oxides, acids, bases and salts. Formulae, valency, simple calculations of formulae and composition. Equivalent weights, normal solutions, gas laws. Atomic and molecular structure. Evidence for protons, neutrons and electrons. Nuclear charge and size. Atomic number. Moseley's law and periodic classification. Mass number, isotopes, mass spectrograph. Atomic structure. Energy levels and four quantum numbers. Electrovalent, covalent, and co-ordinate bonds. Fajan's rules, ionisation potentials, ionic radii, covalent radii, electron affinities.

Kinetic theory of matter. Derivation of $PV = \frac{1}{2} nmu^2$. Experimental gas laws. Properties of ideal gases. Vapour-liquid equilibrium. Molecular and ionic crystalline solids.

Solutions, equilibria and chemical reactions. Expression of concentration of solutions. Raoult's law. Colligative properties. Molecular weight. Ionisation. Strong and weak electrolytes, electrolysis and hydrolysis. Le Chatelier's principle. Effect of temperature and pressure on equilibrium. Equilibrium constants. Dissociation of constants and solubility products, pH and indicators. Buffer solutions.

Periodic table. General introduction-atomic volumes, covalent radii, ionic radii, ionisation potentials, general trends in periodic table, general idea of transition series, rare earth series, etc. Detailed treatment of elements of Periodic Groups IA IIA, VA, VIA, VIIA.

Organic Chemistry. Alkanes and alkenes, synthesis and physical and chemical properties. Alkynes briefly. Alkanols, ethers, alkyl halides and esters. Aldehydes and ketones. Alkanoic acids. Benzene. Addition and substitution reactions of aromatic compounds. Nitro-compounds. Amines, tests for distinguishing. Aniline.

Part II.

Qualitative Analysis; dry tests. Group separation tables. Discussion of individual group separations. Identification of anions.

Valency and molecular structure. Shape of atomic orbitals. Elementary ideas of overlap and the covalent bond. Variable valency. Direction of covalent bonds. Mention of resonance and hydrogen bond. Polarisability and polarising power.

Periodic table. Group III, B and A1; Group 1B, Cu, Ag and Au; Group VIII, Fe, Co and Ni.

Complex salts. Co-ordination number. Evidence for complex formation: Isomerism in: complex ions and the role of water in complex salts. Co-ordination numbers 2, 3, 4, 5 and 6. Shape of complex ions.

2.42 INORGANIC CHEMISTRY.

Molecular structure. Qualitative idea of way in which physical methods are used to determine structure of molecules. Structure of ionic lattices. Simple examples like Cs, Cl, NaCl, CaFs. Shape of covalent molecules. A knowledge of various shapes and examples. In simple cases, relationship of shape to atomic orbitals involved. Periodic table. Group II (Zn, Cd and Hg); Group III (Ga, In and Tl); Group IV (Si, Ge, Sn and Pb; Ti, Zr, Hf and Th); Group V: Further treatment of nitrogen, compounds like HN₃, N₂H₄, NH₂OH, nitrogen halides and sulphides. V, Cb and Ta. Group VI: Further treatment of sulphur; sulphur halides, oxyhalides. Se and Te. Cr, Mo and W. Group VII: Interhalogen compounds, oxyacids and peracids. Mn, Tc and Re. Group VIII. General properties and discussion of heavier Group VIII elements.

Rare earths and actinides. Stable valencies and general relationships. Carbonyls, Carbonyl hydrides, halides and nitrosyls. Relatively brief discussion of preparation and properties.

2.44 AND 2.44D INORGANIC CHEMISTRY.

Modern valency theory. Elementary wave mechanics. Hydrogen molecule. Covalent bond, valence bond and molecular orbital approach. Hybridisation, multiple and fractional bond orders. Factors affecting bond strength. Overlap integral, electro negativity resonance, etc. Nature of the metal-ligand bond in complex compounds. Physical methods and the structure of complex compounds. A survey of modern methods and of experimental results. Nuclear chemistry; a survey of fundamentals and recent developments. Special topics such as electron deficient compounds, reaction mechanisms in inorganic chemistry, recent chemistry of the hydrides, organo-metal chemistry will be treated as time permits. An essay on some topic in advanced inorganic chemistry will be required.

2.52 AND 2.52A QUANTITATIVE ANALYSIS.

Laboratory rules. Instruction in the use and maintenance of apparatus. The balance, its care and use. Calibration of weights. Record of results. Notes on sampling and its technique. Solution of sample. The technique of gravimetric analysis. Theoretical considerations in quantitative analysis, the concept of solubility product. mechanism of precipitate formation with discussion of supersaturation, coprecipitation, post-precipitation and adsorption. Washing of precipitate and peptisation. Volumetric analysis. Calibration of apparatus; method of use. Reference to Australian Standards publications. Acidimetry and alkalinity. Hydrogen ion activity and its measurement. Dissociation constants of weak acids and bases and simple calculations of pH value in such solutions. Use and range of indicators for various types of acid-base titrations. Titration curves and buffer action. Oxidation and reduction from electronic aspect; simple treatment of oxidation-reduction potentials. Importance of pH on these potentials. Redox indicators. Precipitation reactions in quantitative analysis; absorption indicators and their limitations. Specific topics such as water analysis, fuel and gas analysis as time permits. 1.0

The theoretical treatment will be accompanied by a course of practical exercises to illustrate the important techniques in quantitative analysis and the use of the reagents discussed.

2.53 QUANTITATIVE ANALYSIS.

Amplification of topics such as buffer action, ionic equilibria, redox potentials, electrode potentials, with some mathematical illustrations.

Study of methods of separation used in analytical work including use of organic reagents.

Systematic study of analytical chemistry of a selected number of elements.

The practical work will illustrate these principles.

2.54 AND 2.54D QUANTITATIVE ANALYSIS.

2.62 AND 2.62A ORGANIC CHEMISTRY.

The systematic chemistry of the chief classes of organic compounds, with emphasis on the aliphatic types and a brief discussion of the corresponding aromatic compounds. Alkanes, alkenes, alkynes, aromatic hydro-carbons, cyclo-alkanes, alcohols, alkyl halides, ethers, carbonyl compounds, acids, esters, amides, amines and nitro compounds. An introduction to stereochemistry, carbohydrates, proteins, fats and oils.

2.63 AND 2.63A ORGANIC CHEMISTRY.

A more detailed study following on 2.62 Organic Chemistry, with emphasis on aromatic chemistry. The aromatic hydrocarbons, aromatic substitution; halogenation, nitration, sulphonation. The anyl halides, nitro compounds and sulphonic acids and derivatives. Phenols, aromatic alcohols, amines and other reduction products of aromatic nitro compounds. Diazo reaction and coupling. Aromatic carbonyl compounds, including quinones. Dyestuffs, colour and dyeing. The aromatic acids and derivatives. An introduction to heterocyclic compounds, polymerisation and high polymers (including natural polymers).

In 2.63A special emphasis is placed on carbohydrates, fats and other materials of biological interest.

2.64, 2.64A AND 2.64D ORGANIC CHEMISTRY.

An advanced treatment of specialised topics in organic chemistry. Reaction mechanisms, stereochemistry, structural carbohydrate chemistry and selected topics from carbocyclic chemistry and the oxygen and nitrogen heterocyclic fields (including natural products).

2.65 APPLIED ORGANIC CHEMISTRY.

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This subject covers the application of chemical reactions and physical techniques to structural and analytical determinations in organic chemistry. Emphasis is placed on the correlation of reactivity with structure. Subject matter is selected from the behaviour of fixed oils, essential oils, alkaloids, fine chemicals, vitamins, carbohydrates, natural and synthetic high polymers, etc.

2.72 MATHEMATICAL CHEMISTRY.

These courses, 2.72 and 2.73, are intended to follow the normal mathematics course given to students in first year and set out to apply the work done in that year to problems which arise in Applied Chemistry, and, in addition, to introduce some specialised techniques such as dimensional analysis and statistical methods. Consideration is given to the proper presentation, critical examination, and assessment of experimental data, and to the design of experiments.

General Chemical Calculations.—Elementary problems in chemical equilibria, mixtures etc. The solution of typical transcendental and higher degree algebraic equations encountered in Chemistry.

The Handling of Experimental Data.—Non-statistical methods of arranging and handling experimental data.

Dimensional Analysis.—General dimensional methods and their applications.

Differential Equations.—Meaning, significance, use and application in chemical phenomena.

2.73 MATHEMATICAL CHEMISTRY.

Partial Differential Quantities.—Typical partial differential functions encountered in statistics and chemical thermodynamics.

Statistical Methods.—Kinds and sources of data. Estimation of parameters, tests of significance and interpretation of data. Correlation and regression, quality control, sampling. Analysis of variance. Design of experiments.

2.84 Advanced Organic Analysis.

The lectures given in this subject will provide the necessary theoretical background.

The practical work will include illustrations of instrumental analysis (refractometry, colorimetry, spectrophotometry) and micro-analytical procedures.

2.91 BIOCHEMISTRY.

An introduction to the biochemistry of carbohydrates, lipids, amino-acids, proteins and other compounds of biological importance.

2,92 BIOCHEMISTRY.

An introduction to the following topics:---

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A brief treatment of physico-chemical phenomena of biological importance, including the properties of the colloidal state.

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The nature of enzymes and their mode of action, the classification of enzymes and the more important enzymic systems.

An introduction to the metabolism of carbohydrates, lipids and proteins.

2.911 BIOLOGY.

An introduction to basic biological principles. Introductory biology, o.g., living and non-living, vital activities, plants and animals, protoplasm, the cell, etc. Outline of classifications; Animal and plantkingdoms. Diversity of living organisms. Evolution and genetics. Heterotrophic nutrition. Ecology.

2.912 BIOLOGY.

A continuation of 2.911 Biology in the more specialised fields of mammalian anatomy, vertebrate histology, angiosperms, ecology, systematics (taxonomy).

2.913 Physiology.

An introductory consideration, of the following features of the physiology of both plants and animals will be presented. As far as possible experiments to illustrate these will be carried out in the practical work.

Physico-chemical structure of living matter.

Physiological significance of physico-chemical phenomena.

Permeability of plant and animal cells.

Synthetic processes in plants and animals with special reference to photo-synthesis and related processes.

Movement of nutrients and water in plants and animals.

Digestive processes in animals and plants.

Respiration and physiological oxidations in plants and animals. Animal heat regulation.

- Intermediary metabolism of carbo-hydrates, fats, proteins, etc. Secretory and accumulatory processes in plants and animals.
- Excretory processes and hormones and vitamins in the physiology of plants and animals.

Physiology of growth and reproduction.

Excitation and inhibition of nerve, muscle and other animal and plant tissues.

Function of the nervous system in animals. Reflexes. Receptors, including special senses.

Tropisms in plants and animals.

Physiology of movement.

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2.914 PHYSIOLOGY.

A more detailed and advanced consideration of the same topics as listed. for . 2.913. Physiology with accompanying suitably advanced experiments.

2.924 MICROBIOLOGY.

Brief historical outline. Distribution of micro-organisms. Morphology an cytology of bacteria. Staining properties of bacteria.

Yeasts and fungi and their importance in certain industrial processes. Pure culture techniques. Classification of bacteria. The effect of physical and chemical agents on bacteria. Physiology of micro-organisms. Nutrition of bacteria. Micro-organisms and their relation to food preservation; disease; resistance of the body to disease.

2.925 MICROBIOLOGY.

Biochemical activities of bacteria.

Growth and multiplication of bacteria. The bacterial growth cycle. Bacteriophage. Mode of action of the virus and its importance in the cheese industry.

Antigen-antibody reactions. Fundamental principles of serology.

Microbial variation. Mutation and adaption.

Principles of heat processing.

Mode of action of anti-microbial agents, for example, acridine dyes and their relation to pH and pK_a .

Standardisation of disinfectants and criticism of popular methods, for example, phenol coefficients, etc.

The microbiology of food. Food spoilage and "food poisoning". The use of micro-organisms in industrial processes.

2.926 MICROBIOLOGY.

Introduction.-General biology of fungi. Economic importance.

Classification.—General principles involved in classification. The major groups including the Fungi Imperfecti. Identification and the use of keys.

Techniques.--Handling. Media. Preparation of media. Sterilisation. Isolation. Maintenance of stock cultures. Sub-culturing. Inoculation. Methods of culturing. Special precautions. Behaviour on different media. Use of indicators.

Morphology and Life-histories.—A study of selected examples from the major groups, including the Fungi Imperfecti. Species of economic importance to be chosen as examples wherever possible.

Spoilage.-General considerations. Mould counts.

Genetics.—An outline of fungal genetics.

2.94D BIOCHEMISTRY.

An introduction to the following topics:---

Catalysis in biological systems; the properties of enzymes; types of enzyme-catalysed systems.

The energetics of biological systems.

Physico-chemical phenomena in cells and tissues.

2.95 BIOCHEMISTRY.

An introduction to the following topics:-

- Amino acids, peptides, proteins. Their chemical and physical properties, structure, classification and biological significance. Special attention is paid to the colloidal properties of proteins.
- The general properties of enzymes and the nature of the catalytic process. Specificity, activators, inhibitors, coenzymes, prosthetic groups.
- Hydrolases, phosphorylases, oxidases, dehydrogenases, adding, transferring and isomerising enzymes.
- Alcoholic fermentation and the glycolytic sequence. The tricarboxylic acid cycle.

2.96 BIOCHEMISTRY.

A more detailed study of the following topics:-

Preparation and purification of enzymes.

Influence of various factors on the course of enzymic reactions. Enzyme-substrate complexes.

- The mathematical theory of enzymatic reactions.
- The chromoproteins, with special reference to those possessing catalytic activity.

Biological oxidation processes.

The utilisation of energy in biological systems.

2.97 BIOCHEMISTRY.

A further study of compounds and materials of biological importance, their chemical and physical properties, and their synthesis and degradation in nature, including the following: the compound lipids, proteolipids, polypeptides, simple and conjugated proteins, nucleic acids and related compounds, nitrogen bases, certain carbohydrates and derivatives, vitamins and hormones.

The nature and properties of viruses.

The biochemical bases of the hereditary mechanisms.

- The biochemistry of immunological phenomena.
- The intracellular location of enzymic systems.

CHEMICAL INSTRUMENTATION.

An introduction to certain aspects of applied physics which will acquaint students with the instruments in common use in chemical laboratories. The subject matter is illustrated by reference to the optical instruments and electrical and electronic devices which a chemist will meet in industrial practice.

Microscopy is dealt with as a separate section within the course.

MATERIALS FOR LEATHER MANUFACTURE.

A study of tanning materials, heavy chemicals, dye stuffs, oils and finishing materials used in the manufacture of leather. Sources, use and economic importance.

PRINCIPLES OF LIGHT LEATHER MANUFACTURE.

The processing of shoe upper leathers, finishing leathers, luggage, upholstery leathers, etc.

PRINCIPLES OF HEAVY LEATHER MANUFACTURE.

The tannage and finishing of sole, felt and harness leathers.

SCIENCE OF LEATHER MANUFACTURE.

The chemistry and proteins with particular reference to collagene and keratin. The physical chemistry of proteins with particular reference to hydration and swelling phenomena. The reaction of proteins with alkalines. The classification and chemistry of enzymes with particular reference to proteases. Theories of bating. The chemistry of vegetable tanning. The chemistry of chromium salts. Theories of vegetable and chrome tannage. The mechanism of miscellaneous tannages. Surface active phenomena in relation to leather processing. The chemistry of synthetic tannings.

ANALYTICAL CHEMISTRY OF LEATHER MANUFACTURE.

Simple routine procedures are not included in this course. Lectures are devoted to research techniques and physical testing of leather.

BACTERIOLOGY AND MYCOLOGY OF LEATHER MANUFACTURE.

The bacteriology of super faction. The behaviour of bacteria towards sole. Bacterial growth in tannery leather. Growth of moulds and yeasts of leather and in liquors. The use of antiseptics and fungicides.

LEATHER LABORATORY.

Students undertake a research project under direction.

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Chemical: Engineering.

Subjects 3.01 to 3.95.

3.14 and 3.14A INDUSTRIAL CHEMISTRY.

This course aims at giving the student in Applied Chemistry and in Chemical Engineering a broad introduction to the chemical industry.

The course will deal with the following subjects:-

The raw materials, processes, and products of the chemical industry. The relation between various types of manufactures and processes. The location of chemical industries.

A discussion of specific industries, or groups of related industries, dealing with the chemical processes involved, mass balances, overall and sectional efficiencies, energy balances and requirenents, choice of equipment and materials of construction, service requirements and flow sheets. packing and distribution of products, effluents and special maintenance problems.

Examples of the industries which may be selected are-

- (a) Sulphuric acid;
- (b) Fertilisers-potash and phosphates;
- (c) The nitrogen industry;
- (d) The coal carbonisation industry with related by-products;
- (e) The alkali and alkali-chlorine industries;
- (f) The dyestuff industry;
- (g) The explosives industry;
- (h) The plastics and paint industries;
- (i) The heavy organic chemical industries, including chemicals from petroleum;
- (i) The cellulose industry, including paper and rayon;
 - (k) Synthetic fibres;

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(1) Electro-chemical and electro-thermal industries, such as calcium carbide, aluminium, magnesium.

Some time will be devoted to new developments in the chemical function, to processes which are being operated on a pilot, or small industrial scale, but which appear to be important new developments.

The structure of the chemical industry. An analysis will be made of the component parts of a typical industrial concern. Management, research, engineering, production, sales and service, labour and personnel, development and finance will be considered. The place of the chemist or chemical engineer in this industry, and his relation to other personnel will be described.

Safety in the chemical industry. Some time will be devoted to the general problem of industrial safety, and specifically to safety in the chemical industry and to methods of ensuring it.

3.15 INDUSTRIAL CHEMISTRY.

This course aims at continuing the study of the chemical industry commenced in 3.14 Industrial Chemistry and includes, in addition to further process chemistry, an introduction to some of the operational and managerial problems of the industry. The course is designed to give the student who hopes to make his career on the production side of the chemical industry an understanding of the wider problems which he is likely to meet together with an increased knowledge of the technical problems.

Advanced Industrial Chemistry.

This course, which is for honours students only, carries to a further stage the work undertaken in 3.15 Industrial Chemistry and includes work on problems of management and safety in the chemical industry, problems on plant operation including costing and the general economics of the manufacture of chemical products in various places, together with some studies of advanced process chemistry. The course includes an analysis of the structure of large chemical manufacturing concerns and a consideration of the importance of the various sections such as research, development, production, engineering, sales and commercial service in the industry.

INDUSTRIAL CHEMISTRY PROJECT.

This project involves the study of a selected chemical process requiring investigations both in the laboratory and in the literature, and in the production of a thesis on the selected topic.

3.24 and 3.24D CHEMICAL ENGINEERING.

The first two terms are devoted to a study of solid handling, fluid flow and heat transfer. The last term includes introductory lectures on distillation, gas absorption, psychrometry, drying, evaporation and extraction as well as other important topics to be studied during the following year.

3.25 CHEMICAL ENGINEERING.

Two one-hour lectures and one three-hour laboratory per week for one year.

This course covers the diffusional chemical engineering unit operations, covering in detail solid and liquid extraction, distillation, absorption and adsorption.

3.25A CHEMICAL ENGINEERING.

Two one-hour lectures per week.

This course covers miscellaneous unit operations such as evaporation, psychrometry, drying, crystallization, fluidization, mixing, sedimentation, flotation, filtration, flow through porous media.

3.34 AND 3.34D CHEMICAL ENGINEERING DESIGN.

This course consists of two hours lecture and three hours laboratory per week for one year. It covers the essentially mechanical section of chemical engineering design in the first part of the year and the second part is devoted to elementary design of unit operation equipment. The topics will include:

Stress analysis of simple steel structures, elementary reinforced concrete construction, mechanical equipment (shafting, bearings, drives, agitator mechanisms, etc.), pressure vessels for low and medium pressures, code requirements, reticulation of steam, vacuum, brine and fluid services generally. Safety practices.

Elementary instrumentation, heat exchangers, solid-liquid extraction apparatus, gas absorption and liquid-liquid extraction equipment, fractionating columns, dust and mist collection equipment, evaporators, rotary driers and humidification equipment.

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3.35 Advanced Chemical Engineering Design.

The course consists of two hours lecture and three hours laboratory per week for one year.

Advanced lectures will be given on the topics covered in 3.34 Chemical Engineering Design and other selected topics of particular current interest. This programme will be completed early in the year and students will then work on a Major Design Project which will be integrated closely with 3.75 Chemical Engineering Project.

3.44 CHEMICAL ENGINEERING CALCULATIONS.

This course consists of two hours lecture per week for one year and embraces the following topics:

Units and dimensional analysis; graphical methods and nomography; empirical formulae and non-periodic curves; some application of differential equations; behaviour of gases and vapour-liquid relationships; conventions, definitions and use of thermodynamic data; materials balances including fuel calculations; energy balances; combined materials and energy balances for a process or chemical works, including the possible use of diagrams made from such data.

3.54 CHEMICAL ENGINEERING MATERIALS.

This course consists of two one-hour lectures per week for one year.

The properties mainly needed in materials for chemical engineering plant construction are strength, and resistance to creep, wear, fatigue, corrosion, and chemical resistance. These properties and their industrial applications will be considered for the following materials:

A. Metals.

Iron and iron alloys, steel and steel alloys, non-ferrous metals and alloys.

- Methods of production and heat-treatment effects will be outlined briefly.
- Protective coatings, powder metallurgy and an introduction to corrosion are included.
- B. Non-metals.
 - Refractories: Types and properties, chemical resistance, furnaces.
 - Abrasives: Theory of abrasion process, applications.
 - Glass: Chemical glassware, heat-resistant types, glass-lined vessels.
 - Insulating Materials: Industrial types.
 - Organic Plastics: Industrial types and properties, chemical equipment, bondings, coatings.
 - Rubber: Crude, hard, synthetic, fabrication methods, adhesives, bearings, mountings, chemical conveyors, hose, coatings.
 - Concrete: Mixes, handling and placing, acid-proof, chemicaltank construction.

3.55 CHEMICAL ENGINEERING MATERIALS.

This course consists of one hour lecture per week and extends the topics of 3.54 Chemical Engineering Materials in a more detailed fashion. In addition, lectures are given on corrosion testing.

3.65 CHEMICAL ENGINEERING THERMODYNAMICS AND KINETICS.

Applied Thermodynamics.

Manipulation and use of thermodynamic functions.

Thermodynamics of fluids. Calculation of thermodynamic functions from experimental data and construction of thermodynamic charts and tables. Application of results to chemical reaction equilibria, power cycles and compressible flow.

Heterogeneous equilibria. Relation between free energy, enthalpy and entropy of mixing of liquids and properties of mixtures. Liquidvapour and liquid-solid equilibria.

Calculation of thermodynamic functions from structure of molecules.
Applied Kinetics.

Homogeneous reactions. Reactions in solution. Stirred reactors. Heterogeneous reactions. Fixed bed catalytic reactors. Mass and heat transfer in catalyst beds. Fluidised bed reactors.

3.75 CHEMICAL ENGINEERING PROJECT.

The student will be given an individual project involving literature and experimental investigation, and the final preparation of a flowsheet and design report on a selected chemical process. This project is a final test of all the earlier work the student has done, and brings together in one exercise the knowledge and experience he has gained

INDUSTRIAL SAFETY.

Organisation for industrial safety; human factors in accident prevention; physical factors in accident prevention; the contribution of medicine to industry; the functions and applications of the Factories and Shops Act, Workers' Compensation Legislation.

Metallurgy.

Subjects 4.01 to 4.94.

4.12 GENERAL METALLURGY.

A series of lectures occupying one hour per week for one year. This course gives a general survey of the whole field of metallurgy and is intended to emphasise the relationship existing between the various branches of the subject and the subsidiary subjects studied in other schools.

4.22 METALLURGICAL ENGINEERING.

Principles underlying the unit processes by which metals are extracted from ores and other raw materials. Emphasis on those principles common to all metallurgical processes involving chemical reactions or changes in state. Metallurgical stoichiometry, thermochemistry and thermophysics, heat balances, fuels and combustion, fluid flow, heat transfer, refractories, physical and chemical attributes of the solid and liquid phases in metallurgical systems, mass action, reaction rates. Quantitative application to metallurgical engineering problems.

Laboratory work will include qualitative analytical study of ores, metallurgical products and alloys, dry assaying of gold ores and an introduction to refractories and fuels testing.

4.23 METALLURGICAL ENGINEERING.

The unit processes used in extracting metals from ores and other raw materials. Gas-solid processes (roasting, calcining and drying), sintering, reduction of metal oxides, smelting, converting, distillation and refining processes studied from the standpoint of the principles introduced in 4.22. Metallurgical Engineering. Apparatus, design and operation variables and engineering calculations for the important unit processes. Hydrometallurgical and electrometallurgical processes. Laboratory experiments designed to measure important variables in typical metallurgical processes and to illustrate the principles of process equipment on a small scale will be performed.

4.24 METALLURGICAL ENGINEERING.

Integrated metallurgical engineering processes. Synthesis of the principles, unit operations and unit processes studied in preceding courses, with emphasis on the development of complete flowsheets for producing metals from ores. Economic and other considerations involved in choice of process. Production metallurgy of iron and steel and of the important non-ferrous metals.

4.32 PHYSICAL METALLURGY.

Introduction to the crystalline structure of metals; the principal types of metallic structure and typical properties; the effects of stress; work hardening, annealing, fatigue, creep. Fundamentals of casting and working metals and alloys. The phase rule and equilibrium diagrams as applied to metals and alloys. The physico-metallurgical study of the principal alloys of lead, tin and zinc; copper-base alloys; and plain carbon steels. Laboratory work will include the preparation of alloys; mechanical testing of wrought and heat treated specimens; physical methods of investigation such as pyrometry, dilatometry and thermal analysis; and the microscopical study of the simpler types of metallic structure.

4.33 PHYSICAL METALLURGY.

A study of the principal alloy steels, cast irons and miscellaneous ferrous alloys, in continuation of the work commenced in 4.32 Physical Metallurgy; the alloys of aluminium and magnesium; miscellaneous alloys of importance for magnetic, high temperature, etc., properties.

A closer study of the effects of stress and deformation in producing controlled properties, preferred orientation, etc., and in alleviating unwanted effects produced by the limitations of the casting process. (Suitable industrial operations will be chosen for study and lectures, laboratory work and visits to a local industry will be co-ordinated for this purpose). A brief survey of modern theories on the physics of metals and alloys and of advanced methods of investigation.

Laboratory work will include microscopical and physical investigations of more complex alloy systems and projects based upon the metallurgical aspects of the industrial operations studied.

4.34 PHYSICAL METALLURGY.

Modern theories of the metallic state studied in more detail than in 4.33 Physical Metallurgy, but with constant attention to illustrations drawn from contemporary industrial metallurgical practice. Advanced study of ternary and complex equilibria in metals, slags, refractories, etc., and the effects of out-of-equilibrium conditions upon such systems.

Crystallography and crystal analysis; stereographic projection, pole figures, etc., and their use in investigations.

Laboratory work will include use of advanced methods of physical investigation.

4.44 INDUSTRIAL METALLURGY.

A choice of several topics from the following (not necessarily complete) list will be available to enable students to gain a more intimate knowledge of particular industrial specialities in the various centres. Where possible, lectures will be given by industrial experts in the various fields—

- 1. Industrial Relations.
- 2. Industrial Organisation.
- 3. Metalliferous Mining.
- 4. Preparation of Minerals.
- 5. Iron and Steel Making.
- 6. Non-ferrous Metal Extraction.
- 7. Founding.
- 8. Metal Forming.
- 9. Welding and Joining.
- 10. Electroplating.
- 11. Powder Metallurgy.
- 12. Advanced Physical Testing.
- 13. Advanced Metallurgical Analysis.
- 14. X-Ray Diffraction.
- 15. Quality Control.

4.54 METALLURGY SEMINAR.

A series of lectures on all aspects of the presentation of verbal reports and papers will be given. Then each student will deliver a paper on a technical subject chosen by himself. This will be followed by discussion of the paper and its method of presentation.

4.64 METALLURGICAL THERMODYNAMICS.

Thermodynamics emphasising topics useful in metallurgical operation. Free energies of substances at elevated temperatures and activities of metals in solid and liquid alloys, used in interpreting metallurgical phenomena and in determining the feasibility and limitations of metallurgical processes.

4.912 AND 4.912D ENGINEERING METALLURGY.

For engineering students who do not expect to practise metallurgy as a profession.

Comparison of atomic structures, ionic, covalent and metal structures. General structural properties of metals, grain size and control. Plastic deformation, slip planes, cold work and work hardening, hot work, internal stresses and their removal. Physical metallurgy, types of equilibrium diagrams for the main types of binary alloys. Non-ferrous metals, copper and its alloys. Tin, lead, antimony and white metals; zinc, nickel, chromium, manganese, tungsten, cobalt, vanadium, molybdenum. The manufacture of ferrous metals, iron ores, products of the steel and iron industry. The blast furnace, pig iron, foundry cupolas. Steel by open hearth, Bessemer and electric furnace methods. Wrought iron and tool steel.

The physical metallurgy of iron and steel. The iron-carbon equilibrium diagram. Structure and physical properties of carbon steel. Heat treatment of iron and steel, quenching, tempering, annealing, normalising, case hardening and other methods of hardening. Cast iron.

Alloy steels, chief alloying elements, manganese steels, chromium, nickel and chrome, vanadium or chrome molybdenum types. High speed tool steels, silicon steels, stainless steels.

Metallographic preparation of specimens, etching reagents, use of microscope.

4.924 GENERAL METALLURGY.

The subject will be treated under three headings, section (ii) receiving most attention.

(i) Extractive (primary) and general metallurgy.

(ii) General physical (secondary) metallurgy.

(iii) Physics of metals.

Laboratory work will, as far as possible, keep in step and link up with the lectures, although most time will be spent on practical aspects of section (ii). The treatment will necessarily be brief but all available opportunities will be taken to link up with previous chemical subjects.

(i) Extractive and General Metallurgy.

Types of ore and their relationship to extraction processes.

Classification of extraction processes—pyrometallurgical, electrometallurgical, etc.

Chemical and physical principles of these processes.

Principles of refining processes.

Refractories and slags.

(ii) General Physical Metallurgy.

Structure of metals and its relation to their properties.

Casting and working principles; processing defects and their control or elimination.

Classification of alloys and their representation by equilibrium diagrams.

'Corrosion and protection of metals.

Principles of non-ferrous physical metallurgy; copper alloys, light alloys, white metals.

Principles of ferrous physical metallurgy; carbon steels, heat treatment, alloy and special steels, cast irons.

Metallurgy of metal joining processes.

(iii) Physics of Metals.

Properties of metals as derived from the periodic classification. The zone and band theories of solids.

Theory of alloys derived from the above considerations.

Brief survey of the applications of physical theory to the electrical and plastic properties of metals.

Mechanical Engineering.

Subjects 5.01 to 5.94.

5.101 AND 5.101A ENGINEERING DRAWING AND MATERIALS.

This course will consist of lectures on the elements of drawing office practice, and engineering materials and practice.

Drawing.—Use of instruments. Lettering and printing. Standard sheets scales. Projections of simple solids. Freehand and sectional sketching.

Plane Geometry.—Parabola; ellipse; hyperbola; involute; evolute; cycloidal and trochoidal curves.

Descriptive Geometry.—Projections; sections; oblique views; development of surfaces.

5.11 AND 5.11D ENGINEERING DRAWING.

Instruction in the correct use of drawing instruments and the application of drawing standards. Measurements and dimensioning. Orthographic, isometric and dimetric projections. Lectures on engineering materials and practice, properties and uses of the common engineering materials. In the drawing office the student will be required to do a reproduction on white paper to a scale of full size and to a reduced scale in orthographic projection of a machine part or simple assembly given to the student in isometric projection, and to do a tracing of this in ink on tracing paper. He will also be required to make dimensional freehand drawings of five of the machine parts enumerated below and to make accurate detail drawings and/or assembly drawings from the freehand sketches as a basis.

Machine parts and elements-

Valves (stop, check, safety, gate).

Cocks (water, gauge, glass assembly, etc.).

Bearings (plummer block, oil ring, ball bearing, etc.).

Couplings (rigid, flexible, Oldham, Universal Joint).

Clutches (cone, disc, dog).

Pumps (gear type, semi-rotary, small piston pump).

Pistons (I.C. piston and piston rod assembly).

5.12 AND 5.12D MECHANICAL ENGINEERING DESIGN.

Design procedures, loadings and factors of safety standards. Stresses in bolts. Design examples involving simple stresses. Design of shafts and bearings, belt drives and pulleys (leather, ∇ pivot drives), friction clutch, springs and screws (for power applications).

Design work associated with the above will be carried out in the drawing office.

5.13 MECHANICAL ENGINEERING DESIGN.

Design of gears (spur, worm), friction brakes (band, shoe), and load lifting appliances.

Design in the drawing office of a complete crane trolley.

5.14 MECHANICAL ENGINEERING DESIGN.

Design of machine elements with due consideration to acceleration effects. Design of reciprocating mechanisms.

Students will work in groups of to or three in the drawing office on one of the following assignments:---

Air Compressor.

Internal Combustion Engine.

Steam Engine.

5.21 MECHANICAL TECHNOLOGY.

(a) Properties of Materials and their Principal Uses.

Ferrous metals, non-ferrous metals and alloys, timber, plastic compounds, coatings and adhesives.

(b) Description of Machine Elements.

Fastenings: Screw fastenings, riveting, welding, brazing, soldering, keys and cotters, couplings, clutches, bearings, cams.

5.211 AND 5.211A WORKSHOP PROCESSES AND PRACTICE.

An introduction to some of the basic processes and practices of engineering workshops, to prepare students for the industrial training they must undergo as part of their courses. Students will attend lectures and demonstrations in some of the following fields, according to the courses in which they are enrolled. Instruction is given by the trade sections of the Department of Technical Education.

Fitting and machining, blacksmithing, heat treatment, founding and patternmaking, welding (oxy and electric), boilermaking, automotive mechanics.

5.22 MECHANICAL TECHNOLOGY.

Material Forming, Hot and Cold.

Physics and chemistry of plastics, presses, plastics manufacturing, die casting, punching and shearing bending, embossing, bulging, necking, curling, contracting, spinning, thread-rolling, deep drawing, ironing, cold-heading and upsetting, extruding, wire drawing, rolling and channelling.

Hot forging, rolling, extruding, welding and flame cutting.

Casting: Patternmaking, coring, sand-moulding, sand casting, floor-moulding, machine-moulding.

Centrifugal casting, slush-casting, lost-wax process.

5.23 MECHANICAL TECHNOLOGY.

Chip-forming: Hand and machine tools.

Theory of metal cutting: Single-point tools (force and power) milling, multi-point tools, grinding, honing and lapping.

Process limits and surface-finish, measuring methods.

Machine Tools.

Lathes, centre-turret, automatic, single and multi-spindle, copying lathes.

Drilling machines, single and multi-spindle, tapping machines, boring mill, jig borer.

Planer, shaper, slotter.

Milling.

Broaching.

Sawing and filling.

Hobbing.

Gear generating.

Grinding, cylindrical, centreless, surface-honing and lapping

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5.32 AND 5.32D ENGINEERING MECHANICS.

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A. Kinematics of the plane motion of a particle.

- 1. Rectilinear motion.
- 2. Curvilinear motion.
- 3. Graphic methods of solution.
- 4. Moment of velocity and acceleration.
- 5. Central motion.

B. Kinematics of the plane motion of a rigid body.

- 1. Translation.
- 2. Rotation.
- 3. Instanteous centres-centrodes.
- 4. Superposition of motions.
- 5. Velocity and acceleration in the plane motion.

C. Dynamics of the plane motion of a particle.

- 1. Newton's laws.
- 2. Energy law.
- 3. Kepler's laws.
- 4. Inertia forces-D'Alembert's principle.
- D. Kinematics and dynamics of the relative motion.
 - 1. Relative motion of points.
 - 2. Motion of points relative to a body.
- E. Dynamics of the plane motion of a system of particles.
 - 1. Fundamental laws.
 - 2. Corollaries.
- F. Dynamics of the plane motion of a rigid body.
 - 1. Fundamental laws.
 - 2. Energy law.
 - 3. Conservation of momentum.
 - 4. The central impact of bodies.
 - 5. The eccentric impact.
 - 6. Replacement of bodies by equivalent two or three point masses.
 - 7. Inertia forces-D'Alembert's principle.

G. The gyroscope.

H. Kinematics of mechanisms.

- 1. Instanteous centres.
- 2. Velocities by means of instantaneous centres.
- 3. Vector velocity and/or orthogonal velocity diagrams.

- · 5. Coriolis component.
 - 6. Floating link mechanisms.

5.33 THEORY OF MACHINES.

- A. Cams.
 - 1. Determination of cam profiles to satisfy given conditions.
 - 2. Analysis of given profiles.

B. Flywheels for reciprocaling machines.

C. Engine governors.

D. Balancing.

1. Rotating masses.

2. Reciprocating masses.

E. Toothed gearing.

- 1. Conditions for constant velocity ratio.
- 2. Involute gearing-standard and corrected gears.

F. 'Gear trains.

Simple, compound, epicyclic.

5.34 THEORY OF MACHINES.

- 6. P.

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A. Inertia effects in mechanisms.

Bending of members, pressures in joints.

B. Mechanical vibrations.

1. One degree of freedom, vibration measuring instruments, \mathbf{v}_{i}^{t} tion isolation.

- 2. Two degrees of freedom, undamped vibration absorbers.
- 3. Critical speeds of shafts.
- 4. Torsional vibration of shafts.

5.41 AND 5.41D DESCRIPTIVE GEOMETRY.

Plane geometry; ellipse, parabola, hyperbola, involute, cycloid and other curves.

Fundamental concepts of descriptive geometry, including reference systems, representation of point, line and plane; fundamental problems of position, of perpendicularity and of measurement. Construction of curves from plane geometry. Various surfaces and solids, their sections, developments and intersections in solid geometry. Application of descriptive geometry to certain problems arising in engineering practice. Especial emphasis on ability to visualise problems and processes involved in their solution.

5.52' FLUID MECHANICS.

Historical development and present day scope of subject. Physical properties of fluids.

Finid statics. Pressure-density-height relations. Manometry. Forces on plane and curved surfaces. Statics of moving systems. Equilibrium of bodies wholly or partly submerged in a fluid.

Flow of an ideal incompressible fluid. Pathlines and streamlines. Steady flow. Equation of continuity; one dimensional. Equation of motion along a streamline.

Flow of a real fluid. Viscosity. Friction force and energy loss. Velocity distribution and its significance. Laminar and turbulent flow. Reynolds number. Laminar flow through circular tubes and between parallel plates. Stoke's law. Lubrication mechanics.

Fluid measuring instruments. Measurement of fluid properties, static and stagnation pressures. Rate meters. Venturi meters. Orifices. Nozzles. Flow bends. Rotameter. Anemometers and current meters. Pitot-tube. Weirs. Dilution methods. Float measurements.

Momentum equation. Forces on bends, fixed and moving vanes. Impulse turbine. Moment of momentum equation and its application to reaction turbines, centrifugal pumps and fans.

Steady flow in closed conduits. Pipe-flow relationships. Frictionfactor charts. Minor losses. Hydraulic and energy lines. Syphons. Non-circular sections. Branching pipes.

Elementary problems of unsteady flow. Orifice discharging under falling head. Discharge of reservoir through pipeline.

Flow of liquids in open channels. Classification of flow. Steady uniform flow. Hydraulic jump. Specific energy, critical depth.

5.53 FLUID MECHANICS.

Statics of compressible fluids. Standard atmosphere. Stream function. Sources and sinks. Source in uniform stream. Pressure distribution around a moving cylinder. General case of equation of continuity, energy and momentum balance. Dimensional analysis. Flow of incompressible fluids in pipes. Dynamical similarity. Resistance of immersed and floating bodies. Unsteady flow of liquids in closed conduits. Impact of jets on stationary and moving vanes. Elementary theory of centrifugal pumps and fans.

5.54 Fluid Mechanics.

A. Rotodynamic Machinery.

Similarity relations. Specific speed and its relation to design of wotodynamic runners. Scale effect and model laws. Cavitation. Onedimensional theory of rotodynamic machines. Design procedure for a radial flow pump according to the one dimensional theory. Thermodynamics of the flow of gases and their application to rotodynamic machines. Design procedure for an axial flow impeller. General principles and characteristics of hydrodynamic transmissions. Propeller in the open stream—(a) airplane, (b) marine. Theory of hydraulic design of inward radial flow, axial flow and mixed flow turbines. Some particular problems of installation and operation of rotodynamic machines.

B. Gas Dynamics.

The general energy equation of a compressible fluid. The sound velocity. The Mach number. Non-frictional flow of a compressible fluid inside ducts and pipes. The Fanno and Raleigh equations. The convergent-divergent nozzle. The effect of the variation of the outlet pressure on the flow conditions. Normal shockwaves. Pressure, density and static temperature changes across shockwaves. Energy efficiency of a shockwave. Oblique shockwaves. Frictional flow in a constant area duct with or without heat transfer. The principles of jet propulsion; rockets, turbojets, ramjets.

5.64 PRODUCTION ENGINEERING DESIGN.

Interchangeability requirements. Use of standards. Hole basis or shaft basis. Limits and fits. Unilateral and bilateral tolerances. Functioning, manufacturing, and inspection data. Effect of gauge tolerances and gauge wear. Magnitude of tolerances. Tolerancing of cylinders, gaps and widths, lengths, angles and tapers, squares, hexagons and roundness, etc., profiles, radii and screw threads. General analysis of designs for production. Advantages and disadvantages of pursuing interchangeable principle. Designing for interchangeability or unit assembly. Design, dimensioning and tolerancing of particular types of work, and associated jigs, fixtures, tools and gauges. Economics of tooling-up. Development and use of standards in design of work, jigs, tools etc.

5.72 AND 5.72D THERMODYNAMICS.

Thermal Properties of Perfect Gases.

First law of thermodynamics; principle of the heat engine; state of a substance; measurement and units of P, V and T.

Gas Laws.

Boyle's, Charles' and combined gas laws; characteristic equation; the lb-mole; $R = \frac{CJ}{M}$; specific heats.

Energy.

Conservation of energy. Forms of energy. General energy equation. Simple energy equation for non-flow processes. Joule's Law of Internal Energy. Enthalpy (total heat).

Entropy.

Definition; the T- ϕ diagram; change in ϕ for C.P. C.V. and C.T. operations. General expression for change in entropy in terms of P. V, and T.

Thermodynamic Processes.

Determination of dQ, dW and dE for constant pressure, constant volume, constant temperature operations. Isentropic and polytropic operations. Representation of change of state on P-V and $T-\phi$ diagrams. Relationship between R, Cp and Cv. Relationship between dQ, dW, dE. Value of "n" for a given process. Relationship between P, V and T for a change in state.

Heat Engine Cycles.

The working cycle; the Carnot cycle; reversibility. Stirling and Ericsson cycles; Philips' hot air engine.

Air Compressors.

Types and applications; work done in single stage and multi-stage reciprocating compressors; intercooling. Effect of clearance; conditions for maximum efficiency; regulation of output; compressor efficiencies.

Heat Transfer.

Transmission by conduction—solids in series; thin- and thickwalled tubes; equivalent mean radius. Transmission by convection film coefficients; transmission from fluid to fluid through metal plates; overall heat tranfer coefficients. Transmission by radiation—Stefan's law; radiation from solids and gases; cases involving three forms of heat transfer.

Properties of Steam.

Formation of steam at constant pressure; properties of wet, dry and S/H steam. Determination of steam quality; Entropy of watersteam (briefly); use of steam tables.

Steam Boilers.

Purpose; classification; examples of water-tube and fire-tube types; essential fittings. Boiler auxiliaries (briefly); boiler performance (briefly).

Internal Combustion Engines.

Classification; air standard cycles and efficiencies (in terms of temperature). Operation and construction of three types; two-stroke and four-stroke cycles; comparison of Diesel and petrol engines. Testing and performance of engines (I.H.P, B.H.P, Fuel H.P. various efficiencies and curves).

5.73 THERMODYNAMICS.

I.C. Engines-General.

Review of air standard cycles and efficiencies. Effect of compression ratio and maximum permissible pressure on A.S.E. Effects of dissociation and variable specific heat. Calculation of cycle temperatures and efficiencies; use of Hottel charts.

I.C. Engines.

Gas and petrol engines—two and four stroke cycles; ignition; governing; process of combustion; detonation. Petrol engine effects of ignition timing; valve timing; mixture strength (fuel consumption loops). Supercharging; high compression ratio; carburettors. Oil engine—hot bulb type; semi-Diesel; two and four stroke Diesels; air blast and solid injection; governing; process of combustion; effect of mixture strength and compression ratio. Testing—usual tests; indicators; dynamometers; fuel and air measuring instruments; exhaust gas analysis. Various efficiencies; performance curves; heat accounts.

Heat Transfer.

Mean temperature difference for counter-flow and parallel-flow heat exchangers. Mean temperature difference for evaporators; condensers; thermal resistance and overall coefficient of heat transfer.

Boiler Auxiliaries.

Economizers; superheaters, air preheaters; combustion equipment.

Boiler Performance.

Heat losses; heat accounts; equivalent evaporation; thermal efficiency.

Steam.

Entropy of water-steam; $T-\varphi$ and P-V diagrams for watersteam; adiabatic equation. Expansions of a vapour; Mollier diagram for water-steam.

Steam Cycles.

Carnot cycle; Clapagron's equation; Rankine cycle of operations. Rankine efficiency for wet, dry and S/H steam; feed pump term. Ideal regenerative cycle; use of regenerative methods with compound reciprocators and steam turbines.

Steam Nozzles:

Purpose; types; steam flow through nozzles; critical pressure; determination of steam velocity and weight of discharge. Determination of nozzle dimensions; effects of friction and super-saturation.

Steam Turbines.

Principles of operation; reduction of steam velocity; types of turbine. Velocity compounding; pressure compounding; pressurevelocity compounding; reaction turbines; combination turbines. Velocity diagrams for single stage only; calculation of tangential force, work and horsepower; stage efficiency.

5.74 THERMODYNAMICS.

Steam Turbines.

Blade friction, reheat, internal efficiency. Velocity diagrams for impulse and reaction turbines. Drum and blading dimensions, methods of improving efficiency, applications of turbines.

Gas Turbines.

Development; constant volume and constant pressure cycles. Ideal thermal efficiency; adiabatic and polytropic efficiency; methods of improving efficiency; actual cycles. Description of components (compressor, turbine, burner and heat exchanger). Application and performance characteristics.

Steam Engines.

Steam chest and cylinder; steam valves and valve gear; reversing gear; valve diagrams. Indicator diagrams; behaviour of steam in cylinder; indicated steam consumption; missing quantity.

Calculation of cylinder sizes for simple and compound engines. Testing of steam plant; heat accounts; performance curves. Methods of improving efficiency; application of steam engines.

Steam Condensers.

Surface and jet condensers; cooling water calculations; vacuum efficiency; calculation of air present; air removal; air pumps and ejectors; modern developments.

Binary-fluid-cycles.

Methods of extending temperature range using two fluids; mercurysteam, internal combustion-steam, diphenyl-steam plants; practical applications; efficiencies attained; future possibilities.

Refrigeration.

General principles; terms used; reversed Carnot cycle; cold air machines (Bell-Coleman cycle). Vapour compression types; effects of superheating and under-cooling; conditions for maximum COP; nature and use of I-p and P-I diagrams. Absorption refrigeration; commercial and domestic. Choice of refrigerants; refrigerator calculations; testing of refrigerators; heat accounts.

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Special Boilers.

Progress in design of steam generators for high pressures and for quick starting; Clayton, Velox, La Mont Loffler, Benson, etc., boilers.

5.94 MECHANICAL ENGINEERING.

This course covers the fundamental mechanical engineering principles of heat engines and simple theory of machines. It will include the subject-matter of 5.72 Thermodynamics, together with selected topics from 5.32 Engineering Mechanics and 5.33 Theory of Machines.

Electrical Engineering.

Subjects 6.01 to 6.94.

6.12 ELECTRIC CIRCUIT THEORY.

Introduction: Circuit and field problems, basic circuit parameters, units, electric conduction. Ohm's law, resistance, effect of temperature, non-linear resistances.

Electromotive force: Sources of e.m.f. Generation of alternating and direct voltages.

D.C. networks: Series and parallel resistances. Delta-star conversions, node and mesh equations, circuit theorems.

Magnetic circuits: Analogy between magnetic and electric circuits. Computations, magnetic force, magnetic hysteresis, permanent magnets.

Circuit parameters in circuits: Inductance, mutual inductance, capacitance and resistance in d.c. and a.c. circuits. Transient and steady state solutions.

A.C. concepts: Sine wave theory, vector representation, complex algebra.

R.L.C. circuits in the steady state: Circuit theorems, resonance, coupled circuits, air core transformers, equivalent circuits.

Harmonics: Production of harmonics. Solution of circuits for non-sinusoidal voltages and currents.

6.13 AND 6.13B ELECTRIC CIRCUIT THEORY.

Harmonics and harmonic analysis.

Polyphase circuits, balanced and unbalanced, symmetrical component treatment.

Passive networks, network analysis, two and four terminal networks, electric wave filters.

Networks with active elements, analysis of circuits with vacuum tubes.

Transients in electric circuits and networks, Laplace transform method.

Non-electric and mixed networks, electromechanically coupled systems.

Feedback in amplifiers, automatic control and servomechanisms.

Quasi-stationary field problems, potential problems, field plotting relaxation methods, computation of circuit parameters, skin effect, proximity effects, heat dissipation.

Materials used in electrical engineering, conductors, semiconductors, dielectrics and insulating materials.

Non-linear circuit elements, vacuum tubes, rectifiers, thermistors.

Electric transmission lines treated from both the power and the communication aspect. Overhead and underground lines. Reflection, loading, artificial lines, concentric lines, transients.

Maxwell's equations, propagation of waves along transmission lines, wave guides and in vacuo.

Magnetic circuits and forces between currents and magnetic fields.

6.214 ELECTRIC POWER ENGINEERING A.

Transformers. Leakage reactance. Current surges. Phase conversion. Special types. Harmonics in single and 3-phase transformer. Design. 3-winding transformers. Thermal rating. Instrument transformers.

Power transmission by underground cables and overhead lines. Line constants. Rigorous solution for steady state conditions. Reactive power. Power circle diagrams. Voltage surges. Terminal effects.

Symmetrical components. Application to unbalanced faults.

Protection. Operation of basic devices and application to equipment and system protection.

System voltage regulation. Power limits and stability.

Traction. Speed time curves.

Illumination. Requirements and design.

6.224 ELECTRIC POWER ENGINEERING B.

Principles of e.m.f. generation. Armature windings for direct and alternating current machines. Leakage reactance, armature reaction, rotating fields.

Synchronous generator; operation on load; synchronous reactance; estimation of regulation; parallel operation on large and small systems; transient conditions; automatic voltage regulators. Synchronous motors; circle diagrams; vee curves; synchronous condensers.

Induction motors; operating characteristics; speed control by pole changing, cascading and control of secondary e.m.f. Induction generator. Synchronous induction motor.

Commutator motors. Phase advancers. A.C. and D.C. control systems for starting, speed control, braking, and load balancing. Electric and regenerative braking; plugging.

Metadynes, selsyns.

6.23, 6.23A AND 6.23B ELECTRIC POWER ENGINEERING.

Magnetization of iron, magnetic circuits in transformers and machines. Transformers, construction, operation, theory, design, polyphase, instrument transformers. D.C. and A.C. machine construction. Machine windings. Generated e.m.f., rotating m.m.fs. in polyphase machines. Synchronous generators and motors. Induction motors, single phase motors. D.C. generators and motors, operation, applications, starting and control. Rotary converters. Transmission, overhead and underground, voltage regulation, power limits, stability, protection. Distribution, wiring rules, power factor correction. Circuit breaking devices, arc extinction. Basic devices and relay applications in protection. Meters, indicating, recording and integrating. Illumination, light sources, visibility, requirements for effective illumination.

6.303, 6.303A AND 6.303B ELECTRONICS.

(a) Electron ballistics: charged particles and their motion in electrostatic and magnetic fields.

Electron emission from metals: thermionic emission, photoelectric emission, secondary emission.

Electrical conduction through vacuum, gases and vapours: space charge limitations, occurrence of gas in electronic devices, gaseous discharge, Townsend discharge, breakdown, glow discharge, arc discharge.

High vacuum electron tubes: characteristics, rating and control in high vacuum diodes and triodes, tetrodes, pentodes, beam power tubes and other multi-electrode tubes.

Gas tubes: effect of gas in thermionic diodes, mercury arc rectifiers, ignitrons; effect of gas in thermionic triodes, thyratrons.

(b) Single phase rectifier circuits: rectifier theory, smoothing and filter circuits. Vacuum tubes as Class A amplifiers: considerations of voltage gain, input admittance, waveform distortion, poweroutput and efficiency; coupled amplifiers with various types of coupling.

Amplifiers of the Class AB, Class B and Class C type: design and operation.

Vacuum tube oscillators: types of oscillators and conditions for oscillation.

Modulation and detection: the modulation process and types of modulation, radio communication.

6.304. 6.304A AND 6.304B INDUSTRIAL ELECTRONICS AND CONTROL.

A course designed to link electronic and electric power engineering and various other branches of engineering and science in the minds of students, and to give advanced students composite projects involving many aspects of what they have learnt together with economic and practical aspects.

Section A.-Regulators and servomechanisms, dynamics of closed systems, industrial control problems.

Section B.-Induction heating, dielectric heating.

Section C .- Selection of topics such as-

Polyphase rectifiers;

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Electronic control of motors and generators;

Basic timing circuits;

Ignitrons and thyratrons as line switches;

Resistance-welder controls;

Industrial X-rays;

Photoelectric devices, electronic lamps;

Electrostatic precipitation;

Power line carrier.

6.314 HIGH FREQUENCY ENGINEERING A.

Propagation of radio waves: A general treatment of propagation by means of ground, sky and space waves. Reflection and refraction in conducting media.

Properties of the ionosphere. Practical problems of propagation at different frequencies.

Radiation: Fundamental considerations deriving from Maxwell's laws. Use of Poynting's vector. Calculation of field pattern from linear antenna in free space. Effect of ground reflections, and properties of spaced antennas. Pattern and gain obtainable from directional arrays. Wave guides, aperture radiators and reflectors. Receiving aerials. Vacuum tube circuits: Behaviour of basic oscillator and amplifier circuits at low and high frequencies. Inverse and positive feedback. Conditions for oscillatory or non-oscillatory response. Sinusoidal and relaxation oscillations. Trigger circuits. Input admittance, output impedance, gain and phase shift of untuned amplifiers. Tuned amplifiers, response and operation, class A and class C. Harmonic generators, linear amplifiers and special amplifiers.

Modulation and modulators—amplitude, frequency and phase. Response of circuits to modulated waves. Frequency multiplication of modulated waves. Demodulation and demodulators. Frequency conversion and mixers.

Elements of radio communication and navigation systems. Elements of television systems. Brief treatment of electro-acoustic transducers, elements of acoustics.

6.324 HIGH FREQUENCY ENGINEERING B.

Principles and methods of design procedure are exemplified in the .design of equipment of the following types:---

Low frequency and high frequency measuring and testing devices, audio frequency systems, special-purpose amplifiers, cathode-ray -oscillographs, communication transmitters and receivers.

6.334 LINE COMMUNICATION ENGINEERING.

More advanced work on circuit theory following 6.13, specially applied to line communication work. Telegraph systems, manual operation, machine operation, elements of equipment and characteristics.

Carrier telegraphy, line and equipment operation. Picture transmission. Long lines and cables.

Telephone systems, general principles and electrical design of common components, circuit design, switching systems and exchanges, carrier systems. Distortion, interference, cross talk, power line interference, protection, amplifiers and repeaters.

6.83 AND 6.83D ELECTRICAL ENGINEERING.

Special course for engineers not intending to follow electrical engineering as a profession. Presentation of the fundamental principles of electric and magnetic circuits and the application of these principles to the theory and performance of direct and alternating current machines.

Lighting systems and illumination, wiring code, safety precautions.

6.84 ELECTRICAL ENGINEERING.

More advanced work following 6.83 on the operating characteristics of motors. Controller design and application, including types, methods of acceleration and retardation, protective devices. Essentials of connecting motor to load. Principles of moving fluids and solids. The application of motors, electron tubes and photo-electric cells.

6.94 ELECTRICAL ENGINEERING.

This course consists of one hour lecture and two hours laboratory per week for an entire year. Half of the course is devoted to detailed mathematical and descriptive study of electric and magnetic circuits. The other half of the course will provide an introductory course on transformers, motors, generators and electronics.

6.95 ELECTRICAL ENGINEERING.

This course consists of two one-hour lectures and three hours laboratory per week for an entire year. Half of the course is devoted to detailed mathematical and descriptive study of transformers, motors, generators, wiring practice and electrical measurement. The other half of the course is devoted to electronics and special applications of electrical engineering to chemical plant. It is envisaged that this section of the course will be given by various specialists. The following subjects are examples of its coverage:—

Thermionic tubes; conduction of electricity through gases; rectifiers; rheostats; magnets; electric furnaces and electroplating; power generation and distribution.

Mining Engineering and Geology.

Subjects 7.001 to 7.94.

7.001 MINING PROCESSES AND PRACTICE.

This course is an introductory series of lectures in mining dealing with the following:-

History of the mining industry, development of methods of working, ventilation of mines, mine lighting, transport and mining machinery, mine organisation and mine management, health and safety in mines, mine gases and explosions.

7.002 MINING.

Mine Atmospheres. Mining Hygiene. Dust Control. Mine Lighting. Gas Testing. Deep Boring and Shaft Sinking.

Mine Atmospheres.

Atmospheric conditions in mines. Sources of pollution of mine sir; mine gases; properties and physiological effect of various gases; sampling of mine air; air analysis; detection of gases, gas detectors.

Temperature and humidity; their causes; geothermic gradient; physiological effect of temperature and humidity; kata thermometer; effective temperature; conditioning of mine air; hot and deep mines. Environmental surveys.

Mining Hygiene and Dust Control.

Miners' diseases; silicosis; pneumoconiosis; nystagmus; sporotrichosis; ankylostomiasis; dermatitis. Compensation and treatment.

Dust formation. Dust prevention:—Boring; cutting; loading; travelling roads; ore bins and chutes; screens. Air cleaning. Dust extraction. Dust measurement.

Mine Lighting and Gas Testing.

Brief historical development of safety lamp; principle and construction of wire gauze. Conditions to be fulfilled in efficient safety lamp; types of flame safety lamps; electric hand lamps and cap lamps; M.L. lamps; mains lighting; discharge lighting; aids to illumination.

Lamp fuels; tests on lamp fuels; illuminating power; design and equipment of lamp rooms; safety lamp tests.

Gas detection. Flame safety lamps; special methane detectors.

Deep Boring and Shaft Sinking.

Percussive, rotary; non-coring, coring; equipment, accessories; lining and surveying of boreholes.

Shaft sinking. Preliminary considerations; selection of site; determination of number and size of shafts; ordinary methods of sinking and lining shafts; appliances and accessories required.

Ventilation and lighting of shafts; dealing with water from shafts.

Shaft sinking in difficult conditions; special methods of sinking; enlarging, repairing and deepening shafts. Large diameter boreholes.

7.003 MINING.

Explosives and Blasting. Mine Ventilation. Methods of Working Coal.

Explosives and Blasting.

Action of explosives; types of explosives; composition and classification of explosives. Permitted explosives; tests of explosives; choice of explosives; sheathed explosives; storage of explosives. Detonators; charging and firing shots; gases due to shotfiring; multiple shotfiring. Exploders. Arrangements of shotholes in coal and stone. Substitutes for explosives. Tunnelling; shot hole drilling practice and methods of blasting.

Mine Ventilation.

Quantity of air required for ventilation; measurement of quantity and pressure of air; resistance to flow of air.

Ventilation laws; their evolution and application; equivalent orifice; motive column; evasée chimney; air distribution in mines; splitting air currents; regulators. Methods of producing ventilation; brief historical review; natural ventilation; description and characteristics of centrifugal and axial flow fans. Main and auxiliary ventilation; ventilation surveys.

Methods of Working Coal.

Open-cut methods; proving the deposit; general outline of development; equipment used. Shaft mountings and insets; location; factors affecting location; structure. Pit bottom; excavation; support; layout. Development of coal seams; order of extraction; methods employed; horizon mining. Bord and pillar workings; suitable conditions; size of pillars; typical layouts and machines used; pillar extraction. Longwall working; suitable conditions; layouts and machines used. Methods of working in special cases; steep seams; thick seams; seams in close proximity; seams subject to spontaneous combustion. Roof supports; at the face and on roadways. Hand, hydraulic, pneumatic and mechanical stowage. Caving. Withdrawal of supports. Preservation of timber supports.

Laboratory.

Fan testing. Ventilation plans. Dust measurement. Mine air analysis. Gas detectors.

7.004 MINING.

Winding, Transport and Drainage. Power Supply and Transmission. Mine Organisation, Management and Mining Law.

Winding.

Guides—rigid and flexible. Cages, cage-chains, detaching hooks, capels. Headframes, keps. Decking arrangements. Winding engines, drums, brakes, reversing gear, overwind and slow banking gear. Koepe and other winding systems. Characteristic winding curves. Balanced winding. Skip winding. Signalling systems. Ropes.

Transport.

Rails; tracks; skips. Manual haulage. Horse haulage. Rope haulage. Locomotive haulage. Safety devices; signalling systems; haulage calculations.

Drainage.

Adit levels. Siphons. Ram pumps. Piston pumps. Multi-throw pumps. Differential pumps. Duplex pumps. Centrifugal and multistage centrifugal pumps. Mono pumps. Megator pumps. Sumps and standages. Drainage of flooded workings.

Power Supply and Transmission.

'Fundamental principles of electric and magnetic circuits and the application of these principles to the theory and performance of direct and alternating current machines.

Compressed Air. Air compression; types of compressors; receivers; transmission lines; pressure drop in lines; air meters; application and air consumption of various types of air motors.

Electricity—Outline of Colliery Electrical Organisation and Equipment.

Surface Installation at Mines. Distribution of power; sub-stations; electric winding engines—straight a.c. system, converter equalizer system, Ward Leonard system, Ilgner system, C.M.B. system, Cascade Motor system; ventilation fan motors; other surface plant; bare overhead transmission lines; rectifiers; surface lighting. Lamp Room equipment.

Underground Plant. Underground distribution; typical examples. Shaft cables. Pit bottom sub-stations. Roadway cables. Transformers. Calculations of size of cables. Joint boxes. Underground equipment. Motors; control, switchgear and protective devices. Flame-proof equipment. Trailing cables; connections for trailing cables; care, treatment and repair of trailing cables. Haulage locomotives.

Switchgear and accessories for coal face equipment. Earth continuity protection. Remote control devices. Intrinsically safe equipment. Signalling.

Mine Organisation, Management and Company Law.

Surface organisation and equipment and colliery costs. General surface arrangements; location of plant; workshops and surface buildings. Colliery organisation and management; control of labour; duties and functions of officials; reports; returns and notices; labour and output; materials and stores; systems of payment. Time keeping; measurement of work; analysis of costs; estimates; overheads.

Company organisation and company law; economics of New South Wales coalfields. Trades unions and associations.

7.013 METALLIFEROUS MINING.

Working of unstratified deposits.

Definition of mining terms. Types of mineral deposits. Prospecting.

Surface mining methods. (a) Alluvial mining; panning; long tom sluicing; hydaulicing; dredging; draft mining. (b) Quarrying; layouts; glory-holing; methods of loading and transporting products.

Underground mining methods. Factors influencing selection of methods. (a) Open stope supported naturally. Open stoping; sublevel stoping; shrinkage stoping. (b) Open stope supported artificially. Horizontal cut and fill; inclined cut and fill; stulled and square set stoping. (c) Caved stopes. Block caving; sub-level caving; top slicing.

*7.014 COAL MINING.

Subsidence and Strata Control. Spontaneous Combustion, Fires and Inundations. Explosions, Rescue and Recovery Work.

Subsidence and Strata Control.

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Subsidence; early theories, angles of draw, surface movements, influence of thickness of seam, depth, inclination of strata, nature of strata, methods of working, etc. Shaft pillars and pillars for other surface supports.

Properties of coal measure rocks.

State of stress at mining depths; the stress conditions in the vicinity of single and multiple roadways and their effects.

Stress conditions along pillar extraction lines in bord and pillar mining.

Principal stress conditions in longwall mining and their effects; means of modifying excessive stress conditions.

Rock bursts in mines; theories; classification; conditions conducive to bursts; examples of rock bursts; preventative measures.

Spontaneous Combustion, Fires and Inundations.

Oxidation of coal; historical review of theories of cause of spontaneous combustion; factors influencing self-heating; observation and organisation in seams liable to spontaneous combustion; detection of incipient heatings.

Methods of dealing with heatings and gob fires; removal of fires; construction of seals.

^{*}Optional for students in the Mining Engineering Course who wish to specialise in Coal Mining.

Layout of workings in seams liable to spontaneous combustion. Re-opening of sealed-off areas.

Other causes of underground fires; precautions and methods of dealing with fires.

Sources of water under pressure; precautionary measures when working under or approaching water; water blast; dams.

Explosions, Rescue and Recovery Work.

Ignition of gas and coal dust; explosive properties of coal dust; factors affecting explosibility; nature and characteristics of gas and coal dust explosions; causes, effects and precautionary measures; research work on gas and coal dust explosions.

Rescue work; respiration; self contained breathing apparatus; smoke helmets and respirators; organisation and operation of rescue work; rescue stations and brigades; mine accidents; ambulance stations and organisation.

Laboratory.

Analysis of dusts. Explosion tests of coal dust and methane. Rescue apparatus,

*7.24 METALLIFEROUS MINING.

Mining.

Rock drills; drill steel and steel sharpening; drill bits; churn, calyx and diamond drilling.

Blasting in stopes; long hole blasting.

Transfer of broken ore from stopes to chutes and cars.

Mine fires; fire fighting; fire protection in stopes and shafts and electrical installations.

Sampling.

Underground sampling. Procedure. Stope and development sampling; reduction of samples; computations for tonnage and assay values; books and assay plans.

Borehole sampling. Procedure; spacing of boreholes; computation for tonnage; average value.

Alluvial sampling. Borehole samples; power and hand drill drive; pipe panning; computation of bore value; computation for yardage and value.

Pit sampling. Dump-sampling; reliability.

Mining Law and Valuation.

New South Wales Mining Act.

Ore reserves-proved, probable and prospective; mineral beneficiation and marketing of ores.

^{*}Optional for students in the Mining Engineering Course who wish to specialise in Metalliferous Mining.

Mineral properties. Taxation; life; annual value; present value. Mine Accounts. Day labour, contract and bonus work.

Organisation of mine management; mine reports.

Mine stores and storekeeping.

Laboratory.

Principally spent on additional work on-

- (a) Metalliferous mine ventilation plans.
- (b) Preparation of minerals and fire assaying.

(c) Laboratory work and tests for preparation of theses.

7.034 PREPARATION OF MINERALS.

Object, scope and economics of coal preparation and mineral dressing.

Size Reduction: jaw, gyratory, cone and roll crushers, Bradford breakers, hammer mills, stamps. Grinding, ball mills, rod mills, tube mills.

Liberation: theory and effect on concentration procedures.

Sizing: laboratory sizing and industrial screens.

Theory of Classification: classifiers; coal washing machines which operate on classification principles.

Coal Preparation: distribution of ash in coal; float and sink tests; washability curves; jig and trough washers; float and sink separators; cyclone separators; spiral concentrators; froth flotation; pneumatic separators.

Mineral Dressing: sink and float; jigging; flowing film concentration; flotation and agglomeration; spiral concentrators; magnetic separators; electrostatic separators; amalgamation; cyanidation; recovery of metal from ores.

Storage: conveyors, weighing; sampling; feeding; thickening; filtering; pumping; tailings disposal; centrifuges; dust collection.

Flowsheets: mill design; pilot plants

7.052 MINING ENGINEERING PRACTICE.

Introduction. A general review of mining practices and methods. Mining viewed as a link between geology and different industries. Proving the mineral by boring from the surface. Methods of deep boring. Tunnelling. Organisation and equipment. Drilling and loading. Explosives and blasting. General considerations of breaking ground with explosives. Some details of principal methods of shaft sinking and lining. Underground methods of working metalliferous Underground methods of working coal deposits. deposits. Strata control. Subsidence. Methods of supporting roadways and workings -general principles and description. Special methods of supportstowing. Underground transport. Shaft winding. Some details of winding. Power. Steam. Compressed air. Electricity. Drainagegeneral considerations. Some details of principal types of pumps. Mine lighting. Mine ventilating. General principles concerning the production and distribution of the air current. Mine atmospheres. Heat and humidity. Gases-properties and physiological effects. Gas testing. Dusts and their control. Health and hygiene. Safetygeneral considerations. Fires and fire-fighting. Mine explosions. Rescue and recovery work. Underground organisation. Surface organisation. Surface installations. Overall control and management. Surface methods of working metalliferous and coal deposits. Mining -its problems and future.

7.502 GEOLOGY.

Introduction, the scope and applications of geology; cosmology and structure of the earth; agents of denudation, weathering, river action, glaciology, wind action, the sea and its action, lakes; underground water, diastrophism, vulcanism and earthquakes; igneous sedimentary and metamorphic rocks, coal and petroleum, introductory stratigraphy and historical geology, the relationship of geology to mining and civil engineering problems.

Laboratory.

Examination and identification of common minerals and rocks in hand specimen; interpretation and preparation of geological maps and sections.

Field Work.

Six excursions to be held on Saturdays during the year.

7.503 Petrology.

(For 7.503A see also 7.573 GEOLOGY.)

Petrology.

Detailed treatment of the mode of occurrence of igneous rock bodies; the composition and constitution of magmas, the physicochemical aspects of crystallization of magmas, temperature composition diagrams for binary and ternary magmas; magma differentiation; sedimentary rocks—detailed treatment of the origin, types and classification of sedimentary rocks. Introduction to the petrology of coal.

Chemical analysis of rocks and their mineralogical interpretation, calculation of norm, variation diagram, trilinear diagram, methods of classifying igneous rocks; the reaction principle in petrogenesis, differentiation, hybridism, assimulation, deuteric activity; origin of igneous rocks; the alkaline rocks and their origin; petrographic provinces.

Principles of sedimentary petrology, the environmental factor in sedimentation, classification of environments, rhythms in denudation and sedimentation, classification of sediments by sedimentary petrological methods, methods of rational analysis of the constituents of sedimentary beds, heavy mineral residues, provenance.

Metamorphism.

Agents of metamorphism, depth, zones and metamorphic facies, metamorphic minerals and structures; cataclastic, thermal, dynamothermal, plutonic and metasomatic metamorphism; classification of metamorphic rock-types, use of equilibrium diagrams in studying metamorphism, lit par lit injection, granitization and anatexis.

Advanced Lithology.

More detailed study of various rocks, including the less common types.

Micro-petrology.

Microscopical examination of minerals and rocks.

Petrographic Methods.

Graphical representation of chemical analyses of rocks; the integrating stage; the Delesse-Rosival method of rock analysis; computation of norms, variation and trilinear diagrams and their use; A.C.F. diagrams, computation of formula of complex minerals from chemical composition.

Petrographic Micro-technique.

Preparation of microslides of rocks and fossils.

7.504 Advanced Mineralogy and Petrology.

Instruction in the use of the universal stage; introduction to the study of petrofabrics.

Industrial Mineralogy.

Application of petrological methods to the study of industrial raw materials; mineralogy of artificial minerals, cements, slags, ceramics and refractories; optical determination of artificial minerals. *Laboratory*.

Practice in the use of the universal stage, petrofabric investigations; thin section examination of artificial minerals found in ceramics, refractories, slags and cements; differential thermal analysis and its applications.

7.513 AND 7.513A MINERALOGY AND CRYSTALLOGRAPHY.

The principles of crystallography, covering the laws of crystals; crystallographic systems, Miller indices notation and other notations, zones, measurement of crystal angles, stereographic and gnomonic projections, use of two-circled goniometer. Twinned crystals, hemihedrism, crystal growth, irregularities of crystals.

X-ray crystallography—crystal systems, space lattice, introduction to the analysis of crystal structure by X-rays Laue diffraction patterns, X-ray spectrometer, powder method of X-ray analysis.

Atomic structures of the quartz, felspar, mica, amphibole and pyroxene groups of minerals, etc.

Relation of physical properties of minerals to their molecular structure; secondary twinning, gliding planes, percussion figures, etching figures, corrosion forms, accurate methods for determining hardness and specific gravity of minerals; structural and composition colouring of minerals, fluorescence, and phosphorescence; magnetic and electrical properties of minerals; categorical synopsis of mineral properties.

A study of the less common mineral groups, including the radioactive minerals.

Isomorphism, polymorphism, pseudomorphism, etc.

Spectrographic analyses of minerals.

Crystallography.

Examination of crystals for symmetry, perspective drawing of crystal models.

Measurement of crystal angles by the one-circle and two-circle goniometer, stereographic and gnomonic projection of crystals. Analysis of crystal structure by X-ray methods.

Optical Mineralogy.

Detailed treatment of the Fresnel and refractive index ellipsoids; relationship between optical properties and (a) crystal system, (b) crystallographic orientation; observation of mineral fragments under the microscope; measurement of optic axial angle, accurate measurement of refractive index and extinction angle, determination of pleochroic schemes.

Optical examination of a wide range of minerals.

Descriptive Mineralogy.

Macroscopic examination of common mineral groups; mode of occurrence and paragenesis.

Determinative Analysis.

Qualitative and quantitative analyses of minerals, supplementing the lecture course.

7.514 MINING GEOLOGY, MINERAL ECONOMICS, MINE VALUATION.

Detailed treatment of the influence of geological structure on ore deposition; epithermal, mesothermal, hypothermal and pyrometasomatic deposits; wall-rock alteration as a guide to ore deposition; studies of geological thermometry; textures of ore deposits and their significance; alteration of ore deposits by weathering, boxworks, supergene enrichment, etc.; metallogenetic provinces; brief treatment of the geology of important mining fields of Australia; brief treatment of the geology of important overseas mining fields.

Underground survey procedures, preparation of mine plans, sampling, minable ore limits, ore reserves, sample assay analyses, and ore reserve calculations.

Detailed treatment of drilling methods.

Marketing of minerals, buyers, prices, Australian consumption, overseas trade, graphs of Australian and world production figures; assessment of mineral resources; strategic, critical and essential minerals; mining enterprise and its relation to the social and economic pattern, commercial controls and national policies.

New South Wales Mining Act.

Mine Valuation.

Appraisal of ore reserves; extraction costs, beneficiation and smelting costs, capital value of machinery, production costs v. market values, taxation, life, annual and present value, etc.

Laboratory.

Mapping exercises, including the application of stereographic projection to the solution of mining geology problems; computation of ore tonnages in mining leases, logging of bore cores, preparation of reports, examination of mine plans.

Mineragraphy.

Principles of the mineragraphic determination of opaque minerals, examination of a wide range of minerals, interpretation of ore textures, applications to ore dressing.

7.523 STRATIGRAPHY AND PALAEONTOLOGY.
(For 7.523A see also 7.573 Geology.)
(For 7.523B see also 7.574 Geology.)

The geological evolution of the Australian Continent from the Pre-Cambrian to the Recent times and other important world localities.

Palaeontology.

Invertebrate palaeontology; systematic classification of the various phyla and detailed morphological study of the important sub-divisions of the phyla; an outline of historical geology. Regional palaeontology; stratigraphical significance of fossil assemblages. Stratigraphical correlation of sedimentary strata; palaeontological environment and its relationship to sedimentology, ecology, evolutionary trends; statistical palaeontology. \cdot Examination and description of representative fossils from the various phyla; study of fossil assemblages.

Structure contour exercises, interpretation of structure and history from geological maps.

7.524 PHOTOGRAMMETRY, PHOTOGEOLOGY AND MILITARY GEOLOGY. Photogrammetry.

As for the Civil Engineering IV degree course elective.

Photogeology.

Interpretation of terrain from aerial photographs; geological structure and rock type of determination, vegetal determination of lithology; applications in military geology.

Military Geology.

Physical character of bedrock in relation to trenching, mining, etc.; groundwater studies and sub-surface drainage conditions; appraisal of the strength of ground as a foundation for fortifications and heavy guns.

Location of sand, gravel and other materials for construction works; prediction as to the stability of different types of ground under different weather conditions; photogeological interpretation of wave, current and tide action and other strandline phenomena (coral reefs, shoals, etc.); studies of the penetration and damage effected in various types of rocks due to bombing and shelling.

Laboratory.

Photogeological interpretation of physiography, structure, lithology, etc.; applications of photogeological methods in engineering practice and in military operations; compilation of geological maps from aerial photographs, use of the Multiplex projector in regional geological studies.

7.533 ECONOMIC GEOLOGY.

(For 7.533A see also 7.574 Geology.)

Magmas and mineral deposits, review of modes of mineral formation, structural control of ore deposition, form and structure of mineral deposits, ore shoots, texture of ore deposits; study of important ore deposits.

Detrital deposits, mineral deposits of sedimentary origin, deposits formed by sublimation and evaporation; brief treatment of epithermal, mesothermal, hypothermal and pyrometasomatic deposits; pegmatitic and magmatic deposits; alteration of metallic ores near the surface.

Gemstones-types, occurrence, synthetic equivalents, methods used in gemstone determination.

Clay and refractory minerals-brief treatment of mineralogical and physical constitution, industrial uses, and mode of occurrence.

Water Supply.

Water table in granular and fractured rocks, artesian water, geological classification of artesian aquifers, review of sub-surface waters in Australia, mathematics of groundwater flow.

Macroscopic and microscopic examination of various ore and other economic materials.

Mathematical and graphical determination of economic structural problems.

7.534 Advanced Engineering Geology.

Geological exploratory work in engineering projects; inter-relation of soil mechanics and geology; testing of the physical properties of rocks.

Geological aspects of quarrying and tunnelling, geology of dam sites and reservoirs, bridge and building foundations; rock creep and landslides; protection of river banks against scour; transportation of sediments, siltation of rivers; soil erosion and its control.

Building stones, concrete aggregates, road materials and railway ballast.

Principles of subterranean installations.

Principles of engineering seismology.

Mining tectonics-structures induced by mining, rock bursts, applications of microseismic methods, strata control in mines; subsidence-causes and effects, support of overburden by pillars, protection of surface structures.

Laboratory.

Laboratory soil tests, consolidation characteristics and permeability of sediments; methods of testing rocks in tension, compression and shear, petrological interpretation of the physical behaviour of various rock types under stress. Logging of bore cores.

Examination and testing of building stones, road materials and aggregates; preparation of reports.

Students will be required to peruse geological literature pertaining to engineering works.

7.543 GEOPHYSICS AND GEOTECTONICS.

(For 7.543A see also 7.574 GEOLOGY).

The physical properties of rocks, stress-strain concepts, mechanics of deformation and rupture in rocks, behaviour of rock types under various stress conditions.

Modern ideas relating to the internal structure and constitution of the earth, the concept of isostasy, major crustal structures—geosynclines, mountain chains, rift valleys, etc.; continental drift theories, sub-crustal convection currents, radioactive heat and diastrophism, continental growth, polar wanderings, glacial epochs, age of earth.

Description and analysis of folds, joints and faults; secondary foliation and lineation, granite tectonics. Salt domes, slump structures and submarine canyons.

Various methods used in geophysical exploration, instrumental details, limitations of the various methods; miscellaneous geophysical methods, including electrical bore core logging and the study of geothermic gradients and heat flow in mines; field techniques, compilation of field data, preparation of geophysical reports.

Microchemical prospecting.—An introduction to microchemical procedures, crystal reactions and spot tests used in field practice; detection of traces of metallic constituents in plants, soils, rocks, and groundwater.

The applications of geophysics to geology.

Geophysics (laboratory and field).

Introduction to the use of geophysical instruments; compilation, plotting and interpretation of the results of simple geophysical surveys (gravimetric, magnetometric and resistivity).

Field Work.

Instruction in geological and geophysical survey methods.

7.544 GEOLOGY (F FUELS,

Coal.

Review of the structural features associated with coal seams, detailed treatment of the physical and chemical properties, microscopic features, metamorphic evolution, utilization and classification; review of Australian occurrences; important overseas coalfields, coal derivatives.

Petroleum.

Detailed treatment of the origin and occurrence, stratigraphic and structural features of oilfields; subsurface laboratory methods micropalaeontological analysis, detrital mineralogy, X-ray diffraction, differential thermal analysis, water analysis, core analysis, fluoranalysis, etc.; subsurface logging methods—cable-tool samples, electrical, radioactive well logging, temperature logging, drilling-mud and cuttings analysis, drilling-time logging and other specialist techniques. Details of drilling methods.

Secondary recovery of petroleum, subsurface maps and illustrations. Important oilfields of the world. Laboratory.

Coal.—Micro-petrological examination of various types of coal, microspore correlation; determination of moisture, ash fusion, point, etc.; proximate analysis and classification.

Petroleum.—Correlation by micropalaeontological and sedimentary petrological methods; interpretation of logging data; preparation and interpretation of subsurface maps, isopach and convergence maps.

Field Work.

Visits to mining centres and engineering works.

7.553 GEOLOGY.

A course for students in Mining Engineering.

(a) Petrology, Crystallography and Mineralogy.

Physical, chemical and optical properties of the chief rock-forming mineral groups; elementary crystallography; detailed study of the origin and nature of igneous, sedimentary and metamorphic rock types.

(b) Stratigraphy and Palaeontology.

Principles of stratigraphy; elementary palaeontology, use and value of fossils; Australian geology (special emphasis on New South Wales geology).

(c) Geology of Coal and Petroleum.

Coalfields and coal resources of Australia.

(d) Principles of Ore Deposition.

Introduction; formation of minerals, importance of underground waters, openings in rocks, metasomatism, texture of ore deposits, form and structure of mineral deposits; syngenetic and epigenetic deposits; structural control of ore deposition, ore shoots; classification of mineral deposits; alteration of ore deposits near the surface; examples of important metalliferous deposits in various countries of the world.

Laboratory.

Examination of hand specimens of rocks; elementary crystallography; microscopic examination of the principal igneous, sedimentary and metamorphic rocks; megascopic study of important ore minerals; interpretation and preparation of geological maps and sections.

Field Work.

A minimum of six days to be spent in the field.

7.554 GEOLOGY.

Geology of non-metallic substances, including structural and building materials, refractories, abrasives, ceramic materials, etc.; groundwater supplies.

Photogeology and its applications; methods of geological and geophysical exploration; geology of foundation sites, cuttings and embankments.

Geology of Coal.

General considerations; details of occurrence, megascopic and microscopic features, chemical and physical properties, classification, origin and review of Australian occurrences; occurrences in other countries of the world.

Metalliferous Geology.

Magmas and mineral deposits; types of ore deposits, including detrital, syngenetic mineral deposits of sedimentary origin, deposits formed by sublimation and evaporation, epithermal, mesothermal, hypothermal and pyrometasomatic deposits, pegmatitic and magmatic deposits; oxidation of metallic ores; metallogenetic epochs; minable ore limits, ore reserves, sample assay analyses; detailed study of main Australian ore occurrences.

Laboratory.

Examination of industrial materials such as refractories, abrasives, road metals, etc.; determination of ores by blowpipe tests; mineragraphy; megascopic and microscopic examinations of coal, advanced mapping and its application to economic problems; photogeology.

Field Work.

A minimum of six days will be spent in the field during the year. Students will be instructed in the methods of geological and geophysical surveying.

7.563 GEOLOGY.

A course for students in Architecture.

Scope of the science of Geology, the various sub-divisions of the science, the geological periods; cosmology and structure of the earth's crust, agents of denudation, weathering, river action, glaciology, wind action, the sea and its action, lakes, underground water; diastrophism, vulcanism, earthquakes, primary and secondary geological structures; principles of physiography; igneous, sedimentary and metamorphic rocks. Introductory study of important ore-forming minerals; economic deposits of non-metallic materials such as clay, gypsum, ochre, limestone, shale, etc. Inter-relation of geology and soil mechanics—types of unconsolidated materials and their behaviour under stress. Geological aspects of foundation sites—ground conditions, groundwater considerations, preliminary and exploratory geological work, influence of geological features on foundation design.

7.564 PETROLOGY AND ADVANCED MINERALOGY.

This course is a composite of the second portion of 7.503B Petrology together with 7.504 Advanced Mineralogy and Petrology.

7.573 Geology.

This course is a combination of parts of two courses, 7.503 Petrology and 7.523 Stratigraphy and Palaeontology.

7.503A Petrology.

- Approximately $1\frac{1}{2}$ terms dealing with the first two paragraphs of syllabus for 7.503 Petrology. Practical work comprises advanced lithology and introductory micropetrology.

7.523A Stratigraphy and Palaeontology.

Approximately $1\frac{1}{2}$ terms dealing with introductory stratigraphy and palaeontology. Practical work comprises mapping and introduction to palaeontology.

7.574 Geology.

This course is a combination of parts of three courses, 7.523 Stratigraphy and Palaeontology, 7.533 Economic Geology and 7.543 Geotectonics and Geophysics.

7.523B Stratigraphy and Palaeontology.

One term completing 7.523 Stratigraphy and Palaeontology commenced in Geology II.

7.533A Economic Geology.

One term on introductory economic geology taken from 7.533 Economic Geology.

7.543A Geotectonics and Geophysics.

One term dealing with geotectonics and, briefly, applications of geophysics.

Civil Engineering.

Subjects 8.01 to 8.94.

8.11 AND 8.11D ENGINEERING MECHANICS.

Graph drawing, graphs of two variables, use of functional graph paper, graphs of three variables. Graphical differentiation and
integration. Simple machines, velocity ratio, mechanical advantage, efficiency, etc. Graphical statics, solution of simple framed structures by graphical and analytical methods. Introduction to the concepts of shear force, bending moment, axial force.

8.112 AND 8.112D THEORY OF STRUCTURES.

Stress, strain, elasticity. Riveted and welded joints, thin shells. Compound stresses. Bending moment and shear force. Theory of bending of beams, bending stresses, shear stresses; deflection of beams. Torsion, springs. Combined bending and twisting, combined bending and direct stress. Strain energy, resilience, impact loads.

8.113 STRUCTURES.

(a) Influence lines for statically determinate beams and trusses. Impact, maximum moments and shears. Continuous beams. Threemoment theorem and applications. Deflection of trusses by graphical and analytical methods. Stresses in redundant frames. Strain energy methods. Castigliano's theorems.

(b) Design of steel structure, columns with bracket loads, plate web girders, mill building, steel-frame buildings.

(c) Reinforced concrete, elastic theory, design of beams with single and double reinforcement T-beams.

(d) Drawing office work associated with (b) and (c).

8.114 STRUCTURES.

(a) Tension coefficients. Space frames. Relaxation methods and analysis of indeterminate structures. Elementary treatment of arches. Experimental model analysis. Moment distribution methods.

(b) Design of retaining walls, weirs, small dams, timber design, strength, joints, beams and joists, columns and struts. Reinforced concrete columns. Plastic theories applied to reinforced concrete. Prestressed concrete design. Limit design of continuous beams.

(c) Associated drawing office work.

8.122 STRUCTURES.

Application of work in Theory of Stuctures (8.112) to the design of simple structures. Design of simple built-up beam or beam system. Design of roof truss, determination of loading, member forces, etc. Design of riveted and welded joints. Theory and design of columns.

8.123 STRUCTURES (THEORY AND DESIGN).

For students in Mechanical Engineering.

(a) Influence lines for statically determinate beams and trusses. Impact maximum moments and shears. Continuous beams. Threemoment theorem and applications. (b) Design of steel structures-columns with bracket loads, plate web girders, mill buildings, steel-frame buildings.

(c) Associated drawing office work.

8.124 STRUCTURES.

For students in Architecture.

Revision of fundamental theory, including proofs where these were previously omitted. Bending of beams. Relationship between load intensity, S.F. and B.M. Distribution of bending stresses and shear stresses with proof of formulae. Curves of maximum B.M.

Slope and deflection of beams. Application to fixed-ended beams. Moment-area methods. Myosotis method. Continuous beams. Theorem of three-moments.

Unsymmetrical Bending.—Bending in a plane inclined to the principal axes of the cross-section. Angles used as beams. Conditions of freedom from twist.

Complex Stresses .-- Principal stresses. Mohr's stress circle.

Theory of Columns.—Columns with lateral loads in addition to direct thrust.

Strain Energy.—Due to axial force, bending moment, etc. Trussed beams.

Framed Structures.—Analysis of frames with one redundant member. Deflection of trusses. Design of riveted and welded joints; tension joints, beam to column connections, etc. Features and the design of plate girders.

Drawing Office Work.—Design of plate girder. Design of column with lateral loading. Design of timber trestle subjected to wind load.

8.125 STRUCTURAL DESIGN.

For students in Architecture.

Statically indeterminate structures. Analysis by strain energy methods.

Analysis of rigid frames by moment distribution. Further reinforced concrete design; simple beams, double-reinforced beams, Tbeams. Continuous slabs. Pigeaud's method. Axially loaded columns and columns with bending and compression. Circular columns. Column footings.

Design of retaining walls.

Drawing Office Work.—Design of a simple reinforced-concrete building frame.

Design of a continuous floor slab with beam system.

Design of cantilever R.C. retaining wall.

Those students who have pursued the study of structural design up to this stage, will be encouraged to carry this study further by taking part of the Civil Engineering degree course.

It is the intention that, apart from the lectures in the engineering course, they should provide full calculations and structural details on one or two of the design projects that they are taking as a part of their Architectural course; this work is marked separately from their work on architectural design and construction: alternatively, in addition to the lectures they may provide a thesis on some matter of structural design in steel or reinforced concrete, or building research.

8.132 AND 8.132D MATERIALS AND STRUCTURES.

For students in Chemical Engineering.

This course consists of two hours lecture and one hour laboratory for two terms. The early sections of the course will be treated on a fundamental basis but in the more advanced work the student will be acquainted with methods of solving various problems without being given the fundamental derivations.

The course covers the following topics:-

Behaviour of material subjected to tension compression, bending and impact and high temperature and low temperature stresses.

Stress strain theories for thin and thick cylinders, particularly in the creep range for the latter.

Dished heads of all types; internal and external pressures.

Welded joints.

Bending moment and shear force in cantilevers and beams; eccentric loading; three-moment theorem applied to supports.

Torsion of circular and hollow shafts, combined torsion and bending; power transmission (multiplane graphical solution).

Stresses and deflections of close coiled springs.

Simple strut theory.

8.23 AND 8.23D MATERIALS OF CONSTRUCTION.

Concrete.—Materials used in modern concretes: manufacture, physical and chemical properties of cements; production, testing, and selection of aggregates; pozzolans; admixtures. Strength, durability, workability, elastic and other properties of concretes. The design and proportioning of mixes. Manufacture and field control, mixing, transporting, placing, curing, formwork, testing. Special types of mortars, concretes, and special techniques.

Timber.—Types, properties and structure of timber. Defects, tests, and selection of structural timber. Attack and preservation. Manufactured units. Steel.—Brief summary of manufacture, testing, selection, and tolerances of structural grades.

Aluminium.—Brief summary of manufacture, properties and use of structural aluminium and aluminium alloys.

Building Stone and Structural Clay Products.—Production, types, application to engineering construction.

8.33 Engineering Computations.

Practical introduction to numerical, graphical and mechanical calculation and analysis as required in the engineering or applied mathematical sciences. Numerical solution of equations, including differential equations, graphical methods; nomography and the construction of graphical charts; curve fitting to empirical data, approximate methods of integration, differentiation and interpolation; use and principles of construction of instruments employed in calculation; electro-mechanical analogues, relaxation methods and many kindred topics.

8.42 LAND SURVEYING.

The principles of the theodolite and dumpy-level; use of level in taking longitudinal and cross-sectional profiles and in setting out works for construction; simple applications of the use of the theodolite in building construction work; simple traverses; setting out; contouring on a grid; simple earth-work problems.

8.43 AND 8.43D SURVEYING.

Chaining; instruments and their use; basic survey methods and principles; tacheometers and tacheometry; procedure for azimuth determination by extra-meridian sun observation; barometric instruments and surveys; barometric survey methods; plane tabling; estimation of errors; areas and volumes; setting out works; legal aspects.

Survey Camp of one week's duration (attendance is compulsory for 3rd year Civil Engineering and Mining Engineering students, 2nd year Applied Geology students). In the case of 4th year Mechanical Engineering students, attendance at this camp is optional, unless the student desires to gain a credit or distinction pass.

8.44 AND 8.44D SURVEYING.

Instruments—modern developments; theory of errors and adjustments; precise surveys; elements of geodesyl mine surveying: aerial surveying and photogrammetry; elementary field astronomy; computations: elements of map projections; engineering applications of surveying.

Survey Camp of one week's duration (compulsory for 4th year Civil Engineering and Mining Engineering students).

8.53 FLUID MECHANICS.

Properties of fluids. Fluid statics. Ideal fluid flow. Orifices and weirs. Viscous fluid flow. Laminar and turbulent flow. Surface and form resistance. Dimensional analysis. Scale models. Pipes and pipe systems. Uniform flow in open channels. Hydraulic machines.

8.54 APPLIED HYDRAULICS.

Non-uniform flow in open channels, channel transitions, hydraulic jump, waves, surges. Discharge measurements.

Potential flow, application to hydraulic structures. Weirs, spillways, energy dissipation.

Pipe flow, networks; unsteady flow, surge, water hammer. Sedimentation.

8.63 CIVIL ENGINEERING.

(A) Engineering Construction.

Construction plant and equipment. Compressed air. Tunnelling. Explosives. Excavations, piling, coffer dams, caissons, dams and weirs, foundation piers and abutments, scaffolding, job programming and economy.

(B) Hydrology.

Elements of hydrology. Precipitation. The run-off process. Infiltration. Water losses. Determination of available flow. Flood flows. Movement of surface water.

8.64 CIVIL ENGINEERING.

(C) Public Health Engineering.

Elements of biology and bio-chemistry, decomposition. Basic Public Health treatment processes (mechanical, physical, chemical, biological, hydraulic). Sedimentation. Sterilisation, filtration. Measure of pollution.

Practical application of basic processes to design and operation of treatment works. Planning and construction of water supply and sewerage schemes. Refuse disposal and treatment. Swimming pools. Minor Public Health Engineering problems.

(D) Road Engineering.

Elements of road design. Factors affecting design. Economics. Drainage. Road pavements, concrete, bituminous and non-bituminous. Road bridges and ferries. Subsidiary works and facilities. Elements of aerodrome design and construction.

(E) Railway Engineering.

Main features of railway engineering. Economics and special features of layout. Permanent way, ballasting of track, sleepers, rails, rail fastenings, points and crossings. Signalling. Special structures. Rolling stock.

(F) Harbours and Rivers Engineering.

Natural and artificial harbours. Training of river estuaries by groynes, training walls, breakwaters, etc. Effect of tides, wave action. Docks, wharves, slipways. Road and rail access. Construction plant, dredging. Sea-bed exploration. Hydrographic surveying.

(G) Irrigation Engineering.

Natural and artificial irrigation. Soil deterioration and prevention. Water requirements. Sources of water. Methods of application to land. Investigation and design of irrigation system.

Special structures and appurtenances. Water metering. Operation and maintenance of system.

(H) Hydro-electric Engineering.

Associated works and equipment. Preliminary surveys and investigation. Economic factors. Water available, drought characteristics, storage regulation. Emergency precautions, maintenance.

(I) Engineering Administration.

General conditions of contract, principles to be observed in drawing up contract documents including specifications, with practical assignments. Quantity surveying applied to civil engineering works, practical assignments in taking out quantities and preparing estimates. Costing systems, cost statements, economics of projects, sinking funds, capitalised cost, depreciation.

8.73 AND 8.73D SOIL MECHANICS.

Physical and mechanical properties affecting soil action in engineering problems; coefficient of permeability, capillarity and compressibility and their application in practical problems relative to seepage, uplift, liquefaction and the settlement of buildings located above buried compressible soil strata; shearing strength and bearing capacity and their application to engineering problems.

8.73H SOIL MECHANICS AND HYDROLOGY.

Soil Mechanics.—Physical and mechanical properties affecting soil action in engineering problems; coefficient of permeability, capillarity and compressibility and their application in practical problems relative to seepage, uplift, liquefaction and the settlement of buildings located above buried compressible soil strata.

Hydrology.—Elements of meteorology and climatology, analysis of precipitation for engineering purposes, soil physics, the run-off process, interception, infiltration, evapotranspiration, estimations of future floods, long-term yield of surface streams, application of hydrologic principles to civil engineering projects with special reference to Australian conditions.

8.84 TOWN AND COUNTRY PLANNING.

Principles of regional and town planning. Inter-relationship of various civil engineering and planning problems. Evolution of the modern town and city and relationships of architecture and engineering to problems of development and civic design. Street systems. Transportation. Public buildings and utilities. Parks and playgrounds. Housing. Zoning. Methods of financing city improvements.

8.92, 8.92¢ and 8.92¢ Properties of Materials.

Principles of testing of materials, standard tests, precision, errors; mechanics of tests for tension, compression, shear, impact hardness, fatigue, creep; behaviour of engineering materials.

Laboratory work includes tension, compression, hardness and impact tests on metals and experiments on flexure and torsion.

8.93 AND 8.93D PROPERTIES OF MATERIALS.

Detailed treatment of material properties and uses; elastic and inelastic behaviour; methods of failure and various theories related therewith; design factors; non-destructive test procedures; experimental stress-analysis methods.

Laboratory work includes tests on timbers and wires, creep experiments and work with wire resistance strain gauges.

PROFESSIONAL ELECTIVES.

Two elective subjects are to be selected from the chosen "Option". 1. CIVIL ENGINEERING DESIGN.

(a) Theory and Design of Structures.

Study of design aspects of civil engineering by further work on influence lines for statically indeterminate structure, relaxation theories and the mathematical theory of elasticity together with topics such as arches, columns, prestressed concrete, column analogy, limit design of steel structures and model analysis.

(b) Soil Mechanics and Foundation Engineering.

Advanced studies of theoretical and applied sections of soil mechanics, including foundations, mass soil behaviour, tunnels and arching, stability of slopes, soil testing and stabilistation work.

(c) Hydrology and Hydraulics.

Further studies of a selection of topics such as catchment characteristics, infiltration, sediment transportation by streams, river flow and flood routing. Flood flow estimation, long term water-supply yield. Hydraulic structures such as spillway gates, outlet works and diversion works.

(d) Advanced Mathematics.

Students whose interests are along the lines of advanced mathematics may study application of such work to specialised engineering problems.

(e) Modern Foreign Language.

Students with a leaning towards modern foreign languages may elect to master a language and review recent engineering literature of the country concerned.

2. CIVIL ENGINEERING CONSTRUCTION AND ADMINISTRATION.

This option is for the student intending to work mainly upon construction work, local government work, and in similar spheres where general supervision of a field organisation is an important factor. Appropriate subjects are:—

(a) Construction Equipment and Methods.

Analysis of construction procedure and selection of equipment for various tasks. Cost estimating, job planning, production capacity, operating costs for different equipment, scheduling of materials and methods applicable to specific kinds of construction.

(b) Geology.

Further study of Australian geology and its relation to construction tasks. Structural geology and interpretation of further work in petrology and study of the application of such topics to civil engineering. Geological mapping. Photographic geology, introductory treatment of geophysics. Study of typical geological investigations for dam sites, etc. Preparation of geological reports. Field work in geological surveying and the mapping of a small area.

(c) Management.

Purposes of management. Leadership. Personnel control. Applications to construction. Management in practice. Financial aspects. Sales engineering.

(d) Road Engineering.

Fundamental principles of road engineering. Detailed study of design and construction practice for various types of traffic and other conditions. Maintenance techniques.

(e) Public Health Engineering.

Review of fundamentals of public health engineering—followed by relatively detailed and comprehensive study of the application of such principles to design, construction and operation of water supply and sewerage system, treatment work, etc., with special reference to modern developments. Review of associate work such as refuse disposal, industrial hygiene, etc.

3. SURVEYS AND INVESTIGATIONS.

(a) Astronomy and Geodesy.

Fundamentals of geodesy and astronomy and a study of the application of these sciences to national projects.

(b) Topographical and Aerial Surveying and Photogrammetry.

A specialised study of all aspects of topographical surveying and its application to major civil engineering projects.

Study of terrestrial and aerial photographic surveying and the theory of photogrammetry. Use and principles of stereoscopic mapping instruments.

Specifications for aerial photography.

Application of aerial photography to civil engineering projects and geology.

(c) Soil Mechanics.

See Section (b) of Civil Engineering Design Option.

(d) Hydrology and Hydraulics.

See Section (c) of Civil Engineering Design Option.

(e) Geology.

See Section (b) of Civil Engineering Construction Option.

4. MATERIALS.

(a) Soil Mechanics.

See Section (b) of Civil Engineering Design Option.

(b) Concrete Technology.

Further studies in basic behaviour of concrete materials, introductory micromeritics, physical behaviour of set concretes. Influence of cement on concrete behaviour, additive and replacement compounds. Compacting, hardening and special techniques. Examination of physical and chemical environmental factors.

(c) Advanced Mechanics of Materials.

Advanced theory of elasticity. Investigation of failure theories. Complex stress failure. The structure of matter as related to stress distribution. Structural theories of deformation. Inelastic behaviour. Selected experimental work in the materials field. Description of strain gauges and significance of test results.

(d) Photoelasticity and Experimental Stress Analysis.*

The theory and practice of two dimensional photoelasticity, including appropriate investigations into simple models. Structural similitude, analogies. The wire resistance strain gauge. Static and dynamic strain gauge circuits. Selected experimental investigations to illustrate the subject matter.

^{*} This combination constitutes a double elective. Certain lectures in subject (c) are also required.

(e) Advanced Mathematics.

To be arranged to suit advanced study of materials behaviour.

(f) Modern Foreign Language.

See Section (e) of Civil Engineering Design Option.

Wool Technology.

Subjects 9.01 to 9.94.

9.104 NUTRITION.

Composition of the animal body. Composition and classification of foodstuffs and pastures. Digestion, absorption and metabolism of carbohydrates. proteins, fats, minerals and vitamins. Digestibility of foodstuffs. Nutrient and energy balances and requirements of livestock. Feeding standards and the quantitative application of nutritional data with particular reference to Australian conditions. Fodder conservation, pasture improvement (strains and ecotypes, top-dressing, pasture management and rotational grazing). Hay, ensilage. Supplementary feeding—grain, hay, crops and cropping. Rates of stocking. While particular emphasis will be given to nutritional requirements of sheep, those of other farm livestock will be dealt within this section.

9.114 FARM LIVESTOCK.

A study of the breeding, feeding, management and most common sources of loss in livestock, other than sheep, of importance to the pastoral industry of Australia.

9.12 SHEEP HUSBANDRY.

The sheen and its development. Introduction to breeds, classification of breeds. Sheep breeds—descriptions, uses and economic relationships. Sheep judging. Anatomy and physiology of the sheep. Principal sheep areas in the Commonwealth, development of the sheep and wool industry, and its place in the economic life of Australia. Natural conditions governing sheep farming and stratification of the industry. Calendar of operations on a sheep property—classing of ewes and rams: culling; mating; crutching and wigging; lambing; dockings, markings, and castration; branding; shearing; weaning; drenching; mulesing, etc.; dipping: shepherding. Purchase and care of rams. Care and management of the breeding ewe. Hogget rearing. Principal sources of loss, and their control.

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9.124 FARM MANAGEMENT AND MECHANISATION.

Business and practice of farming on various types of holding. Conditions governing class of farming in a district. Bookkeeping and valuation. Purchase and running of properties. Budgets. Economics of farm management. Inspection visits and comparative compilation of detailed reports of properties inspected or visited during practical work. Farm buildings, dips and yards. Tractors and modern developments, use and influence in farming organisation implements. Pumps and sprays. Electricity on the farm-motors, lighting plants. Engines and power transmission-care and maintenance. Shearing machinery-installation and servicing. Experting. Elementary plumbing and draining.

9.13 SHEEP HUSBANDRY.

(a) Sheep Production.—Crossbreeding. Fat lamb production. Stud breeding—record keeping. Factors affecting sheep and wool production—pasture improvement, fodder conservation, supplementary and drought feeding. Elementary marketing. Principles of animal production—reproduction and fertility, milk secretion, growth and development, elementary nutrition, elementary breeding. Sheep products preparation for market and quality concepts (skins, mutton and lamb).

(b) Sheep Health.—Sheep husbandry in relation to diseases. The Stock Diseases Act. Types of disease, immunity. Bacteriology and pathology: Parasitology—external parasites (lice, mite, foot louse, blowfly—myiasis); internal parasites (worms, fluke and black disease, hydatids). Diseases of the fleece—fleece rot, canary stain, pink rot. Deficiency diseases. Poison plants. Specific diseases—anthrax, balanitis, black leg, caseous lymphadenitis, dystocia, entero-toxaemia, foot rot, foot abscess and scale, mycotic dermatitis, photosensitisation, pregnancy toxaemia and hypo-calcaemia, swelled head, subterranean clover disease, tetanus malignantoedema, toxaemic jaundice, urinary calculi, etc. Veterinary first-aid. Common drugs.

9.134 ACCOUNTANCY.

Definitions. Principal documents. Theory of double-entry bookkeeping. Classes of accounts. The books of account. Entering and Trial balance. posting. Distinction between capital and revenue. Classes of errors. Bank reconciliation statements. Columnar or tabular recording. Sectional and self-balancing ledgers-control accounts. Petty cash. Bills of exchange and promissory notes. Ascertainment of the cost of goods sold and rate of stock turnover. Trading and profit and loss accounts. Balance day adjustments. Balance-sheet. Grouping of balance-sheet items. Classes of assets and liabilities.

9.144 COMMERCIAL LAW.

Law of contract. Sale of goods. Principal and agent. Bailments. Common carriers. Bill of Sale. Pawn. Hire purchase agreements. Lien. Mortgages. Guarantees. Ships and shipping and sea carriage of goods. Commercial terms.

9.154 SYNTHETIC FIBRES.

Study of the origin, identification and use of synthetic fibres used on wool processing machinery.

9.22 AGRONOMY.

Economic and environmental factors affecting agricultural development and utilisation of land.

Climate.—Rainfall; moisture relationships. Temperature. Light responses. Classification of climate. Homoclimes. Application of climatological data to land utilisation.

Soil.—Soil formation and soil types. Work of the soil surveyor. Requirements of a fertile soil. Physical properties in relation to crop production and land management. The supply of nutrients to plants; organic matter and the biological condition of soil; the nitrogen economy of soils.

Topography.—Effect on climate, soil, erosion rate and utilisation of machinery.

Classification and naming of plants.

Vegetative cover.-Types. Clearing and developmental costs.

Proximity to markets.—Transport of livestock, wool, wheat and perishable products.

Modification of environment.—Irrigation and drainage; electricity supply. Scientific discoveries and developments.

Soil erosion.—Principles of wind and water erosion. Effect of land utilisation. Prevention and control.

Agro-climatological associations in the chief divisions of New South Wales.

Principles of crop production.—Tillage, rotation of crops, fertilisers and manuring. pH of soil and its modification.

Sheep and irrigation agriculture.—Economic combination; prospects for expansion. The place of sheep in wheat belt.

Trees on the farm.—Suitable types for windbreaks and shade; fodder trees; establishment and after-care; direct practical values and incidental advantages.

9.24 PASTORAL AGRONOMY.

Climatic, vegetal, and topographic characteristics of the major agricultural and pastoral divisions of New South Wales, with special reference to suitability for stock raising and mixed farming. Principles of agrostology. Pasture plants; gramineous, leguminous and other species. Indigenous and exotic types. Advantages and disadvantages of native pasture for the pastoralist. Pasture establishment and management for different regions of New South Wales. Irrigated pastures.

Weeds in relation to the pastoral industry; harmful effects, factors in the control of weeds, methods of combating weeds, weedicides and hormone-type herbicides. Some useful points of weeds.

Principles of crop rotation. Rotations suitable for tablelands and Western areas. Ley farming.

Detailed treatment of crop plants utilised in sheep raising. Fodder conservation; principles; economics of conservation; cereal and meadow hay, silage, grain.

9.33 Economics.

Nature, scope and methods of economics. Economic laws and terms. Economic systems. Price and marketing—controlled marketing. Price control. Supply and demand. International trade and theory of comparative costs; balance of trade; tariffs and trade policies. National income. Foreign payments. The state and national income. Index numbers.

Economics of the wool industry:

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- (a) Production—the key importance of the wool industry in the Australian economy; climatic and other physical controls over the wool industry; trends in breeding—crossbreds and fat lambs; the long-term trend of production; the importance of research; the problem of drought; water and fodder conservation; the nature of costs.
- (b) Demand—the nature and direction of demand; the dependence of the wool market on external trade—possibilities of developing the domestic market and the export market.
- (c) Substitutes—the history and present organisation of wool marketing; BAWRA and J.O.; the attitude of the wool industry to stabilisation programmes.

9.34 BANKING, CURRENCY AND FOREIGN EXCHANGE.

Financial institutions (money, banking systems, trading banks). Domestic monetary theory and policy—value of money, factors affecting value of money, effects of changes, inflation and deflation, monetary policy and the national income. Exchange rate theory and policy—exchange rates and methods of quotation, spot and forward rates, gold standard. Exchange control—international currency and reconstruction, International Monetary Fund and exchange adjustments.

9.42 GENERAL TEXTILES (YARNS).

Brief introduction to the history and structure of the textile industries. Yarn count systems. Textile mathematics relating to yarns. Theories of spinning by draft V. twist and roller-drafting methods. The effect of fibre length, fibre diameter and twist on the properties of yarn. The origin, properties, uses and identification of natural and synthetic textile fibres. Remanufactured fibres, their processing and uses. Twisting processes. The preparation of yarn for fabric manufacture. Sizes and sizing. The production of fancy yarns. Recent developments in yarn manufacturing processes.

At the end of this course the student must present a series of plain and fancy yarns which he has prepared to exemplify the subject matter of the lectures.

9.43 GENERAL TEXTILES (FABRICS).

Felts and non-woven fabrics. Woven fabrics and their production. Introduction to textile design as a preparation for more detailed study later. Mathematics of cloth setting. Simple and compound cloth structure. Methods of ornamenting fabrics, by yarn, colour, weave, colour and weave, colour printing, flock printing and cloth finishing. Complex textiles, including gauzes, pile fabrics and tapestries. Survey of knitted structures and knitting mechanisms. Standard fabrics and their identifications. Scaffolding threads and their applications. The appreciation of good design in textiles. New development in textile manufacture. Textile literature and research association, their interests and utility.

In this course students must produce a range of hand or power woven fabrics, the construction of which should be based upon the principles of fabric structure discussed during the term. It is most important that the textile student should note changes in the dimensions of these fabrics' weaving state to finishing. Data recorded in this way is of inestimable value in later years as there is no way of making precise calculations of grey particulars from the finished fabrics.

9.44 YARN MANUFACTURE (WOOL).

A functional and detailed study of the machinery used to produce worsted and woollen yarns. The various systems of spinning will be described and the latest developments aimed at economies in production. Consideration will also be given to the structures of the wool textile industry, its research activities and problems. Method of wool cleaning and drying. Worsted—functional aspects of worsted machinery. Details of worsted carding, preparing, combing and drawing on English, French, and Anglo-Continental systems. Spinning by flyer, cap and ring and later developments. Twisting and fancy yarn manufacture. Woollen—raw materials; the functional aspects and mechanisms of carbonising and blending; carding and ring and mule spinning; remanufactured fibres, their types and sources of supply; grinding, carding and spinning yarn calculation; yarn conditioning and testing; warping and winding; a résumé of problems in the processing of rayon on woollen and worsted machinery.

9.52 WOOL.

Place of wool in world trade and in the economic life of Australia. Elementary wool science. Wool quality—fleece defects. Principles of wool processing in relation to preparation of the clip. Wool areas of the Commonwealth. Wool terms. Types. Woolclassing—principles and special clips, responsibilities of the classer. Marketing. Costs to grower, selling procedure. Methods of selling. Fellmongering, scouring and carbonising. Wool research. Wool improvement. Wool publicity.

9.53 WOOL.

Preparation of wool, from various types of flocks, for marketing. Recognition of wool types and assessment of wool quality number. Wool pressing and branding. Sorting Merino and Crossbred wool to spinning quality and length. Classing various types of clips-large and small Merino, large and small Crossbred, large and small Tablelands Merino clips, Comeback clips. Special treatment of clips from North-west, Central-west, Riverina and Far-west districts. Wool appraisal in terms of type, quality, number and yield. Wool judging.

9.54 Wool (Wool Store Study).

This subject will consist of practical exercises in the estimation of wool types and their values, using existing trade procedure (A.W.R.C. types). Instruction will cover style grades; burr, seed and dust percentages; washing—carbo, and top and noil yields; skin wools, slipes and scoured wools; wastes and shippers' lines; oddments such as overgrown, dead, black, etc.

9.74 FIBRE SCIENCE.

Biology of fibre growth—histology, fibre arrangement, morphology and fleece genetics. Fibre physics. Microscopic and sub-microscopic structures. Fine structure investigations. Fibre chemistry. Principles of protein chemistry and special reactions of keratin. Moisture relationships. Carbonising. Finishing processes. Chemistry of skin secretions. Wool wax recovery and utilisation. Wool metrology. Conditioning house procedure.

9.94. GENETICS.

Applied genetics in relation to sheep and other farm livestock. Mendelian theory. Chromosomes and the physical basis of heredity. Mechanisms of crossing over. Genetics of sex differentiation. Sex linkage. Multi-factor inheritance. Principles of statistical genetics. Strength of inheritance. Selection—phenotypic, family lines, progeny test. Relation of genetics to sheep improvement. In-breeding and line breeding.

Mathematics.

Subjects 10.01 to 10.94.

10.11 MATHEMATICS.

Review and extension of matriculation algebra and trigonometry. Determinants, partial fractions, limits, convergence of infinite series, approximations.

The circular, exponential and hyperbolic functions and their inverses. Equations and limits involving these functions.

Derivatives and their applications. Indefinite and definite integrals. Approximation to the numerical value of a definite integral by Simpson's rule.

Quadrature, rectification, determination of volumes, means, moments, centroids and quadratic moments.

Partial derivatives, total differential and applications.

Taylor's and Maclaurin's expansions and their uses.

The co-ordinate geometry of the straight line and of such curves as are of technical importance, using Cartesian and polar systems of reference. Determination of linear laws and reduction of other laws to linear form. Use of logarithmic and other forms of graph paper.

First order differential equations of "variables separable" type and of "exact" type. Second order equations of the type y'' + ay' + by = 0.

Introduction to complex algebra.

10.11B MATHEMATICS.

A special course in statics and dynamics integrated with the work in advanced mechanics and properties of matter which is taken in third term of first year Course I (Applied Physics), Course II (Applied Chemistry), Course III (Chemical Engineering) and Course IV (Metallurgy).

10.11-B MATHEMATICS.

In part-time courses offered in the Faculty of Science the subjects 10.11 Mathematics and 10.11B Mathematics are combined and presented in approximately two equal courses over two years, the courses being designated 10.11-B Mathematics Part I and 10.11-B Mathematics Part II.

10.12 AND 10.12D MATHEMATICS.

A fuller treatment of Mathematics 10.11 with special reference to functions of more than one variable. Multiple integrals.

The Laplace transform and its use in solving linear differential equations. Solution of differential equations in series. Introduction to partial differential equations.

Revision of work on complex numbers covered in 10.11. De Moivre's theorem, nth roots. Complex circular and hyperbolic functions.

Introduction to three-dimensional co-ordinate geometry. Lines, planes and surfaces.

Nector analysis. Differential calculus of vectors. The vector differential operators. Stokes' theorem and the divergence theorem.

Introduction to Fourier series and harmonic analysis.

The general principles of dynamics and their applications.

10.13 MATHEMATICS.

A course for students in Applied Physics.

Statistical theory and its application to experimentation. Some special functions relevant to mathematical physics. Matrix algebra.

10.14 MATHEMATICS.

Selected topics in Mathematical Physics including some of the following: tensors, elasticity, boundary value problems, hydrodynamics, calculus of variations, numerical methods.

10.22 MATHEMATICS.

A course for students in Chemical Engineering.

Functions of two or more variables. Partial derivatives. Multiple integrals, centroids, moments of inertia, centre of pressure. Linear differential equations (solved by conventional and Laplace methods). Partial differential equations.

10.23 MATHEMATICS.

A course for students in Chemical Engineering. Application of partial differential equations to problems in Chemical Engineering fluid mechanics. Theory of complex variable.

10.33 MATHEMATICS.

A course of advanced mathematics for students in Electrical Engineering Courses. Complex variable theory and contour integration inversion theorem. Solution of differential equations met in electrical engineering. Potential theory, electromagnetic theory. Laplace and wave equations.

10.43 MATHEMATICS.

A course of advanced mathematics for students in Civil Engineering Courses. Spherical trigonometry. Statistical analysis. Further Laplace transform; theory and applications.

10.51 MATHEMATICS.

A course for students in Architecture.

Revision and elementary mathematics needed in costing. Revision of algebraic processes.

Plane and solid geometry. Conic sections. Trigonometry.

Co-ordinate geometry: location of points by co-ordinate systems, plane and solid; graphs in cartesian co-ordinates.

Calculus: differentiation, integration.

Centroids and moments of inertia.

10.91 MATHEMATICS.

A course for students in Wool Technology.

Simple probability theory. Determinants; solution of linear equations. Least squares method of fitting linear forms, and extensions.

Rectangular cartesian and polar co-ordinate systems, with applications.

Elementary differential and integral calculus, up to and including a treatment of circular, exponential and hyperbolic functions and their inverses. Power series. Numerical solution of equations.

Functions of several variables: partial derivatives and multipleintegrals.

10.92 MATHEMATICS.

A course for students in Wool Technology.

Philosophy of the statistical approach. Study of variation—distributions, averages and means of dispersion, reliability of estimate, probability and fiducial limits. Analysis of variance and covariance, components analysis, tests of significance. Goodness of fit, chi square tests. General sampling problem and design and analysis of general sampling investigations. Relationship between variables. Regression analysis with one or more independent variables. Control of variation—experimental designs, control charts. Handling of data which do not follow a standard pattern—transformations, nonorthogonal analyses.

Architecture.

Subjects 11.01 to 11.96.

11.11 DESCRIPTIVE GEOMETRY.

This subject provides an introduction to general draughtmanship. The student is taught the correct choice of drawing office materials, use of instruments, the elements of good lettering, geometric drawing, perspective and sheet composition. A good grounding in this work is essential in later years.

There are about thirty-two lecture-demonstrations followed by drawing. Each student is required to complete thirty sheets of drawings dealing with the following: Exercises in line drawing and plane geometry; lettering; orthographic, isometric, oblique, axonometric projection; theory of perspective, exteriors, interiors, inclined planes; shadows cast by geometrical features and simple architectural subjects on vertical and horizontal planes; shadows in perspective; solid geometry; development of intersections and surfaces; roof developments and layout; graphic symbols.

11.21 FREEHAND DRAWING AND PRESENTATION I.

Introduction by means of studio and out-door drawing to architectural presentation and as an aid to design process. Practical survey—by way of simple tasks—of drawing materials, media and elementary techniques. Study of the sources and effects of light, with particular regard to their influence on form definition in delineation. Freehand lettering and the progressive study of simple geometrical, irregu'ar planar and complex casts. Independent work in sketch-book form, with appropriate instructions and a limited number of stated assignments, designed to develop powers of observation and memory and to provide scope for practical expression of initiative and imagination.

11.22 FREEHAND DRAWING AND PRESENTATION II.

Continuation of Part I at a higher level with emphasis on outdoor work: instruction in free out-door sketching and sketch notation in conjunction with study in various media of more complex range of natural and artificial forms. Elementary measuring and plotting in association with sketching of simple buildings. Practical analysis of techniques of more advanced character. Importance of good composition stressed in all work. Private sketch-books as a medium for independent experiment and practice as for Part I. Students' sketch-books will be marked separately and those failing to reach a reasonable standard will continue sketch-book work in Third Year.

11.31-11.32 Architectural Studies and Design.

A course in general design, taken over Years One and Two, leading to Architectural Design and Construction. The objectives of this study are a development of aesthetic perception in the student and an awareness of his relation to his environment. By process of inquiry and critical analysis each student is encouraged to make individual assessment of design fundamentals. Participation in forum activity is encouraged in the way of prepared talks, debates and group discussions.

11.31 ARCHITECTURAL STUDIES AND DESIGN I.

This subject embraces architectural drawing, rendering, perspective and introduction to design.

During first and third terms the student works in the studio under the guidance of an instructor. Short lectures are given in conjunction with the studio work. Exercises are carried out dealing with the following:

- Architectural Drawing-Selection of materials; linear patterns; lettering; sketch plan presentation.
- Rendering-Wash exercises in monochrome and colour; value, hue and intensity; rendered elevations and perspectives.
- Perspective (in conjunction with Descriptive Geometry sheets) —Exteriors, interiors and shadows in perspective.
- Design—Elements of design—line, shape, form, texture and colour; study of objects of everyday use; analysis of an architectural feature.

During the second term problems in elementary design are set to be carried out by the student at home.

11.32 Architectural Studies and Design II.

Design Fundamentals.

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Design Concept—Elements of design and principles of composition introducing three dimensional design exercises; models; analytical study of value in colour.

Colour—Historical survey and theories of colour mixing; the Otswold and Munsell Systems of colour notation; the psychology of colour and its relation to purpose.

Texture—The senses involved and study of characteristics of surfaces; relation to purpose; texture "collages".

Space Concept—Study of space articulation; the model; analytical purpose problems and integration of previous studies.

11.41-11.43 HISTORY OF ARCHITECTURE.

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This is one of the basic subjects leading to Architectural Design, net because of possible present-day use of any plan or feature from the works of past masters, but for the reason that some knowledge of past systems of building, use of materials, principles of design, use of geometry and choice of form for purpose and beauty rightly should be understood. The place of architecture and living environment in the social structure of peoples and their effect on the course of civilisation provide a useful and substantial part of the knowledge required by designing architects of this age.

The subject is treated in a wide manner, appropriate reference being made to significant events and conditions; the mass movement of peoples and the effect of military invasions; land and sea trading routes, lines of communication and the spreading of ideas; political, religious, social and economic influences; the work of the guilds and craftsmen.

The allied arts and minor crafts are considered as well as the masterpieces of architecture. Most examples are examined analytically in plan, external form, section and structure. The approach is critical rather than archaeological, the past affording examples of how recurrent architectural problems have been solved structurally and aesthetically. Some consideration is also given to urban planning, streets, grouping, gardens, etc.

The subject is divided into three stages. Each stage consists of about thirty-three one-hour lectures. A final examination is set at the close of each stage.

11.41 HISTORY OF ARCHITECTURE I.

Primitive constructions: the correlation of hands and mind and the beginnings of architecture.

Ancient (1st Term). Works of the Egyptians, Chaldaeans, Assyrians, Babylonians, Persians, Pelasgians and Etruscans.

Classic (2nd Term). Works of the Greeks and Grecian Empire. Classic (3rd Term). Works of the Romans and Roman Empire.

11.42 HISTORY OF ARCHITECTURE II.

Study of the evolution of church architecture of the Eastern and Western types and the rise and perfection of Gothic architecture.

Early Christian. Later Roman works and the emergence of the basilican type of church building. Variations from the Roman type.

Byzantine. Works of the Byzantine Greeks and development of Eastern types of domed churches. Carcase and "finish" method of construction. Romanesque. The development of Western Christian architecture. Experiments in form and construction towards ideal of a complete architecture in stone, including vaulted ceilings.

Gothic. The pointed style. Zenith of medieval architecture. Engineering in stone. The "unit-bay" system of construction. The correlation of balanced forces to produce stability in buildings of great height. Cathedrals, abbeys, churches, monasteries, castles, municipal buildings, guild-halls, etc. Gothic vaulting, church fitments and decoration.

11.43 HISTORY OF ARCHITECTURE III.

Architecture of the Renaissance in Europe.

Italy. Florence and the Early Renaissance; the architecture of Venice; the Mature Renaissance and Rome; Palladianism and the Baroque; Planning and garden design.

France. Early influence of Italy; the architecture of the Loire; the evolution of the French chateau and landscaping; the unification of the arts under Louis XIV; French civic design.

England. Influences of the carly continental craftsmen; Jacobean architecture; Inigo Jones and the unification of foreign elements; Wren and his school; Palladian influence and the Baroque; the development of the English house during the Renaissance; English contribution to planning.

History of architecture in the 19th and 20th Centuries. The Industrial Revolution and the Romantic Movement. The Age of Revivals; Archaeology and Medievalism; the Eclectics. The emergence of the engineer and the growth of specialisation; Art Nouveau and the Deutsche Werkbund; the development of the Social changes and the development of Building Garden City. New materials and new techniques. The evolution of the Acts. steel framed building, reinforced concrete; its influence on the development of free planning. Louis Sullivan and Frank Lloyd Wright: Le Corbusier and Cubism, the Villa and the Zeilenbau. The development of the house. The growth of the modern city.

11.51 BUILDING SCIENCE I.

Porosity, absorption and permeability of materials and the relationship of these properties to methods of formation, density, capillary attraction, weathering, heat and sound insulation, condensation and strength.

Analysis of the constituents of rainwater and their effect on the weathering of building materials.

A study of the manufacture of bricks and the decay of brickwork due to the action of water. Types of stone and their formation, their properties and reaction to frost and florescence.

Chemical and physical analysis of the constitutents of concrete and the necessary qualities required. Advantages of grading of aggregate. Water content and bulking of sand. Florescence and moisture movement. Methods of waterproofing.

Plastics, types and manufacturing processes.

Chemical and physical analysis of softwoods and the relationship between structure and strength. Moisture content and movement and its relationship to atmospheric humidity. Casehardening theory. Decay, fungi and insect attack.

Chemical and physical analysis of commercial metals, their properties and uses.

11.52 BUILDING SCIENCE II.

Heat as a form of energy, its molecular movement and measurement. Ways in which heat affects homogeneous and heterogeneous solids and their relationship to thermal movement and stresses.

Factors affecting transmission of heat; conduction, convection and radiation. Low and high frequency radiations and their relationship to diathermanous materials.

Calculation of thermal expansion and its resultant stresses. Differential movement in buildings and problems of restraint. Prevention of thermal movement by various methods.

Climate and its influence on design and construction. Australian climatic zones. Ways in which heat gains ingress to buildings and preventive measures. Thermal insulation, its advantages and disadvantages. Thermal capacity and the ways in which it may be used to advantage.

Theory of insulation and the relationship between molecular structure and conduction. Air as an insulator.

Overall thermal transmission coefficient and the relationship of its composite factors. Calculations of thermal conduction of walls. Ventilation of cavities. Transmission through ceilings and roofs and typical calculations.

Sunlit surfaces and rise in temperature and variation due to colour and texture, with calculations.

Reflective insulation and its effect upon radiant heat.

Effects of moisture on thermal conductivity.

11.61 BUILDING TRADES AND CRAFTS.

Short lectures given by different specialists on the staff, both from the point of view of the employer (the master builder) and the specialist craftsman. The specialist trade instructors in the department provide demonstrations in the techniques of bricklaying, carpentry, joinery, plastering, painting and decorating. Each student is required to do a small amount of practical work, such as mixing mortar, carrying and laying of bricks, elementary practical work in carpentry and joinery, plastering and painting. Model making, in connection with the architectural studies.

The general intention of this period is to familiarise the student with the tools and terms used by the building craftsman, and to give him an understanding of the craftsman's skill.

11.71 BUILDING CONSTRUCTION I.

Lectures.

Brief instruction on draughting techniques, projections and lettering.

Brick manufacture, types and qualities; bonding. Types and composition of mortars and their uses.

Cement manufacture, types and uses. Concrete and its constituents. Bulking of sand and determination of correct water content by slump test. Vibrated and lightweight concretes.

Footings and foundations and requirements of Local Councils and Ordinance 71. Trenches and timbering.

Cavity wall construction and treatment of openings.

Hardwoods and softwoods, conversion and seasoning; moisture content and shrinkage. Decay and defects.

Ground floor construction, timber and concrete and types of finishes. First floor timber construction.

Fireplaces and flues and design requirements.

Flat roof construction with consideration of waterproofing and insulation. Types of roof coverings. Skillion and pitched roofs, sizes of members according to Ordinance 71. Suitable roof coverings and their methods of fixing. Chimney stacks and flashings to pitched and flat roof surfaces. Roof plumbing and materials used.

Timber framed house construction, floors, walls, gable end details. Weatherboarding and asbestos cement external covering.

Brick veneer construction. Joinery joints and applications. Types of doors and frames.

Functions and types of windows.

Stone, its selection and uses in building. Types of walling. Cast stone, terrazzo and terracotta.

Water collection and distribution.

Domestic plumbing and drainage according to Ordinance.

Plastering, types of bases and precautions to be taken. Fibrous plaster manufacture. Acoustic tiles.

Paints and their components.

Glass manufacture. Types of glass and their uses.

Practical.

Studio work comprises a number of half imperial detail sheets done during first and second terms. These are designed to give the student practice at setting up a sheet and improving his draughting.

During third term the students have an Integration problem which correlates elementary design theories* with constructional detailing in the form of working drawings of a simple building.

*See 11.31.

11.72 BUILDING CONSTRUCTION II.

Lectures.

The course comprises thirty-four one-hour lectures covering the following points of construction:---

Timber stairs; cupboards and storage walls; large glass areas; building site assessment and preparations; footings; piling and rafts; demolitions; excavations; shoring; underpinning; basement construction; water, moisture and damp-proof walls; theory, preparation and handling of concrete; pouring of concrete, formwork; theory of reinforcing of concrete, brickwork and masonry, placing of reinforcement; roofing of large areas; heavy timber construction; load bearing brick walls; warehouse construction; fire resisting construction; curtain walls; wall facings and finishes (internal and external); floor surfacings.

As it is impossible to cover all points in connection with any topic under discussion in the time available, each lecture is supplemented with a detailed list of references.

Practical.

The work for the year consists of five sheets of detailed drawings and five sheets of working drawings, of imperial size, exemplifying the subject matter of Building Construction Theory II. The actual problems set cover mainly:-Joinery, advanced domestic construction, heavy timber construction, heavy footings, load bearing brick walls and the roofing of large areas. Particular attention is paid to the correct method of executing working drawings and all work is to comply with relevant by-laws and regulations.

11.73 BUILDING CONSTRUCTION III.

Lectures and practical periods for the study of advanced constructional work beyond that of years I and II.

Advanced building detailing, building layout as affected by Local Government regulations, Sydney Corporation Act By-laws 51 to 58 inclusive. Ordinary and fireproof construction, curtain walls, stairways, lifts, light wells. Consideration and detailing of problems met in framed construction, both steel and reinforced concrete.

Economical frame layouts and relationship to architectural plans and design. Detail drawings of wall sections, special facings, flashings, flat roofs, drainage, parapets, fireproofing, internal finishes, etc., and working drawings of multi-storey frame buildings, design and detailing of structural elements in steel (riveted and welded work) and reinforced concrete following the lectures in the Theory of Structures subject 11.103.

The working drawings and details of a multi-storey frame building are required to be done for an Integration problem which is treated in the Design class for some of the architectural design aspects.

11.81 INTRODUCTION TO ARCHITECTURE AND BUILDING.

(a) The functions of the architect in society; the functions of related specialists, builders, structural engineers, quantity surveyors, town planners, specialists in services and equipment, the general foreman, craftsman and labourer.

(b) The structure of the building industry, how the architect fits into it; professional and trade organisations in the industry; the manufacture and distribution of building materials.

(c) Brief description of the main subject matter which the student will have to undertake throughout the whole course; how one subject is complementary to another and the practical implications of all the subjects.

(d) Basic principles in architecture and building; the fundamentals in the course of study which the student must watch for; architecture is fine building; it consists of three things, efficient planning, scientific structure, and beautiful appearance; outline of main points under these three heads in anticipation of the lectures on the theory of architecture and building science, to follow in succeeding years.

11.82 THEORY OF ARCHITECTURE A.

Basic functions of buildings; clients' needs and programme of requirements; functional planning, scientific structure, beautiful appearance; introduction to planning; scientific study of requirements; processes in determination of plan; circulation; process diagrams in planning; site and surroundings; study of various sites and how they affect the building; prospect, aspect, orientation; drawing up a programme of requirements; requirements and human need; locality, structure economy, historical and contemporary structure;; classical and contemporary plan composition; symmetry and asymmetry; decisive plan forms; proportioning of plan units; principles of architectural composition; aesthetic theories; modes of thought; buildings as organisms; visual art, unity, duality, contrast, rhythm, proportion, scale, character; verticality, horizontality; the dominant, major and minor features; major and minor focal points; composition of masses; space enclosure in three dimensions; the element of decision; accentuation.

11.83 THEORY OF ARCHITECTURE B.

Factors influencing architectural design: people, climate, topography, materials, economics, social system, etc.; influence of the weather and the "elements", i.e., sun, light, air, wind, rain, etc.; orientation.

Elements of contemporary architecture; floors, walls, roofs, windows, doors, etc.; expression of function, materials and construction; style; character and atmosphere; colour and texture in buildings.

Choice of materials; engineering services and equipment in buildings.

Logical approach to an architectural problem; procedure of planning and design from the broad aspects to the detailed.

Influence of adjacent buildings on design; elementary notes on urban architecture; scale and other principles of design in simple contemporary work; detailing; the surroundings of buildings. Contemporary philosophies.

11.93-11.96 ARCHITECTURAL DESIGN AND CONSTRUCTION.

This range of subjects embodies and applies all the subject matter of the other lectures and studies in the Architecture Course. Architectural Design includes planning, construction, specialised building techniques, engineering services and equipment, specification, estimating and building job supervision and control.

The whole course consists of a series of practical problems in design, generally accenting fundamental aesthetic and technical points but with problems interspersed expressly to stimulate imaginative thinking.

In all problems construction is considered an essential part of design. In many cases special or unusual points in design are required to be substantiated by sketch details of construction. At least once in the latter end of the course structural calculations and details of construction are produced for a large building.

An increasing proportion of the work as the course proceeds is done under the "group" system.

All work is marked by a jury, with class criticism and discussion.

11.93 Architectural Design and Construction A.

Studio assignments on the analysis of building elements for structure and function, historical survey and consideration of contemporary application in various structural systems, followed by integration development in simple structure. Analysis of module planning, solid and void, plan composition and massing, siting and sun penetration. Requirements in living, eating and sleeping, followed by inclusive consideration in domestic design (multi-cell type), co-ordinating all structural and functional analysis, furniture and interior design and landscaping, in sketch esquisse, working drawing, specification and rendered presentation.

11.94 ARCHITECTURAL DESIGN AND CONSTRUCTION B.

Problems more intricate in planning and technical aspects; exercises designed to determine the influence on design of climate and the elements; construction and materials; the logical use of glass; natural lighting and aspect; the aesthetic exploitation of such practical needs in modern building; expression of character in building.

11.95 Architectural Design and Construction C.

Lighting, both natural and artificial; design of commercial buildings and the examination of associated economic factors; industrial planning, expression of function in large architectural projects; influence of adjacent buildings or sites on design; housing; group building; simple problems in urban architecture involving the concept of town planning. Where possible problems are set for actual sites.

11.96 Architectural Design and Construction D.

Large architectural projects, usually done in small groups, relative to actual sites and involving considerable research into human and community requirements and the problems of structure and mechanical and other equipment associated with large buildings; problems in specialised buildings to fit the present and future needs of the developing community.

11.101-11.103 THEORY OF STRUCTURES.

The whole range of this subject has been divided into five sections. The first three sections (subjects 11.101, 11.102 and 11.103) are compulsory and taken by all students, whereas the last two sections (subjects 8.124 and 8.125) are taken only by those students who elect to do so. It is presumed that these latter students have aptitudes for the structural design subjects of the course and also that they intend to practise it in some measure in their profession. From this point of view the first three sections have been designed to cover the major portion of the field of structures as it affects the Architect, but a certain amount of the work is intended to be dealt with descriptively rather than analytically. In the advanced sections it will, therefore, be necessary to revise the early work, supplying the analytical proofs where necessary, and then proceed to the more advanced work in order to complete the field.

Supplementing the theoretical work there will be exercises in structural design and testing work in the Testing Laboratory.

11.101 THEORY OF STRUCTURES I.

The first year series of lectures in Theory of Structures is designed to give a thorough grounding in the principles used in calculations relating to architectural construction and covers the following:—

- Statics.—Composition and resolution of co-planar forces; equilibrium of co-planar forces (both concurrent and nonconcurrent); moments, couples and equations of equilibrium; force polygons and funicular polygons; forces acting on and determination of stresses in pin-jointed structures by graphical and resolution methods.
- Beams.-Moment determination of reactions for simply supported beams (up to and including two supports and two overhanging ends).

Shear in beams, determination of shear and shear force diagrams.

Bending moments in beams, and bending moment diagrams for beams.

Correlation of and relationship between shear and bending moments in beams.

Modulus of elasticity.

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Summation of elementary beam theory.

11.102 THEORY OF STRUCTURES II.

Beam Theory.—Bending moments and shear force—Diagrams, analysis and relationship to loading. Explanation and derivation of section modulus, moment of inertia, radius of gyration, moment of resistance, deflection and factor of safety.

Theory of Bending.—Fibre stress, horizontal and vertical shear, proof of formulae, relation between deflection and bending moment.

Column Theory.-Short columns, long columns, slenderness ratio and eccentric loading, combined bending and direct stress. Structural Timber.—Properties, gradings, permissible stresses, factors of safety.

Design of beams and checking of stresses.

Design of columns and checking of stresses.

Design of floor systems including connections of members.

Design of roof trusses with wind loading, bending and direct stress on upper chord, roof truss connection of members by bolting and ring connectors, roof systems.

Footings.—Considerations and design for strip footings and isolated footings.

Retaining Walls.—Arched, gravity, buttress, counterfort. Overturning, sliding, drainage, foundation pressure for cases when material retained is: water, granular, fragmentary, cohesive-clay.

Angle of repose, internal friction.

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Concept of equivalent fluid pressure and surcharge.

11.103 THEORY OF STRUCTURES III.

The study of structures in third year is concentrated on structural steelwork (riveted and welded construction) and reinforced concrete.

The sequence of lectures is arranged to provide the design information required by the student in carrying out problems in the Building Construction Class, and the information given precedes the class work so as to allow the student to determine size of structural element prior to commencing detailed drawing.

The influence on design by the Local Government requirements is discussed and all design is related to such requirements.

Structural Steel (riveted and welded construction).

Revision of work on properties of steel, use of rolled steel joists sections, plated sections, use of steel handbooks, properties of sections.

Steel Beam. Design, plated sections, lateral support, web buckling, stiffeners, and bearing. Design of joints, curtailment of plates, beam to beam and beam to column connections.

Steel Columns. Radius of gyration, lateral support, effective length, design of columns with concentric and eccentric loads, design of columnplates, stool connections, cap and base plates, splices.

Steel Roof Trusses. Types of trusses, types of sections, design of members, joints and fixings, truss framing arrangement and bracing. Reinforced Concrete.

General theory of design, usual mixes and strengths, types of reinforcement.

Design of columns (concentric loads only). Rectangular and spirally wound, bar lists and reinforcement positioning.

Design of beams. Free ended, fixed ended, continuous (using coefficients), web reinforcement, cantilevers, use of compression reinforcement. Beam theory, formulae, shear and bond stresses.

Design of slabs. One way, two way, continuous, placing of reinforcement, stair construction, retaining walls.

Design of footings. Unreinforced and reinforced types as governed by limiting dimensions, effect of base plate pressure on design.

General.—Design effect of varying stresses in concrete by altering mix, increasing depth, varying stress in steel reinforcement.

11.114 ARCHITECTURAL RESEARCH (alternative to 8.124-Structures).

In this subject the student is required to undertake research work on early Australian architecture, and on some subject of his own choosing.

The historical research takes place during the first term, and the student is required to work as a member of a group. Each group is assigned a particular building of architectural merit and historical significance, and must carry out a complete investigation of the building and furnish a report including photographs, drawings and evidence of thorough research of historical background.

During the second and third terms each student is required to deliver a brief paper upon some aspect of architecture or the allied arts, the selection of matter being left to the student, subject to approval by the lecturer.

11.115 PLANNING RESEARCH (alternative to 8.125-Structural Design).

The student is encouraged to pursue some special department of planning, relative to modern design. Considerable freedom is allowed, but the student must provide evidence of his own studies and reading. One or two advanced exercises in individual research will be given relative to the projects being undertaken in architectural design and construction. Moreover, in addition to this each student has to prepare a dissertation which he will read before the general body of students, answer questions relative to it from his audience of fellow students and take part in general discussion upon it.

11.125-11.126 PROFESSIONAL PRACTICE.

Contracts; relationship of builder, client and architect; professional ethics as laid down by the Royal Australian Institute of Architects; services and fees; office administration; building law and regulations; aspects and problems of practice; business principles; building finance and supervision; relations with the quantity surveyor, structural engineer and other specialists.

11.135 Specifications.

The definition of a specification; types of specifications and their uses; specifications in parts; setting out front page of a specification; specifications with trades in schedule form; specification for two or more similar buildings, treatment of trades for alterations and additions and use of addendum.

Theory of specification writing; expression in writing; methods of typing dimensions, cross referencing; door schedules and numbering rooms in large buildings; trades covered by regulations; points to observe in visiting site and existing buildings; explanation of differences between a government specification and that of private architect; explanation of P.C. items, provisional and contingency sums and provisional quantities.

Reading and explanation of a standard specification and its uses; practical sketching from specifications and résumé of first two terms.

11.144 BUILDING RESEARCH REVIEW.

A series of lectures on the work of organisations in Australia and overseas engaged in research on problems related to building, including materials, structure and functional requirements.

Special attention is given to contemporary problems in building production, new materials and methods, prefabrication, preassembly, standardization, dimensional co-ordination; relation of building regulations with new materials and methods; the use of research information by the practising architect.

11.154 INTERIOR FURNISHING AND DECORATION.

A series of lectures on furniture, cabinetmaking, the aesthetics of interior finishes, furniture, carpets, curtains and furnishings. Colour, materials and techniques in interior decoration.

11.164 Acoustics and Sound Insulation.

Nature of sound, wave length, frequency amplitude. Resonance. Hearing, thresholds of audibility, masking. Reflection, diffraction, absorption, transmission. Units of intensity and loudness. Geometrical acoustics. Acoustic materials. Auditorium design. Noise reduction in buildings. Transmission of air-borne and impact sound through walls, floors, windows and doors. Isolation of noise from machinery. 11.176 ARCHITECTURAL SCIENCE AND RESEARCH THESIS.

During this period, the student is encouraged to study some specialised aspect of architectural planning and research, such as the latest developments in the equipment and engineering services of buildings, and specialised planning and equipment of buildings, such as hospitals, schools, etc. Some of this advanced study will be relative to the design projects being carried out under the heading of architectural design and construction, civic architecture or town planning, or the student may, with the approval of the Professor, pursue some avenue in scholarship, such as the literature of architecture, aesthetics or history; this work will be embodied in a thesis to be submitted by the student; importance is attached to the general presentation of this thesis.

11.186 Civic Architecture.

A limited number of informal lectures is given by the Professor of Town and Country Planning, covering the principles and problems of Civic Architecture. Research and practical problems are carried out, usually relating to improvement and re-development from a planning and architectural point of view, of parts of existing cities, such as Sydney and Newcastle.

Civic surveys are made of the actual areas and all relative information is obtained by the students in groups, generally with the support of town planning officials in Sydney, Wollongong, Newcastle, etc., who indicate the basic economic, social and industrial conditions within which the student may have to re-plan and re-design the particular street or area.

11.196 TOWN PLANNING.

Introductory course of lectures, arranged by the Department of Town and Country Planning, University of Sydney. There is one term of studio work associated with the lectures. The course of lectures is preparatory to the post-graduate diploma course in Town Planning, conducted jointly by the University of Sydney and the New South Wales University of Technology. This introductory course of lectures provides a brief outline of what is comprised within town and country planning, and touches on the history of town planning, the theory and practice of town planning, and draws attention to the social, economic, geographic and architectural factors involved.

11.203 BUILDING SERVICES AND EQUIPMENT A.

Drainage, sullage disposal, septic tanks, sub-soil drainage, house drainage, by-laws, etc.; laying, joining and testing drains; ventilation of same; water supply, fittings and materials, water storage tanks, pumps, etc.; meters; fire services; sanitary plumbing; types of soil and waste fittings; design and installation of sanitary fittings, soil stacks, waste stacks, flushing systems, hospital and laboratory fittings and appliances; domestic layout including storage tanks, etc.

Gas service and domestic gas service and installation, appliances, flues, etc., heaters, stoves, fires, etc., refrigerators.

Hot water services of various kinds, solid fuel, gas, electric, separate and individual types, various appliances, hot water boilers and heating units; relative costs for different types of building.

11,204 BUILDING SERVICES AND EQUIPMENT B.

Generation and use of steam; sources of heat, combustion, selection of boilers; flues, stacks; layout of boiler rooms.

Hot water supply; types of calorifiers; hot water storage tanks, layout of plant; hot water boilers.

Heating of buildings; heat transmission through walls and floors, etc.; types of radiators, accessories, pipe systems; equipment and fittings.

Pumps; application to specific jobs.

Ventilation; natural and mechanical; air change, fans, ducts, registers; requirements of local authorities.

Refrigeration; refrigeration cycle; machines and accessories; location of plant; cool rooms, construction and insulation.

Air conditioning; description of sensible heat: latent heat, dew point, humidity, heat content of air; relation of aspect to head load, human occupancy, etc.

Fire protection; sprinkler systems; requirements of controlling authorities; fire extinguishers.

Lifts; application of lifts to buildings; types of lifts; requirements of controlling authorities; size of lift cars; size of walls; motor rooms; enclosures.

Lighting; natural and artificial; light intensity; requirements for lighting; types of lamps and fittings; calculation of lighting requirements; methods of installation; switch rooms, etc.

Call systems; application of call systems in hospitals, hotels, business premises, factories, etc.; telephones for intercommunication.

Kitchen equipment; items for kitchen equipment, their application and use; methods of operation, gas, electricity, steam, fuel oil, coal, coke. Servery equipment and accessories.

11.215 ESTIMATING.

Preamble. Introduction; methods employed for estimating; standard mode of measurement; profit, establishment and other changes; plant—purchase and hiring costs; awards, insurances, taxes, etc.; local and other authorities—scale of fees and charges; provisional and prime cost items.

Trades and Operations. Examples of "building up" the elements of unit cost rates in respect to: excavation, drainage, concrete, formwork, reinforcement, brickwork, masonry, structural steel and ironwork, carpentry and joinery, plumbing, floor and wall tiling, paving, plastering, painting and decorating, glazing.

The subject-matter for each trade or operation will include :---

- (a) Current material prices.
- (b) Schedule of unit labour costs.
- (c) Memoranda in respect to:--weights, mixing proportions and yield of materials: waste allowance: working costs and depreciation of plant: scaffolding, etc.
- (d) Problems for students to work out, using class examples for reference.

Variations.

- (a) Measuring and valuing.
- (b) Methods of adjusting.
- Schedules.
 - (a) Grouping of unit items to obtain a bulked cost rate for different structural parts of buildings.
 - (b) Comparison of costs for alternative methods of construction related to structural parts of a building.

Humanities and Social Sciences.

The courses for 1954 will be as follow:---

G1 LOGIC (COMPULSORY).

Science is sometimes described as organised or connected or systematised knowledge; logic may be roughly described as an enquiry into the kinds of organisation, connection and system found in extended bodies of knowledge. For instance, if you open at random a textbook on a scientific subject, you are quite likely to come upon such a statement as this:

"It can be shown by the methods of thermodynamics that Raoult's law and the osmotic pressure equation are related; the validity of one requires the validity of the other." (Linus Pauling—General Chemistry, p. 293).

Mostly, when we read a statement like that, we look closely at such terms as "thermodynamics", "Raoult's law" and "osmotic pressure"; we take for granted that we clearly understand the terms "shown", "methods", "law", "equation", "related," "validity", "re-quircs". Now what we thus ordinarily take for granted is what logic invites us to question and examine-logic is a study in which we ask, for instance, just what we do when we "show" something; in which we ask whether there are distinguishable "methods" for "showing" things; ask whether an "equation" can or cannot be a "law"; ask how statements and terms can be "related"; ask whether "validity" is to be distinguished from "truth", and ask how it comes that the "validity" of something can "require" the "validity" of something else.

In general, all serious discussion, in any field of knowledge, makes constant use of such terms as "suppose", "because", "if then", "implies", and so on: every page of scientific writing mentions "facts", "hypotheses", "theories" and "explanations". It will be our business in this course to examine those features of coherent knowledge which are indicated by these and similar terms. It is hoped that students will find this examination interesting in its own right; and hoped also that it will assist them to make critical appraisals of arguments in other fields of study.

Recommended Books-

No books are prescribed for the course, but students would find it much to their advantage to possess, or have access to, one or several of the following:---

Cohen, M. R. and Nagel, E .- An Introduction to Logic and Scientific Method. Routledge and Kegan Paul-(Complete Edition, 1949). Eaton, R. M.-General Logic. Scribner, 1931. Black, M.-Critical Thinking. Prentice-Hall, 1950.

Larrabee, H. A.—Reliable Knowledge. Houghton Mifflin, 1945. Stebbing, L. S.—A Modern Introduction to Logic. Methuen, 1945.

INTRODUCTION TO MODERN PHILOSOPHY (COMPULSORY). G2

The editors of "The Concise Oxford Dictionary" hold that philosophy is especially concerned with ultimate reality, and with the most general causes and principles of things; and many philosophers would agree with them. For this course, however, we have in mind a rather more modest conception of philosophy. We shall take it that modern philosophy has, to a large extent, been concerned with an examination of the ways in which we may arrive at reliable generalised knowledge:
and that, among the many questions to which philosophers have given attention, a central place is occupied by some questions which concern the nature of systematic enquiry—these are the questions we shall chiefly consider.

We shall therefore be most concerned with those parts of philosophy which lie nearest to logic; but in this course (as contrasted with G1) we shall have in mind the historical fact that the period in which Bacon, Descartes, Locke, Berkeley and Hume were shaping some important parts of the modern philosophic tradition was also the period in which such men as Kepler, Galileo, Gilbert, Harvey and Newton were laying the foundations of modern science. One of the books we shall study is Descartes' Discourse on the Method of Rightly Conducting the Reason and Seeking Truth in the Sciences. The title itself points to the close connections, at this time, between philosophy and science. These connections we shall look at in some detail; in looking at them we shall be taking up, for example, questions about the nature of explanation, the establishing of general truths, the distinction between reason and experience, the nature of perception, the notion of matter or substance, the distinction between primary and secondary qualities, and the notion of causation.

The course will not pretend to be a comprehensive introduction to modern philosophy; it will rather be concerned with those parts of philosophy which, in the work of the seventeenth century writers, are linked to the development of what has come to be called the scientific method of enquiry. It will aim, incidentally, to show whether there is indeed one or several methods of enquiry which are peculiar to the sciences. The exposition will be partly historical, but the chief emphasis throughout will be placed on the questions raised and the answers which may be given to them, rather than on the mere historical succession of theories. It is hoped that students will thus come to see some of the important philosophic pre-suppositions which underlie much of modern science.

Recommended Books-

Students will be expected to read some of the works of Bacon, Descartes, Locke, Berkeley and Hume. There are editions of some of the writings of Descartes, Berkeley and Hume in the Everyman Library (Dent); for Bacon and Locke students may consult:

Burtt, E. A.—The English Philosophers from Bacon to Mill. The Modern Library, 1939.

Some useful discussions of the work of these philosophers, and its relations with contemporary science, will be found in-

Wolf, A.-A History of Science, Technology and Philosophy in the 16th and 17th Centuries. Allen and Unwin (2nd Edition, 1950).
Russell, B.-History of Western Philosophy. Allen & Unwin, 1948.
Putterfeld, H. The Origina of Mature Gamma 2010.

Butterfield, H.-The Origins of Modern Science. Bell, 1949.

Burtt, E. A.—The Mctaphysical Foundations of Modern Physical Science. Routledge and Kegan Paul—(Revised Edition, 1949). A further Minor Elective for full-time students in their third year. An account will be given of the growth of some major scientific theories—for instance, those associated with Copernicus, Newton, Stahl (phlogiston), Black (caloric), Dalton, Young and Fresnel (the luminiferous ether) and Darwin. Members of the class will be expected to undertake, independently, an examination of some substantial scientific theory.

This course will be conducted by Mr. Thornton.

Recommended Books-

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Detailed references will be given in class, but the following books will be generally useful:---

Wightman, W. P. D.-The Growth of Scientific Ideas. Oliver and Boyd, 1950.

Einstein, A. and Infeld, L.—The Evolution of Physics. Cambridge, 1938.

G6 PHILOSOPHY (MAJOR ELECTIVE).

Full-time students in their final year may take philosophy as a Major Elective. The course will aim to give an introduction to present-day thought in some major branches of philosophy. It will include 24 lectures on ethics or moral philosophy, 24 lectures on the theory of knowledge, and 24 lectures on the logic of science and mathematics. Students will be expected to undertake some independent reading. Full lists of references will be given in class.

G70 PHILOSOPHY (CONVERSION).

The full course of 72 hours for conversion students will consist of three parts, each of 24 hours. Part I, given in First Term, will be devoted to logic, as outlined under course G1 above; Part 2, given in Second Term, will be an introduction to modern philosophy along the lines of course G2 above; Part 3, in Third Term, will be devoted either to moral theory, or to the theory of knowledge, or to the logic of science and mathematics. If numbers permit, students will be able to make their own choice from these three possibilities for Part 3. Reading lists will be given in class.

G8 PHILOSOPHY (COMPULSORY IF G1 AND G2 NOT TAKEN).

This course, which is taken by students in part-time courses of the Faculty of Engineering, is a combination of G1 Logic and G2 Introduction to Modern Philosophy.

G10 ENGLISH (COMPULSORY).

A course of 48 lectures on Language and Literature given in Terms 1 and 2 to all first-year undergraduates. The lecturers will be Mr. Elkin, Mr. Geering and Mr. Ginges.

The Language part of the course consists of (1) instruction and exercises in the reading and writing of various kinds of prose, and (2) lectures which are designed to supplement *The Control of Language*, by King and Ketley.

Recommended Books-

King and Ketley-The Control of Language. Longmans.

The Literature part of the course is directed towards an appreciation of the story, the play and the poem through selected short stories, novels, plays and ballads.

Recommended Books-

Fiction-

Hadfield, J. (Ed.)—Modern Short Stories. Dent. Balchin, N.—Mine Own Executioner. Pan. Steinbeck, J.—Of Mice and Men. Penguin. Hemingway, E.—Fiesta. Pan. Hughes, R.—In Hazard. Penguin.

Drama—

O'Neill, E.—Anna Christie (in The Hairy Ape). Jonathan Cape. Shaw, G. B.—Major Barbara. Penguin. Wilde, O.—An Ideal Husband. Penguin.

Poetry-

Sclected Ballads (to be issued to classes by the English Department).

G11 ENGLISH (MINOR ELECTIVE).

A course of 24 lectures for full-time students in their third year. The course, conducted by Mr. Elkin, Mr. Ginges and Mr. Geering, will be devoted to a discussion of satire, with particular reference to modern satirical novels.

Recommended Books-

Orwell, George—Animal Farm. Penguin. Orwell, George—Nineteen Eighty-four. Secker and Warburg. Lewis, Sinclair—Babbitt. Jonathan Cape. Huxley, Aldous—Brave New World. Chatto.

- Waugh, Evelyn-Decline and Fall. Penguin.
- , Macdonnell, A. G .- England, Their England. Pan.
- Voltaire-Candidc. Penguin.

G12 ENGLISH (MAJOR ELECTIVE).

A course of 72 hours in Terms 1 and 2 for full-time students in their fourth year, conducted by Mr. Elkin, Mr. Ginges and Mr. Geering.

This is a course on modern literature, English, American and Australian. It contains a core of works for compulsory detailed study and some additional literature for more rapid and selective reading. The texts are chosen for their individual merit and their representative character. The aim of the course is to indicate the variety and main concerns of modern literature and to encourage critical appreciative reading.

The course will include discussions, play-readings and recordings: as well as lectures. At least eight hours will be devoted to special training in critical reading. The drama is to be studied with reference, whenever possible, to current films and stage-productions.

Main Texts (compulsory reading)—

Students may use any editions which are available.

(a) Drama—

Anderson, Maxwell-Winterset. O'Neill, Eugene-The Emperor Joncs. Miller, Arthur-Death of a Salesman. Wilde, Oscar-The Importance of Being Earnest. Shaw, G. B.-Heartbreak House. Eliot, T. S.-Murder in the Cathedral.

(b) Fiction-

Fitzgerald, R. Scott—The Great Gatsby. Hemingway, Ernest—A Farewell to Arms. Koestler, Arthur—Darkness at Noon. Cary, Joyce—The Horse's Mouth. Hadfield, J. (Ed.)—Modern Short Stories.

Additional Reading-

Details will be given during the course of further selected works in drama, poetry and fiction, including some Australian literature.

G13c English (Conversion).

A course of 72 lectures, conducted by Mr. Elkin, Mr. Ginges and Mr. Geering.

This course is the same as G10, with 8 additional lectures on the control of language and 12 additional lectures on the appreciation of literature. The latter will be devoted to a brief study of modern satire, with reference to the following texts:—

Recommended Books-Macdonnell, A. G.-England, Their England. Pan. Orwell, George-Animal Farm. Penguin. Lewis, Sinclair-Babbitt. Jonathan Cape. Huxley, Aldous-Brave New World. Chatto. Waugh, Evelyn-Decline and Fall. Penguin.

G20 AND G20B HISTORY (COMPULSORY).

This course of 48 lectures is divided into two sections. Both sections must be taken by all students.

G20.1 Man in Society

This background course of 36 lectures, providing an introduction to the history of civilization, is under the supervision of Dr. Auchmuty, with whom other members of the history staff co-operate. After preliminary lectures on the nature and meaning of history, followed by an outline of the Egyptian, Greek, Roman and Semitic contributions to the development of modern Western civilization, the rise of Christianity and the nature of the feudal system are discussed. The period from the Renaissance and Reformation is treated in greater detail with special reference to scientific and geographical discoveries; artistic and literary achievement; the rise of national states; the American and French Revolutions; modern changes in habits of thought, together with the influence of Darwin and Karl Marx; international organization; the contemporary world.

G20.2 Australian History.

This course of 12 lectures, given by Mr. Ingham or Mr. Nairn, attempts in brief outline to present the political, cultural and economic background of the modern Australian Commonwealth, and to give an understanding of the living problems of the contemporary world in their special reference to Australia.

No books are prescribed for either part of the compulsory course, but suitable reading is recommended by the lecturers.

G21 HISTORY (MINOR ELECTIVE).

One of the following may be chosen:-

G21.1 Pacific History.

Twenty-four lectures by Mr. Bach. Part A of this course consists of 10 lectures providing an historical narrative from medieval times to the end of the War of 1939-45; emphasis being given to the development of China and Japan. Part B, the remaining 14 lectures, will be devoted to a survey of contemporary affairs in China, Japan and South-East Asia, with special attention to the problems of Asian democracy, communism and nationalism, together with a discussion of the special problems presented to Asia by American Foreign Policy and its ideological methods.

G21.2 The United States, 1860-1914.

Twenty-four lectures by Mr. Nairn. After a brief review of American history in colonial and early independence times, this course will examine the causes and effects of the Civil War. The development of the United States will then be examined up to the conclusion of World War I. In particular, attention will be paid to the economic and political problems involved in the United States' advance to world leadership of the democratic nations.

Recommended Book -

Nichol, J. F.-The American Union. Penguin.

G21.3 The Middle East in Modern Times.

Twenty-four lectures by Dr. Auchmuty. The Middle East, which includes Persia and the succession states to the old Ottoman Empire, has proved itself, since the time of Napoleon, one of the nerve centres of the modern world. Strategically it is placed athwart the old land route from Europe to India; the Suez Canal, as a highway of imperial and international commerce, is of crucial importance to Australia as to the Asian members of the British Commonwealth; in two world wars Australian troops have found themselves in Egypt and in Palestine; economically the region is of great significance as a major source of oil supply; politically there are problems of large and small states, of democracy and dictatorship, of strong national feeling, of varied religious beliefs and of persistent and only partially absorbed minorities. The aim of the course is to trace the rise of the modern Arab, Turkish and Persian national states; to discuss colonial development in the Sudan and other similar areas; to examine the recent history of the Jewish problem and the nature of the state of Israel; to emphasise the strategic as well as the commercial importance of the Suez Canal; and in particular to stress the nature of the Islamic way of life and the difficulties experienced in reconciling it with the modern Western world. The course will cover the period from 1800 to the present day and will be concerned as much with economic as with strategic and cultural problems.

Recommended Books-

Kirk, G. E.-A Short History of the Middle East. Methuen.

Lawrence, T. E .- The Seven Fillars of Wisdom. Any edition.

- Bullard, Sir Reader—Britain and the Middle East. Hutchinson University Library.
- The Middle East—A Political and Economic Survey. Royal Institute of International Affairs.

Each student will be expected to make a special study of a single problem or topic; for this, individual reading lists will be prescribed.

G22 HISTORY (MAJOR ELECTIVE).

The course is divided into the two parts shown, both of which must be taken by students who choose this elective.

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'G22.1 European History 1815-1914.

A course of 48 lectures given by Mr. Ingham. In this course the main historical trends and tendencies of the nineteenth century are discussed—Conservatism, Liberalism, Nationalism, Socialism. Using contemporary England as a background reference, the application of these ideas is noted in France, Germany, Russia and Italy. A study of Modern Imperialism and of the causes of World War I forms a logical conclusion to this course.

Recommended Books-

Hayes, C. J.—Political and Cultural History of Modern Europe, Vol. 2. Fisher, H. A. L.—History of Europe, Vol. 3. Taylor, A. J. P.—Short History of Modern Germany. Pares, B.—History of Russia. Woodward, E. L.—Three Revolutions.

G22.2 International Organization.

A course of 24 lectures by Dr. Cranfield in continuation of course 22.1. The course outlines the history of the various efforts to solve the most acute problem facing the modern world—the promotion of international co-operation and the achievement of international peace and security. The lectures will touch on the Concert of Europe: the Hague Conferences; the Permanent Court of International Justice; and the United Nations Organization. Although primarily historical, the lectures will also discuss the development of International Law, its nature and scope, its defects and potentialities.

Students will be expected to make themselves acquainted with the Covenant of the League of Nations and with the Charter of the United Nations.

G23c HISTORY (CONVERSION).

The full course consists of 72 lectures, divided as follow:— G23.1c The Expansion of Europe.

Forty-eight lectures by Dr. Cranfield form the first part of this Major Elective, which is completed by course G23.2c. These lectures deal with the impact of Europe upon remote races and societies, the transfer overseas of European institutions, economic techniques. culture and modes of government, and their evolution in very different environments. The history of the various colonial empires since the fifteenth century will be described, the successive theories of empire and the practice to which they corresponded, and parallel developments and repercussions in Europe. The course will discuss the different types of colony set up and the various problems, biological, economic, climatic and cultural, encountered and will conclude with an attempt to draw up a balance sheet of imperialism and to suggest possible lines of future development. The full major elective will provide a student with an outline knowledge of one of the most important and formative movements in the history of civilization as an essential background to a proper understanding of the history of Australia, not as a separate and isolated phenomenon, but as a process related to and stimulated by wider forces within Britain, the Empire and the outer world.

Recommended Book-

Parry, J. H .- Europe and a Wider World. Hutchinson.

G23.2c Australian History.

Twenty-four lectures by Mr. Ingham, completing the major elective entitled *The Expansion of Europe*. This course undertakes a brief survey of the important factors in Australian history—convict era and early settlement, land question, representative and responsible government, growth of industry, rise of the Labour Party in the political arena and the achievement of federation.

Recommended books-

Scott, Ernest—A Short History of Australia. O'Brien, Eris—The Foundation of Australia. Fitzpatrick, Brian—The Australian People. Hancock, W. K.—Australia. Clarke, C. M. H.—Select Documents in Australian History, 1788-1850. Roberts, S. H.—The Squatting Age in Australia. Fitzpatrick, Brian—British Imperialism and Australia, 1788-1833. Fitzpatrick, Brian—The British Empire in Australia.

G30 GOVERNMENT (MINOR ELECTIVE).

The American Political System.

A study of American political institutions and dominant political ideas, especially in recent years. The course will include some historical and social background but will deal chiefly with the recent working of political parties, trade unions, etc., and of the institutions of State and Federal Government in the United States.

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Reference Books-
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Laski, H. J.—The American Presidency. Key, V. O.—Politics, Parties and Pressure Groups. Brogan, D.—The American Political System.

G31 GOVERNMENT (MAJOR ELECTIVE).

A course of 72 lectures. The course will be divided into two parts, the first dealing mainly with description and analysis of political institutions, the second with some basic questions of political theory.

Part A will examine the working of parliamentary government in Britain and Australia, making some comparisons with the American system. Topics discussed will include the nature of federalism, recent changes in the federal structure of Australia, Parliamentary institutions, the relations of government with the electorate, the functions of political parties in the modern state, problems of the modern public service, the legal system.

Recommended Books-Jennings, W. I.—The British Constitution. or Greaves, H. R. G.—The British Constitution. Crisp, L. F.—Parliamentary Government of the Commonwealth of Australia. Reference Books-Jennings, W. I.—Cabinet Government. Jennings, W. I.—Cabinet Government. Laski, H. J.—Parliamentary Government in England. Laski, H. J.—Grammar of Politics. Bassett, R.—Essentials of Parliamentary Democracy. Wheare, K. C.—Federal Government. Greenwood, G.—The Future of Australian Federalism.

Jennings, W. I.—The Law and the Constitution.

Beard, Brogan or Laski on American Government.

Part B will deal with the following topics: the nature of political activity, the distribution of political power in the community, pressure groups, the state, theories of politics, democracy, socialism. This part of the course will complement and be linked to discussions of subjects in Part A.

Recommended Books-

Pickles, D. M.—Introduction to Politics. or Soltau, R. H.—An Introduction to Politics.

G31c GOVERNMENT (CONVERSION).

This course of 72 lectures will be the same as that described under G31.

G40 PSYCHOLOGY (MINOR ELECTIVE).

Heredity and some social issues. This topic is offered as a means to directing students to a critical examination of a number of related social questions which are commonly approached with an uncritical acceptance of current prejudices and practices.

It is intended that an approach to these questions be made through an understanding of scientifically determined facts in order that the dangers of mere opinion or "commonsense" shall be seen as a questionable approach to social questions, in the same way as it is to those technical fields which may be regarded by the student, as an intending technologist, as his major field of study. As part of this intention, the reality of the distinctions, as well as the inter-relationships between heredity and environment, will be examined from the standpoint of causal elements in social behaviour. An examination will then be made of the methods and findings of typical investigations into relevant psychological aspects of these social questions. The lectures will be given by Mr. Olley.

Synopsis—

1. A statement of main issues.

2. The mechanism of heredity.

3. The limits of heredity-what we do and do not inherit.

4. The nature and effects of environment.

5. Heredity and sex differences.

6. Heredity and "race" differences.

7. Heredity and "class" differences.

8. Heredity and delinquency and crime.

9. Heredity and social customs.

Reference Books-

Scheinfeld, A.—You and Heredity. Blackburn, J.—The Framework of Human Behavior. Anastasi, A. & Foley—Differential Psychology. Klineberg, O.—Social Psychology.

G41 PSYCHOLOGY (MINOR ELECTIVE).

The principal aim of this course is to acquaint the student with psychology as a cultural subject.

Beginning with the discoveries of Freud and stemming from them, dynamic psychology has made a profound impact on thought in almost all fields of enquiry, notably the social sciences. As a consequence, the findings of psychology have led to a clearer understanding of custom, convention, morality and the like.

A general account will be given of the basic tenets of psychoanalytic theory and their modification in recent years. This will be followed by an account of the influence of psychoanalytic concepts on literature, art, religion, social theory, anthropology, education and of the manner in which psychology has thrown light on various social problems such as sexual morality, conventionalism, the social deviant, censorship and values.

The principal objective of the course is to develop criticism by encouraging the student to see things as they are and through such objectivity to assist him to see through the assumptions and illusions current in the conventional virtues and customs.

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The lectures will be given by Mr. Martin.

Reference Book-

Freud, S.-Introductory Lectures on Psychoanalysis.

G42 PSYCHOLOGY (MAJOR ELECTIVE).

This course will be confined to a treatment of general psychology with a social emphasis. The usual topics of general psychology perceiving, thinking, remembering, intelligence, personality, motivation and emotion—will be covered and their social aspects considered. An attempt will also be made to suggest how psychology might be integrated with ethnology and social interaction generally, as well as the social determinants of personality which will be emphasised.

Lectures will be given by Mr. Haynes, Mr. Olley, Mr. Martin and Mr. Kenna.

Reference Books-

Stagner, R. & Karwoski, T. S.—Psychology. McGraw Hill, New York, 1952.

Klineberg, O.—Social Psychology.

Hartley & Hartley-Fundamentals of Social Psychology.

G42c PSYCHOLOGY (CONVERSION).

The outline of this course is the same as that given for G42.

G50 ECONOMICS (MINOR ELECTIVE).

Twenty-four lectures given by Professor Hartwell, Mr. Runcie and other members of the Economics Department. This is a course in Descriptive Economics, giving an account of the development and present structure of the Australian economy. It may be taken by itself as a self-contained course, or as a descriptive introduction to the fourth-year Major Elective in Economics.

A brief outline follows:-

· . ·

Stages and events in the development of the Australian economy; the prison farm; the pastoral and gold era; industrialisation. The growth of Australia's national income; how it is now made up and to whom it is distributed. Structure of the economy; size and location of industries; survey of economic resources. Population: growth and present distribution. Key industries: wool, wheat, coal, steel, transport and irrigated agriculture. Foreign trade: imports, exports and the balance of payments; the tariff system. The Australian banking system. Government finance: taxation, Loan Council, the Budget, State finances; other activities of governments in the economy. Trade unions; organisation and policies; the Arbitration Court; joint consultation; incentive schemes.

Recommended Books-

Commonwealth Year Book (most recent).

J. Andrews—Australia's Resources and Their Utilisation, Parts 1 and 2.

G51 ECONOMICS (MAJOR ELECTIVE)

This course will be divided into two parts:-

A. Economic Theory (48 lectures). This part of the course will introduce the student to the main departments of economic theory.

- (a) The Theory of the Firm and the Industry: An examination of the theory of the particular firm and industry; determination of price and output in various market situations.
- (b) The Theory of the Level of Economic Activity: A critical review of various theories of the trade cycle; application of this branch of theory to domestic and international monetary problems and the problems of public finance.
- (c) The Theory of Economic Development: Some aspects of the theory of economic development with particular reference to the problems of "underdeveloped" countries.

B. Economic History (24 lectures). The Industrial Revolution: An examination of the industrial revolution in Great Britain and of the world economy in the nineteenth century.

The lectures will be given by Professor Hartwell, Mr. Runcie and other members of the Economics Department.

Recommended Book-

Samuelson, P. A.—Economics, an Introductory Analysis (2nd Edition. 1951).

Reference Books-

A reading list will be supplied.

G51c Economics (Conversion).

This course of 72 lectures will be the same as that described under G51.

TEXT BOOKS.

				TEXT BOOKS.
	The factors SUBJECT.	ollowing	g tei	t books are recommended for 1954.
1.11	1		PI	EYSICS-1.01 to 1 94
1.11A 1.11D	} Physics	•••	•••	Lemon and Ference—Analytical Experimental Physics.
1.12) .			Poynting and Thomson—University Text Book of Physics—Properties of Matter, Vol. 1.
1.12	} Physics	•••	•••	Starling and Woodall—Physics.
				OR Robertson—Introduction to Physical Optics. Gilbert—Electricity and Magnetism. Milton—Heat. Dushman—Fundamentals of Atomic Physics.
				OR Tolansky-Atomic Physics.
				Crowther—Ions, Electrons and Ionizing Radiations (8th Edition).
1.41 1.41D	{ Physics }	•••	•••	Lomon and Ference—Analytical Experimental Physics.
1.42 _D	Physics	•••	•••	Starling and Woodall-Physics.
			ł	OR Robertson—Introduction to Physical Optics. Gilbort—Electricity and Magnetism. Milton—Heat.
Advai and	nced Visual Ph l Physiological	ysiology Optics	C	Pptometrical Science. Adler—Physiology of the Eye. Ogle—Researches in Binocular Vision. Hartridge—Recent Advances in the Physiology of Vision.
				Heierences. Wright—Researches in Normal and Defective
		ADDIT	FD	Colour Vision. Duke-Elder—Textbook of Ophthalmology. Polyak—The Retina. Dudley—Stereoptics. Tschermak—Physiological Optics. Granit—Sensory Mechanisms of the Retina. Gibson—The Perception of the Visual World. Hering—Spatial Sense and Movements of the Eye. Luneburg—Mathematical Analysis of Binocular Vision.
2.111	Chemistry	APPLI	ЕD	CHEMISTRY—2.01 to 2.97.
	Chicanony	•••	••	Inorganic Chemistry (Revised Edition, 1940) Bound with
				Hildebrand—Principles of Chemistry (5th Edition, 1947).
			i	Sydney Technical College—First Year Practical Chemistry Notes—Union Store.
				Read—I'extbook of Organic Chemistry (3rd Edition). OR
				English and Cassidy—Principles of Organic Chemistry.

SUBJECT.	TEXT BOOK.
APPLIED CHE	MISTRY-2.01 to 2.97 (continued).
2.122 Engineering Chem-	Gyngell-Applied Chemistry for Engineers (2nd
 <i>j</i> - 1 301 <i>y</i> .	Leighou (for reference)—Chemistry of Engineering Material (4th Edition 1942)
	Carman-Chemical Constitution and Properties of
9 99 5	Engineering Materials.
2.32 2.32A Physical Chemistry	Glasstone-Elements of Physical Chemistry.
	Reference.
	Glasstone—Textbook of Physical Chemistry. Eastman and Rollefson—Physical Chemistry.
	Practical.
	Palmer—Practical Physical Chemistry. Practical Notes—Physical Chemistry 1.
2.33 Physical Chemistry	Glasstone-Elements of Physical Chemistry.
	Reference
	Glasstone-Textbook of Physical Chemistry
	Practical.
	Practical Notes-Physical Chemistry II.
9 94 7	Reference.
2.34 Physical Chemistry	Alexander & Johnson-Colloid Science. Harrison, Lord & Loofbourow-Practical
	Steiner-Chemical Thermodynamics. Glasstone, Laidler & Eyring-Theory of Rate Processes.
	Practical.
2.41	Practical Notes—Physical Chemistry III.
2.41a Chemistry 2.41b	Latimer and Hildebrand—Reference Book of Inorganic Chemistry (Revised Edition, 1940). Bound with—
	Hildebrand—Principles of Chemistry (5th Edition, 1947)
	English and Cassidy—Principles of Organic Chemistry.
	OR Read-Textbook of Organic Chemistry (3rd Edition)
	Sydney Technical College—First Year Practical Chemistry Notes—Union Store.
	Vogel—Textbook of Qualitative Chemical Analysis (3rd Edition, 1945).
2.42 Inorganic Chemistry	Sidgwick-Chemical Elements and their Compounds
	(2 vols.). Emeleus and Anderson-Modern Aspects of Inorganic Chemistry.
2.52 2.52A 2.53 Quantitative Analysis.	Vogel-A Textbook of Quantitative Inorganic Analysis.
-	OR
	Kolthoff and Sandell—A Textbook of Quantitative Inorganic Analysis (2nd Edition, 1943).

	SUBJECT.	TEXT BOOK.
	APPLIED CHEM	ISTRY-2.01 to 2.97 (continued).
$\left. \begin{array}{c} 2.62 \\ 2.62 \end{array} \right\}$	Organic Chemistry	English and Cassidy—Principles of Organic Chemistry. OR
2.63	Organic Chemistry	Noner—Chemistry of Organic Compounds. Finar—Organic Chemistry.
		OR Fieser and Fieser—Organic Chemistry. OR
9 <i>61</i>)		Noller-Chemistry of Organic Compounds.
$2.64 \\ 2.64 \\ 2.64 \\ \end{bmatrix}$	- Organic Chemistry	Turner and Harris—Organic Chemistry. Wilde—Characterisation of Organic Compounds. OR
		Openshaw —Characterisation of Organic Chemistry.
		Reference.
2.72	Mathematical Chem-	Worthing and Geffner—The Treatment of Experi- mental Data.
	2002 9 .	Hitchcock and Robinson—Differential Equations in Applied Chemistry. Crumpler and Yoe—Chemical Computations and
		Errors.
		Bridgman—The Method of Dimensions. Barbor and Thiessen—How to Solve Problems in Physical Chemistry.
2.73	Mathematical Chemistry.	Chambers-Statistical Calculations for Beginners. Brownlee-Industrial Experimentation-(H.M. Stationery Office), (4th Edition, 1949).
2.911	Biology	Smith et al—Textbook of General Botany. Grove and Newell—Animal Biology. Buchsbaum—Animals without Backbones.
		Reference.
		Murray—Biology. McLean and Cook—Biology. Rogers et al—Man and the Biological World.
		Hogben—Principles of Animal Biology. Sinnott—Botany—Principles and Problems. Hill et al. Botany
		Scheinfeld—You and Heredity.
		Borradaile—Manual of Zoology. Tansley—Introduction to Plant Ecology. Molesen and Cook—Practical Field Ecology.
		Carey-Botany by Observation.
		Practical.
		Peacock—Elementary Microtechnique. Briggs—Anatomy of Animal Types. Ward and Whipple—Freshwater Biology.
		Reference.
2.91	Biochemistry	. Bell, D. J.—Carbohydrate Biochemistry. Haurowitz, F.—The Chemistry and Biology of Proteins.
2.92	Biochemistry	. Baldwin, E.—Dynamic Aspects of Biochemistry (2nd Edition).
		Bodansky, M.—Physiological Chemistry (4th Edition).

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TEXT BOOK.

APPLIED CHEMISTRY-2.01 to 2.97 (continued).

Baldwin, E.—Dynamic Aspects of Biochemistry. 2.94_D Biochemistry •••

Reference.

Haurowitz, F.-The Chemistry and Biology of Proteins.

Davidson, F .- The Biochemistry of the Nucleic Acids.

Dixon, M.—Multi-Enzyme Systems. Sumner, J. B. and Somers, J.—Chemistry and Methods of Enzymes.

Gale, F.-Chemical Activities of Bacteria.

Bell, D. J.-Carbohydrate Biochemistry.

CHEMICAL ENGINEERING-3.01 to 3.95.

3.14 3.14▲	$\Big\}$ Industrial Chemistry	Riegel—Industrial Chemistry (5th Edition). Shreve—Chemical Process Industries. Groggins—Unit Processes in Organic Synthesis.
3.24 3.24д	Chemical Engineer- ing.	 Brown & Associates—Unit Operations. Perry—Chemical Engineers Handbook. Badger & McCabe—Elements of Chemic Engineering. Kern—Process Heat Transfer. Rouse—Elementary Mechanics of Fluids.
		Reference.
		McAdams—Heat Transmission. Riegel—Chemical Machinery. Robinson & Gilliland—Fractional Distillation. Treybal—Liquid Extraction. Sherwood & Pigford—Absorption Extraction.
3.34 3.34d	Chemical Engineer- ing Design.	Low—Pocket Book for Mechanical Engineers.
		OR
		Mechanical World Pocket Book. Faires—Design of Machine Elements.
		OR
		Maleev—Machine Design.
		Perry—Chemical Engineers Handbook.
		Stoever—Applied Heat Transmission. OR
		McAdams-Heat Transmission.
		B.S. Code 1500 Fusion Welded Pressure Vessels.
		S.A.A. British Specification 436 (Gears).
		Engineering Drawing Practice (1952 Edition).
		Reference.

Hesse & Rushton—Process Equipment Design. Marks—Mechanical Engineers Handbook. American Society for Metals-Metals Handbook. A.S.M.E. Boiler Construction Code. S.A.A. Boiler Code C.B. 1. S.A.A. Code for Corrosion Resistant Steel Boilers C.B. 10.

TEXT BOOK.

CHEMICAL ENGINEERING - 3.01 to 3.95 (continued).

3.34 3.3 4d	Chemical Engineer- ing Design—contd.	S.A.A. Welding Code C.A. 8. S.A.A. Code or Structural Steel in Buildings C.A. I. S.A.A. Code for Reinforced Concrete.
		S.A.A. Crane and Hoist Code.

3:44 Chemical Engineering Hougen and Watson-Chemical Process Principles Calculations. Vol. 1.

Reference.

- Sherwood & Reed-Applied Mathematics in Chemical Engineering.
- Davis, D. S.-Empirical Equations and Nomography.

Chambers—Statistical Calculations. Brownlee—Industrial Experime

- Experimentation (4th Edition, 1949).
- Hitchcock & Robinson-Differential Equations (2nd Edition, 1936).

Lipka-Graphical & Mechanical Computations.

- Haslam & Russell-Fuels and Their Combustion.
- Davies, O. L.-Statistical Methods in Research and Production.
- Worthing & Geffner-Treatment of Experimental Data.
- I. S. & E. S. Sokolnikoff-Higher Mathematics for Engineers and Physicists.
- Materials.
- Stevens & Donald-Rubber in Chemical Engineering, 1949.

Reference.

Vivian—Essential Metallurgy for Engineers, 1948. Rollason-Metallurgy for Engineers, 1947.

Smith, Paul I.-Plastics for Production. 1944.

Barron—Modern Plastics, 1949.

Burton, W. E. (Ed.)-Engineering with Rubber. 1949.

U.S. Department of Interior, Bureau of Reclamation-Concrete Manual.

Norton—Refractories, 1949.

Morey, G. W.—Properties of Glass. 1938.

3.65 Chemical Engineering, Thermodynamics and Kinetics.

Smith, J. M.-Introduction to Chemical Engineer. ing Thermodynamics.

Reference.

Hougen and Watson-Chemical Process Principles. Vols. II and III. Dodge-Chemical Engineering Thermodynamics. Guggenheim-Thermodynamics. Hinshelwood-Kinetics of Chemical Change.

3 54 Chemical Engineering

SUBJECT.

TEXT BOOK.

METALLURGY-4.01 to 4.94.

- Alexander, W. and Street, A .- Metals in the 4.12 General Metallurgy ... Service of Man. Ponguin.
 - Brown, A. and Orford, A.-The Iron and Steel Industry.
 - Farwell, G.-Down Argent Street. Johnson, Sydney.
 - Butts, A.-Metallurgical Problems (2nd Edition). McGraw-Hill.
 - Newton, J.-Introduction to Metallurgy (2nd Edition). Wiley.

4.32

Physical Metallurgy 4.33

4.34

- Brick, R. M. and Phillips, A .- Structure and Properties of Alloys (2nd Edition). McGraw-Hill.
 - Doan, G. & Mahla, E.—The Principles of Physical Metallurgy. McGraw-Hill.
 - Hollomon, J. and Jaffe, L.-Ferrous Metallurgical Design. Wiley.
 - Sachs, E. and Van Horn, K .- Practical Metallurgy. Amer. Soc. Metals.
 - Cottrell, A. H.—Theoretical Structural Metallurgy. Arnold.
 - Kehl, G. L.-Principles of Metallographic Laboratory Practice (3rd Edition). McGraw-Hill.
 - Grossmann, M .--- Principles of Heat Treatment. Amer. Soc. Metals.
 - Hume-Rothery, W.-Atomic Theory for Students
 - of Metallurgy, Inst. Metals. Hume-Rothery, W.—The Structure of Metals and Alloys. Inst. Motals.

MECHANICAL ENGINEERING-5.01 to 5.94.

5.101 5.101A	Engineering Draw- ing & Materials.	Institution of Engineers, Australia—Australian Standard Engineering Drawing Practice (CZ1 —1946). Sydney Technical College—Notes for Mechanical Engineering I.
5.11 5.11d	Engineering Drawing.	Institution of Engineers, Australia—Australian Standard Engineering Drawing Practice (CZ1 —1946). Sydney Technical College—Lecture Notes for Mechanical Engineering I.
5.12 5.12d	Mechanical Engin- eering Design.	Black, Paul H.—Machine Design. OR Faires—Design of Machine Elements (2nd Edition, 1941).
5.13	Mechanical Engineer- ing Design.	 Black, Paul H.—Machine Design. OR Faires—Design of Machine Elements (2nd Editio 1, 1941). B.S.S. Spur Gears. B.S.S. Worm Gears. S.A.A. Crane and H ist Code C.B. 2. N.S.W. Scaffolding and Lifts Act.

SUBJECT. TEXT BOOK. MECHANICAL ENGINEERING-5.01 to 5.94 (continued). 5.32) Engineering Bevan, Thomas-Theory of Machines (2nd Edition 5.32D Mechanics. 1943). Sydney Technical College-Lecture Notes for Mechanical Engineering IIIA. 5.33 Theory of Machines Bevan, Thomas—Theory of Machines (2nd Edition, 1943). Sydney Technical College-Lecture Notes for Mechanical Engineering IIIA. Reference. Rosenauer and Willis-Kinematics of Mechanisms. 5.34 Theory of Machines Bevan, Thomas—Theory of Machines (2nd Edition, 1943). Den Hartog-Mechanical Vibrations (3rd Edition, 1947). Reference. Rosenauer and Willis-Kinematics of Mechanisms. 5.41 Descriptive Abbot, W.-Practical Geometry and Engineering 5.41D Geometry. Graphics (5th Edition, 1951). 5.53 Fluid Mechanics Hunsakor and Rightmire-Engineering Applica-... tions of Fluid Mechanics. OR Rouse, Hunter-Elementary Mechanics of Fluids. Reference. 5.54 Fluid Mechanics Wislicenus—Fluid Mechanics of Turbo-Machines-... Stephanoff—Centrifugal and Axial flow Pumps. Vincent, E. T.-Theory of Gas Turbines and Jet Engines. 5.72 Thermodynamics ... Inchley—Theory of Heat Engines. 5.72D Wrangham—Theory and Practice of Heat Engines. Faires-Heat Engines. 5.73 Thermodynamics Wrangham—Theory and Practice of Heat Engines. ... Wright Baker-Inchley's Theory of Heat Engines. Lowitt—Thermodynamics Applied to Heat Engines. Pyo-The Internal Combustion Engine. Seminars Willis, A. H.—The Technical Lecture.

ELECTRICAL ENGINEERING-6.01 to 6.94.

6.12	Electric Circuit Theory	Kerchner and Corcoran—Alternating Current Circuits (3rd Edition, 1951).
		Hessler and Carey—Fundamentals of Electrical Engineering.
		Reference.
,		Frazier-Elementary Electric Circuit Theory.

- 6.13 Electric Circuit 6.13 Theory. Kimbark, Edward W.—Electrical Transmission of *Power* and Signals, 1949.
 - Kerchner and Corcoran—Alternating Current Circuits (3rd Edition, 1951).

TEXT BOOK. SUBJECT. ELECTRICAL ENGINEERING-6.01 to 6.94 (continued). Starr, A. T.-Generation, Transmission and Util-6.214 Electric Power ization of Electric Power (2nd Edition, 1942.) Engineering A. Fitzgerald and Kingsley-Electric Machinery Electric Power 6.224(1st Edition, 1952). Engineering B. Reference. Mass. Inst. of Tech.-Staff of Dept. of Electrical Engineering-Magnetic Circuits and Transformers. Westinghouse Electric Mfg. Co.-Electrical Transmission and Distribution Reference Book (3rd Edition, 1944). Fitzgerald and Kingsley-Electric Machinery 6.23 Electric Power 6.23A (1st Edition, 1952). Engineering. 6.23в 6.303 Parker-Electronics, 1950. 6.303A Electronics 6.303в Langford-Smith, F .- Radiotron Designer's Handbook (4th Edition). Amalgamated Wireless Valve Co.-Radiotron Valve Data Book. 6.304 Industrial Electronics Cage, J. M.—Theory and Applications of Industrial 6.304A Electronics, 1951. 6.304в [Reference. Westinghouse Electric Mfg. Co.-Industrial Electronics Reference Book, 1948. Arquimbau, L. B.-Vacuum Tube Circuits, 1943. High Frequency 6.314 Engineering. Terman, F. E.-Radio Engineer's Handbook, 1943. 6.324 High Frequency Design. League—The Radio Radio Relay American Amateur's Handbook (latest Edition). Langford-Smith, F.-Radiotron Designer's Handbook (4th Edition). Amalgamated Wireless Valve Co.-Radiotron Valve Data Book. Cook, A. L. and Carr-Elements of Electrical 6.83 **)** Electrical Engineering (5th Edition, 1947). Engineering. 6.83D Erickson and Bryant-Electrical Engineering Electrical Engineering 6.94 Theory and Practice, 1952. MINING ENGINEERING AND GEOLOGY-7.001 to 7.94. Statham—Coalmining. 7.001 Mining... ... Moss-Gases, Dust and Heat in Mines. 7.002 Mining... ... •••

- Penman and Penman-Principles and Practice of Mine Ventilation. Whitaker, J. W.—Mine Lighting. Whitaker and Willet—Colliery Explosions and
 - Recovery Work.
 - Haldane and Graham-Method of Air Analysis. Reference.
 - Beringer-Underground Practice in Mining (3rd Edition, 1947).

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SUBJECT.

	MINING ENGINEERING	AND GEOLOGY-7.001 to 7.94 (continued).
7.002	Mining—continued	Peele-Mining Engineer's Handbook (2 Vols., 3rd
		Young, G. J.—Elements of Mining (4th Edition,
		1946). Forster Brown-Shaft Sinking. Uren-Petroleum Production Engineering.
7.003	Mining	Penman and Penman-Principles and Practice of Mine Ventilation.
		Statham-Winning and Working.
		Reference.
7.004	Mining	Same as for 7.002—Mining. Broughton—Electric Winders (2nd Edition, 1948).
		Reference.
		Peolo-Haulage Winding. Boringer-Underground Practice in Mining (3rd Edition, 1947)
		Peele-Mining Engineer's Handbook (2 Vols., 3rd Edition, 1951).
		Young, G. J.—Elements of Mining (4th Edition, 1946).
		Wheeler, H. R.—Manual of Modern Underground Haulage Methods.
7.013	Metalliferous Mining	Lewis-Elements of Mining.
		Reference.
		Peele-Mining Engineer's Handbook (2 Vols., 3rd Edition, 1951). Beringer-Underground Practice in Mining (3rd
7.014	Coal Mining	Edition, 1947).
	·····	Whitaker and Willet—Colliery Explosions and Recovery Work.
		Penman and Penman—Principles and Practice of Mine Ventilation.
		Waltham—Mine Rescue and First Aid.
		Reference.
7.024	Metalliferous Mining	Same as for 7.002-Mining.
		Truscott-Mine Economics (2nd Edition, 1946).
		Reference.
	D	Peele-Mining Engineer's Handbook (2 Vols., 3rd Edition, 1941).
7,034	Preparation of Minerals	Mitchell, D. R.—Coal Preparation. Gaudin—Principles of Mineral Dressing.
		Reference.
		Taggart, A. F.—Handbook of Mineral Dressing. Richards and Locke—Textbook of Ore Dressing. Taggart, A. F.—Elements of Ore Dressing.

SUBJECT.

TEXT BOOK.

MINING ENGINEERING AND GEOLOGY-7.001 to 7.94 (continued).

... Emmons, Thiel, Stauffer and Allison—Geology— Principles and Processes (3rd Edition, 1949). OR

Longwell, Knopf and Flint—Physical Geology (3rd Edition).

Reference.

Cotton, C. A.—Geomorphology (5th Edition, 1949). Hills, E. S.—Outlines of Structural Geology (2nd Edition, 1944).

Geikie-Structural and Field Geology (5th Edition, 1940).

Shimer—Introduction to the Study of Fossils (2nd Edition, 1949).

Woods, H.—Palaeontology Invertebrate (6th Edition).

Ries and Watson—Engineering Geology (5th Edition, 1948).

Rutley—Elements of Mineralogy (24th Edition, 1948).

Smith, H. G.—Minerals and the Microscope (4th Edition, 1940).

Reference.

Rogers and Kerr-Optical Mineralogy (1942).

David—The Geology of the Commonwealth of Australia.

Harker-Petrology for Students (7th Edition).

Hatch, Wells and Wells—The Petrology of the Igneous Rocks (10th Edition, 1949).

Tyrrell—The Principles of Petrology (9th Edition, 1948).

Dana—Textbook of Mineralogy (4th Edition).

Emmons-Geology of Petroleum (2nd Edition).

Lahoo-Field Geology (4th Edition, 1941).

Bateman, A. M.—Economic Mineral Deposits (2nd Edition, 1950).

Lindgron-Mineral Deposits (4th Edition).

Reports of Scientific Societies and Geological Surveys.

Reference.

 ... Forrester, J. D.—Principles of Field and Mining Geology.
 McKinstry—Mining Geology.
 Raistrick and Marshall—Nature and Origin of Coal and Coal Seams.
 Stutzer and Noe—Geology of Coal.
 Lindgren—Mineral Deposits (4th Edition).
 Bateman, A. M.—Economic Mineral Deposits (2nd Edition, 1950).
 Leggett—Geology and Engineering.

Heiland-Geophysical Exploration.

7.554 Geology

7.553 Geology

SUBJECT.

TEXT BOOK.

CIVIL ENGINEERING-8.01 to 8.94.

Reference.

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8,112 8,112n	Theory of Structures	Den Hartog-Strength of Materials.
\$ 113	Structures	 Salmon, E. H.—Materials and Structures, Vol. I, Elasticity and Strength of Materials. Timoshenko and MacCullough—Elements of Strength of Materials (3rd Edition, 1949). S.A.A. Code CA2.
0.110		Reference.
		 Stewart, D. S.—Practical Design of Simple Steel Structures (Vols. I and II—3rd and 2nd Editions, respectively). Grinter, L. E.—Design of Modern Steel Structures. Pippard and Bake—Analysis of Engineering Structures (2nd Edition, 1943). Husband and Harby—Structural Engineering (5th Edition, 1947). Salmon—Materials and Structures, Vol. II, Theory and Design of Structures. Sutherland, H. and Reese—Introduction to Rein- forced Concrete Design (2nd Edition, 1943).
8.114	Structures	Same as for 8.113—Structures. Magnol, G.—Prestressed Concrete.
8.122	Structures	S.A.A. Interim Codes 350, 351, 352.
		Reference.
		 Stewart, D. S.—Practical Design of Simple Steel Structures (Vols. I and II—3rd and 2nd Editions, respectively). Grinter, L. E.—Design of Modern Steel Structures.
8.123	Structures	Same as for 8.113—Structures.
		Reference.
.8.23 8,23d	} Materials of Con- struction.	U.S. Bureau of Reclamation—Concrete Manual. Bateman, J. H.—Materials of Construction. Bauer—Plain Concrete (3rd Edition, 1949). Lea and Desch—The Chemistry of Cement and Concrete.
		Reference.
8.33	Engineering Computations.	 Allock and Jones—The Nomogram (4th Edition, 1950). Lipka, J.—Graphical and Mechanical Computation Part II. Southwell, R. V.—Relaxation Methods in Engineering Science. Whittaker, E. T., and Robinson—The Calculus of Observations (4th Edition, 1944). Beference.
\$ 52	Fluid Mechanics	Rouse_Flementary Mechanics of Fluide
0. 03	ruig Mecnanics	 Vennard—Elementary Fluid Mechanics (2nd Edition, 1947). Dodge and Thompson—Fluid Mechanics. King, Wisler and Woodburn—Hydraulics. Hunsaker and Rightmire—Engineering Applica- tions of Fluid Mechanics. Wislicenus—Fluid Mechanics of Turbo-Machinery.

	SUBJECT.	TEXT BOOK.
	CIVIL ENGINEE	RING-8.01 to 8.94 (continued)
		Reference.
8.54	Applied Hydraulics	Rouse (Ed.)—Engineering Hydraulics. Rouse—Fluid Mechanics for Hydraulic Engineers. Bakmeteff—Hydraulics of Open Channels. Woodward and Posey—Hydraulics of Steady Flour in Open Channels.
		Reference.
8.63	Civil Engineering	Wisler and Brater—Hydrology. Linsley, Kohler and Paulhus—Hydrology. Johnstone and Cross—Elements of Hydrology. Smith, H. G.—Minerals and the Microscope. Leggett—Geology and Engineering.
		Reference.
8.64	Civil Engineering	BarrowsWater Power Engineering. Creager, Justin and Hinds-Engineering for Dams. Steel-Water Supply and Sewerage. Phelps-Public Health Engineering. WebbRailroad Construction. Du Platt, Taylor-Docks, Wharves and Piers. Etcheverry-Irrigation Practice and Engineering.
8.73 8.73 8.73н	Soil Mechanics	 Terzaghi and Peck—Soil Mechanics in Engineering Practice. Taylor, D. W.—Fundamentals of Soil Mechanics. Tshebotarioff, G. P. (McGraw)—Soil Mechanics, Foundations and Earth Structures.
		Reference.
		T. William Lambe—Soil Testing for Engineers. Terzaghi—Theoretical Soil Mechanics. A.S.T.M., 1950—Soil Testing Procedures.
8.92 8.92d	Properties of Materials.	David, H. E., Troxell and Wiskoeil—Testing and Inspection of Engineering Materials.
		Beaumont, R. A.—Mechanical Testing of Metallic Materials (2nd Edition, 1944). Stanford, E. G.—The Creep of Metals and Alloys. Batelle Memorial Institute—Prevention of the Failure of Metals under Repeated Stress. Gilkey, Murphy and Bergman—Materials Testing. Williams—Hardness and Hardness Measurements. A.S.T.M., B.S.S. specifications, special references, etc.
	WOOL T	ECHNOLOGY—9.01 to 9.94.
9. 104	Nutrition	Halnar. and Garner—The Science and Practice of Feeding Farm Animals (3rd Edition, 1946).

Reference.

Morrison, F. B.-Feeds and Feeding.

SUBJECT.

L .

TEST BOOK.

WOOL TECHNOLOGY-9.01 to 9.94 (continued).

9.114	Farm Livestock	•••	McMeekan, C. P.—Principles of Animal Production. Nichols—Livestock Improvement (2nd Edition 1946).
			Phillips, R. W., F.A.O.—Breeding Animals Suited to Unfavourable Environments.
			Reference.
			Sisson—Anatomy of Domestic Animals (3rd Edition).
			Dukes—Physiology of Domestic Animals.
9.12	Sheep Husbandry	•••	Belschner—Sheep Management and Diseases. Pearse, E.—Sheep, Farm and Station Management (6th Edition).
			British Ministry of Agriculture Bulletin—Rations for Livestock (11th Edition, 1948).
			Reference.
			Fraser, A.—Sheep Husbandry. Hammond, J.—Growth and Development of Mutton Qualities.
			Coffey-Productive Sheep Husbandry (3rd Edition).
9.94	Genetics	•••	Lush, J. L.—Animal Breeding Plans (3rd Edition,
			Hagedoorn, A.—Animal Breeding (4th Edition, 1950).
			Kelly-Ánimal Breeding.
	м	۵TH	EMATICS_10.01 to 10.04
10.11	Mathematics		Durell, C. V., and Bobson, A Elementary
			Calculus, Vols. 1, 2. Bell, London. Middlemiss, R.—Analytic Geometry. McGraw Hill, New York.
			Reference.
			 Synge, J. L., and Griffith, B. A.—Principles of Mechanics. McGraw Hill, New York. Bell, R. J. T.—Co-ordinate Geometry of Three- dimensions. McMillan, London.
10.11в	Mathematics	•••	Lamb, H.—Dynamics. Cambridge.
ю.12 10.12д	$\}$ Mathematics	•••	Rutherford, D. EVector Methods. Oliver and Boyd, Edinburgh.
			Sokolnikoff, I. S. and E. S.—Higher Mathematics for Engineers and Physicists. McGraw Hill, New York.
			Jaeger, J. C.—An Introduction to the Laplace Transformation. Methuen, London.
			Reference.
			Synge, J. L., and Griffith, B. A.—Principles of Mechanics. McGraw Hill, New York.

Bell, R. J. T.—Co-ordinate Geometry of Threedimensions. McMillan, London.

	SUBJECT.		TEXT BOOK.
	MA	THEMAT	ICS—10.01 to 10.94 (continued).
10.22	Mathematics	•••	Students should not procure text books before
10.23	Mathematics		Students should not procure text books before
10.33	Mathematics		Churchill, R. V.—Introduction to Complex Variables and Applications. McGraw Hill, New York Brainerd, J. G., Koehler, G., Reich, H. J. and Woodruff, L. F.—Ultra-High-Frequency Tech- niques. Nostrand, New York.
			Reference.
			Stratton, J. A.—Electromagnetic Theory. McGraw Hil, New York.
			Carslaw, H. S., and Jaeger, J. C.—Operational Methods in Applied Mathematics. Oxford.
10.43	Mathematics	•••	Jacger, J. C.—An Introduction to the Laplace Transformation. Methuen, London.
			Reference.
			Weatherburn, C. EMathematical Statictics.
			Fisher, R. A., and Yates, F.—Statistical Tables. Oliver and Boyd, Edinburgh. Moroney, M. J.—Facts from Figures. Pelican,
			London. Brownlee, K. A.—Industrial Experimentation. H.M. Stationery Office, London.
			Quenouille, M. H.—Introductory Statistics. Butterworth Springer, London.
			Analysis. McGraw Hill, New York.
10.91	Mathematics	•••	Caunt, G. W Elementary Calculus. Oxford.
			Reference.
			 Osgood, W. F. and Graustein, W. C.—Plane and Solid Analytic Geometry. McMillan, London. Sokolnikoff, I. S. and E. S.—Higher Mathematics for Engineers and Physicists. McGraw Hill, New York.
			Reference.
10.92	Mathematics	•••	Moroney, M. J.—Facts from Figures. Polican, London.
			Fisher, R. A. and Yates, FStatistical Tables. Oliver & Boyd, Edinburgh.
			Wilks, S. S.—Elementary Statistical Analysis. Princeton University Press.
			Quenouille, M. H.—Introductory Statistics. Butterworth Springer, London.
		ARCHI	TECTURE—11.01 to 11.96.

Reference.

11.11 Descriptive Geometry Lee, L. A., and Reekie, R. F.—Descriptive Geometry for Architects and Builders. Faulkner, Ziegleld & Hill—Art Today.

	SUBJECT.	TEXT BOOK.
	ARCHITECTU	RE —11.01 to 11.96 (continued).
11.31 11.32	Architectural Studies and Design.	 Holmes, John—Applied Perspective. Scott, Robert Gillam—Design Fundamentals. Graves, Maitland—The Art of Colour and Design. Rathbone, Richard Adams—Introduction to Functional Design. Ostwald, Wilhelm—Colour Science. Munsell, A. H.—A Colour Notation. Evans, Ra'ph M.—An Introduction to Colour. Moholy-Nagy, L.—Vision in Motion. Kepes, Gvongy—The Language of Vision.
11.164	Acoustics and Sound Insulation.	 Cullum, D. J. W.—Practical Application of Acoustic Principles. Knudsen and Harris—Acoustical Designing in Architecture. Constable, J. E. R. & K. M.—The Principles and Practice of Sound Insulation. Hope Bagenal—Practical Acoustics. Post War Building Studies No. 14—Sound Insulation and Acoustics.
$11.41 \\ 11.42 \\ 11.43$	History of Architec- ture.	Fletcher, Sir Banister (Batsford)—History of Architecture—on the Comparative Method. Briggs, M. S.—Architecture.
		 Reference. Statham, H. H.—A History of Architecture (3rd Edition, 1950). Normand—A Parallel of the Orders of Architecture. Anderson, W. J. and Stratton—Architecture of the Renaissance in Italy. Ward, W. H.—Architecture of the Renaissance in France, Vols. 1 and 2. Blomfield—Short History of Renaissance Architecture in England.
11.51	Building Science	Geeson-Building Science, Vol. I. Fitzmaurice-Principles of Modern Building.
11.52 11.71 11.72	Building Science Building Construc- tion.	Helefence. Barrow—Building Science. Knight, B. H.—Builders' Materials. Shuto—Modern Building Materials. Same as for 11.51—Building Science. Local Government Ordinance, No. 71. Sydney Corporation Act, By-laws 51 to 58 inclusive. Mitchell, G. A.—Building Construction—Element- ary Course. Mitchell, G. A.—Building Construction—Advanced Course.
		Reference.
		McKay, W. B.—Building Construction, Vols. 1, 2
		and 3. Mackey, G. F.—Gregory's Modern Building
		Practice in Australia. Sharp, W.—Australian Methods of Building
		Fitzmaurice, R.—Principles of Modern Building, Vol. I.

	SUBJECT.				TEXT BOOK.		
11.82 11.82 11.83	ARCI	HITECTU chitec-	JRE 11.01 Robertson, Compo-	to 11 Hovesition	.96 (continued). ward—Principles of	f A	rchitectu r a l
11.101	Structures I	•••	Reynolds Mecha	and nics.	Reference. Kent—Introduction	r to	Structural
11.102	Structures II		Reynolds Mecha	and inics.	Reference. Kent—Introduction	r to	Structura l
11.103	Structures III	•••	Reynolds a Stewart, I Struct Husband Sutherland Concre	and 2 D. S <i>ures</i> , and d and ete D	Reference. Kent—Structural S —Practical Design Vols. I and II. Harby—Structural I Reece—Introducti besign.	iteelu of S Eng on to	oork. imple Steel gineering. Reinforced

HUMANITIES AND SOCIAL SCIENCES-G1 to G99.

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Recommended text books are indicated under Description of Subjects, pages 250 to 263.

NOTE.—Text books for subjects not listed will be recommended by lecturers in those subjects.



of the

COUNCIL OF THE NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY

For the year ended 30th June, 1953.

The Council of the New South Wales University of Technology, in pursuance of the provisions of Section 47 (1) of the Technical Education and New South Wales University of Technology Act, 1949, has the honour to transmit to the Minister for Education the following report upon the proceedings of the University during the period of twelve months ended 30th June, 1953.

General.

Continued progress in the extension of facilities for advanced training and research in the various branches of technology and science, and in the building and developmental programme of the University has been evident throughout the year.

Enrolments in degree courses, particularly in the Faculty of Engineering, show an increase over last year's figures, while enrolments in courses for conversion from diplomas to degrees have doubled, increasing from 56 in 1952 to 113 in 1953.

The response of students to the opportunity for gaining higher qualifications provided by the part-time conversion courses of the University has been gratifying and indicates the need of industry for part-time courses at tertiary level. Additional conversion courses approved by Council during the year were those in Applied Physics and Architecture, both of which have operated since the beginning of 1953, and that in Optometrical Science, to commence in 1954.

To meet the growing demand for advanced part-time instruction, Council also approved the establishment of part-time degree courses in Applied Chemistry, Chemical Engineering, Industrial Chemistry, Food Technology, Applied Biology, Leather Chemistry and General Science. The Council believes that these courses will be a most important addition to tertiary education facilities in this State.

Special graduate courses offered by the University have been well received by members of the professions and by industry and Council is pleased to record that all such courses have been self-supporting and have more than covered the additional lecturing costs involved.

The number of students undertaking post-graduate study and research continues to increase and 103 students are now working for a higher degree. The Council is especially pleased that the facilities provided for advanced training and research are being so widely utilised. The Council feels that an important contribution is being made by the University to the promotion of specialised instruction and research at high level in Australia.

An increasing number of research projects was undertaken by staff in the various Schools of the University during the year and several long-term projects were continued. Steps were taken to extend facilities by which special research might be undertaken for industry. A laboratory testing service is operating in the School of Wool Technology and arrangements are in hand to provide similar services in other Schools.

For some time Council and its staff, together with the Technical Education Advisory Council, have been concerned at the high rate of student wastage in diploma courses, the conduct of which is now the Council's responsibility on behalf of the Department of Tech-It was felt by Council that the high proportion nical Education. of diploma students failing to complete their courses within the minimum number of years indicated that the syllabuses and time distribution of diploma courses should be reviewed and modified in Accordingly, the courses were the light of current requirements. examined and certain alterations to structure and content have been proposed. It was appreciated that, because of their employment in industry and attendance at lectures, diploma students have limited time to devote to private study and in the revision of the courses care has been taken to ensure that the students derive maximum benefit from the time spent at the University. In particular, additional tutorial periods are planned and increased laboratory instruction and other aids to students will be incorporated within the new syllabuses. Council is of the opinion that the revised diploma courses will be better suited to the current needs of students and of industry than the existing courses and will do much to reduce student wastage.

In furtherance of the aim of the University to offer courses which not only provide sound professional training but also introduce the students to some of the wider questions of contemporary society and promote their interest in cultural and social subjects, additional staff was appointed to the School of Humanities and Social Sciences and an increased range of Humanities courses was given from the beginning of 1953. During the period under review, the general pattern of instruction in the Humanities has remained unchanged, although certain modifications to the content of the courses have been made along lines suggested by the experience of Humanities teaching over the past two years. In addition to providing courses for all first degree students, the School of Humanities has given instruction in Economics, Logic, Politics and Social History in the Management and Public Administration diploma courses of the Department of Technical Education. The staff has

been active in research in their various subjects and several papers have been read to professional and educational associations. One book and several articles have been published by members of this staff during the year and three books and further articles are in preparation.

A development of major importance was the establishment of a student hostel at Kensington in February, 1953. The hostel now accommodates eighty students. These include sixty students from South East Asian countries, many of whom are taking courses under the Colombo Plan. On completion of additions now being made to the hostel, accommodation will be available for nearly 300 boarders. Further particulars concerning the establishment of the hostel and the opportunity it provides for extra-curricula activities appear later in the report.

Council decided during the year to initiate action to fill the Chairs of Applied Psychology, Civil Engineering, Electrical Engineering and Mechanical Engineering and to appoint an Associate Professor of Architecture and Building. Advertisements inviting applications for these positions have been circulated in Australia and Great Britain.

Throughout' the year keen interest has been shown by students in a wide range of student organisations and activities within the University. A Sports Association was formed to encourage and coordinate sporting activities and already considerable assistance has been given to the various sports clubs by the procurement of much needed equipment and by affiliation with established sporting bodies. In addition to the sports clubs, a representative group of societies concerned with religion, drama, music, etc., are active, serving a variety of cultural and social interests. A detailed reference to student organisations and activities is given elsewhere in the report.

Development of the University site at Kensington was accelerated during the latter half of the year under review. All external brickwork and the roof of the first major building were completed and the fitting out of the top floor commenced. Seven light framed buildings were occupied by the School of Chemical Engineering and work was started on the erection of four light framed buildings for the School of Metallurgy. Further details of the development at Kensington are given later in this report.

Degrees were conferred on the first graduates of Newcastle University College at a ceremony held in the Newcastle City Hall on 16th May, 1953. Enrolments in degree courses at Newcastle showed some improvement for 1953. Details of enrolments appear elsewhere in the report.

The Council held five ordinary meetings, one adjourned, and one special meeting during the year. Membership of Council and attendances at meetings are given in Appendix I to this report.

On 6th March, 1953, Dr. R. W. Harman resigned from the Council. Dr. Harman served on the Developmental Council and was Vice-President of the University from the appointment of the first Council on 5th July, 1949, until the date of his resignation. The Honourable J. S. J. Clancy, Justice of the Supreme Court, was elected Vice-President of the University at a special meeting of Council held on 17th March, 1953.

On 31st December, 1952, Mr. A. Denning, who had been joint Director of the University and of the Department of Technical Education, resigned his position as Director of the University so that he might devote his full time to the Department of Technical Education. Mr. Denning was later appointed a member of the Council. Professor J. P. Baxter was appointed Director of the University as from 1st January, 1953.

Dr. H. S. Wyndham, Director-General, New South Wales Department of Education, and Mr. W. McC. Gollan, M.L.A., were appointed to Council on 1st December, 1952, and 11th March, 1953, respectively.

The following standing committees of the Council functioned during the year. The composition of these committees is given in Appendix II.

Executive Committee; Buildings and Equipment Committee; Library Committee; Public Relations Committee; Newcastle University College Committee.

Obituary.

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The Council expresses deep regret at the death of two of its members and records its appreciation of the services they rendered to the University.

John Gordon McKenzie, B.A., B.Ec., Director-General, New South Wales Department of Education, in November, 1952. Mr. McKenzie had been a member of the Developmental Council. On 5th July, 1949, he was appointed to the first Council of the University, of which he was a member until his decease.

Fred Wilson, O.B.E., F.I.O.B., President, Building Industry Congress of New South Wales; President, Federal Council, Building Industry Congress; and Director Howie Moffat & Co. Pty. Ltd., in June, 1953. Mr. Wilson was a member of the Developmental Council and of the first Council of the University from its inception on 5th July, 1949, to the time of his death. Mr. Wilson also served on the Buildings and Equipment Committee of Council.

Advisory Panels.

Meetings of the following Advisory Panels related to University courses were held on the dates indicated:—

24th July, 1952-Architecture Advisory Panel.

30th July, 1952-Humanities Advisory Panel.

12th August, 1952-Electrical Engineering Advisory Panel.

10th September, 1952-Mechanical Engineering Advisory Panel.

24th September, 1952-Building Advisory Panel.

30th September, 1952-Applied Physics Advisory Panel.

1st October, 1952-Optometry Advisory Panel.

17th October, 1952-Wool Technology Advisory Panel.

30th October, 1952-Production Engineering Advisory Panel.

15th April, 1953—Applied Chemistry and Chemical Engineering Advisory Panel.

15th April, 1953-Food Technology Advisory Panel.

15th April, 1953-Leather Chemistry Advisory Panel.

21st April, 1953-Civil Engineering Advisory Panel.

The appointment of an Advisory Panel for Applied Geology was approved by Council on 8th September, 1952. On 10th November Council reviewed the membership of all existing Advisory Panels.

The Council wishes to record its appreciation of the assistance rendered to the University by the members of these Panels.

Enrolments.

Enrolments in the University in 1953 were:-

	lst Year.	2nd Year.	3rd Year.	4th Year.	Conversion.	Total.
Applied Chemistry Applied Physics Architecture Chemical Engineering Civil Engineering Electrical Engineering Mechanical Engineering Metallurgy Mining Engineering Wool Technology	. 7 . 1 . 16 . 13 . 51 . 30 . 29 . 10 . 10	11 1 10 5 33 29 25 8 3	7 2 8 5 24 20 10 5 4	3 6 10 16 20 9 9 	34 5 1 15 5 12 33 8 	62 9 41 48 129 111 106 8 32 17
	167	125	85	73	113	563

Day Degree and Conversion Courses:

The number of students admitted to the University in 1953 with a view to proceeding to a first degree in one or other of the above courses was 224.

Higher Degree Courses:

Students Students	studying studying	for for	award award	of of	M.E. Ph.D.	or de	M.Sc. gree	degree	s ••	$\frac{71}{32}$
									-	103
									-	

Special Graduate Courses:

Enrolments in special graduate courses conducted in the various Schools totalled 495. A list of the courses provided is given under "Courses of Study" in this report.

		lst Year.	2nd Year.	3rd Year.	4th Year.	5th Year.	6th Year.	Total.
Aeronautical Engineering †Architecture Building †Chemical Engineering Chemistry Civil Engineering Electrical Engineering †Food Technology Leather Chemistry Mechanical Engineering †Metallurgy Naval Architecture Optometry Production Engineering Quantity Surveying Radio Engineering Science †Secondary Metallurgy Miscellaneous Diploma Subjects	····	$\begin{array}{c} 23\\ 23\\ 4\\ 49\\ 119\\ 87\\ 72\\ 2\\ 1\\ 146\\ 9\\ 7\\ 9\\ 4\\ 16\\ 5\\ 30\\ 34\\ 6\\\\ 646\\ \end{array}$	$ \begin{array}{c} 10\\23\\5\\7\\7\\9\\66\\84\\2\\2\\126\\4\\1\\9\\6\\10\\3\\32\\16\\15\\\dots\\510\\\end{array} $	$\begin{array}{c} 5 \\ 40 \\ 11 \\ 24 \\ 77 \\ 71 \\ 70 \\ 6 \\ \\ 159 \\ 3 \\ 4 \\ 111 \\ 5 \\ 9 \\ 2 \\ 28 \\ 11 \\ 5 \\ \\ 541 \\ \end{array}$	$\begin{array}{c c} 2\\ 23\\ 8\\ 26\\ 75\\ 73\\ 51\\ 4\\ 1\\ 103\\ 7\\ 1\\ 103\\ 3\\ 9\\ 9\\ 3\\ 19\\ 11\\ 9\\ \dots\\ 441 \end{array}$	3 43 52 62 93 49 4 1 77 2 8 5 18 16 2 424	 39 20 1 9 9 5 74	43 191 33 178 392 390 326 19 5 611 36 16 49 20 52 18 127 88 42 110 2,746

Diploma Courses* and Part Time Degree Courses.

Instruction in degree and graduate courses was provided at Sydney and Newcastle, and in diploma courses at Sydney, Newcastle, Wollongong, Lithgow and Broken Hill.

* These courses lead firstly to a diploma (A.S.T.C.) and then by conversion courses to a Bachelor's degree.

† These courses leading to a diploma require attendance for six years; other courses require attendance for five years.

Scholarships, Bursaries and Exhibitions.

The Council gratefully acknowledges the following Scholarships, Bursaries and Exhibitions which were awarded during the year:-

Two Broadcasting Radio Electrical Industries Fellowship Club, Sydney, Scholarships.

The A. E. Goodwin Scholarship.

Two John Heine Memorial Foundation Scholarships.

The Imperial Chemical Industries of Australia and New Zealand Research Fellowship.

Eighteen Joint Coal Board Scholarships.

The Monsanto Research Scholarship.

Four New South Wales Combined Colliery Proprietors' Association Scholarships.

Two Wool Industry Fund Scholarships.

The Zinc Corporation Scholarship.

Five Public Bursaries.

Fourteen Public Exhibitions.

One hundred and eighteen Commonwealth Scholarships.

Particulars of the awards are given in Appendix III.

Conferring of Degrees.

At the second graduation ceremony, he'd in the Great Hall of the University of Sydney on 21st March, 1953, 58 students were admitted to the degree of Bachelor of Science or Bachelor of Engineering and six to the degree of Master of Science. The President of the University, Mr. Wallace C. Wurth, conferred the degrees and Dr. Ian Clunics Ross, Chairman of the Commonwealth Scientific and Industrial Research Organisation, delivered the Occasional Address. Present at the ceremony were the Premier of New South Wales, the Honourable J. J. Cahill, the Chief Justice, the Honourable K. W. Street, the Deputy-Premier and Minister for Education, the Honourable R. J. Heffron, and the Chancellor of the University of Sydney, Lieut.-Colonel Sir Charles Bickerton Blackburn.

The Council wishes to record its appreciation of the generosity of the Senate of the University of Sydney in making available the Great Hall for the ceremony.

The first graduation ceremony of Newcastle University College, held on 16th May, 1953, is reported below.

The names of recipients and the details of degrees awarded at the ceremonies are given in Appendix IV.

Newcastle University College.

The first graduation ccremony of Newcastle University College was held in conjunction with the presentation of diplomas in the Newcastle City Hall on 16th May, 1953. The Acting Premier, the
Hon. R. J. Heffron, M.L.A., attended and the Lord Mayor of Newcastle, Alderman F. J. Purdue, delivered the Occasional Address. The ceremony served to emphasise the continuing interest in University education in Newcastle.

Three students were admitted by the President to the degree of Bachelor of Science. The names of the recipients and details of the degrees awarded are given in Appendix IV.

1953 enrolments, which are included in the general enrolment figures of the University, were as follows:---

Degree Courses:

Chemical EngineeringCivil EngineeringElectrical EngineeringMechanical EngineeringMining Engineering	••• ••• •••	1 2 1 6 5	15
Conversion Courses:			
Applied Chemistry Chemical Engineering	•••	$ \begin{array}{c} $	
Mechanical Engineering Metallurgy	•••	$\begin{array}{ccc} \ddots & 2\\ \ddots & 10\\ \ddots & 5\end{array}$	
		·	25
Higher Degrees:			
Master of Science	••	3	
Master of Engineering	••	1	
Doctor of Philosophy	••	1	
			Ð
			45
Diploma Courses:			10
Architecture		13	
Chemical Engineering		13	
Chemistry		. 41	
Civil Engineering			
Electrical Engineering		. 29	
Mechanical Engineering		102	
Metallurgy		36	
Physics		1	
Science		. 13	
Miscellaneous Diploma Subjects		34	
			312
			~~~

# Transitional Provisions of Technical Education and N.S.W. University of Technology Act, 1949.

Section 25 of the Technical Education and New South Wales University of Technology Act, 1949, provides that the University Council shall have, *inter alia*, the following powers—

- (a) appointment of deans, professors, lecturers and other officers and employees of the University, and
- (b) entire control and management of the affairs, concerns and property of the University.

Section 33 of the Act provides that, until a day to be appointed by the Governor and notified by proclamation published in the *Gazette*, the provisions of the Public Service Act, 1902, shall apply to staff appointments to the University.

In the early stages of the development of the University, Council was fortunate to have the services of the Director of Technical Education, Mr. A. Denning, as joint Director of the University. This arrangement had been continued each year with benefit to the University in its early formative period.

On 10th November, 1952, the Council decided that the stage of development of the University had been reached when a separate Director should be appointed, together with a nucleus of full-time administrative staff and that, providing the organisation worked smoothly, Council would in due course recommend to the Minister for Education that the "appointed day" referred to in Section 33 of the Act be fixed at 1st January, 1954.

• Consequently, on 1st January, 1953, following the resignation of Mr. A. Denning, and on the recommendation of Council, Professor J. P. Baxter, previously Deputy Director, was appointed Director of the University. Mr. G. L. Macauley, Registrar, also commenced full-time duties in this position and similar arrangements were made for other officers to devote themselves fully to the administrative work of the University.

# Senior Staff.

The following appointments of senior staff were made during the year under review—

Associate Professor of Organic Chemistry:

S. J. Angyal, Ph.D. Bud., A.A.C.I.

Associate Professor of Inorganic Chemistry:

R. S. Nyholm, M.Sc. Syd., Ph.D., D.Sc. Lond., F.A.C.I., A.R.I.C.

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Associate Professor of Food Technology:

F. H. Reuter, Dr. Phil. Berl., F.R.I.C., F.A.C.I.

Senior Lecturer in History:

J. J. Auchmuty, M.A., Ph.D. Dublin, M.R.I.A., F.R.Hist.S.

- Senior Lecturer in Chemical Engineering: F. W. Ayscough, B.Sc. Syd., A.R.I.C., A.A.C.I.
- Senior Lecturer in Mathematics: J. B. Douglas, M.A., B.Sc. Melb.

Assistant Registrar: R. E. Pert, B.A. Syd.

Council approved the establishment of the position of Associate Professor of Chemical Engineering, subject to funds being available.

Professor D. W. Phillips was elected Chairman of the Professorial Board at the meeting of the Board held on 10th February, 1953. The election was made necessary by Professor Baxter's vacating the office following his appointment as Director. At the Professorial Board meeting of 9th June, 1953, Professor Phillips was re-elected Chairman for a further two years.

Professors J. P. Baxter, D. W. Phillips and F. E. Towndrow were re-appointed as Deans of the Faculties of Science, Engineering and Architecture, respectively, for the period 1st July, 1952, to 30th June, 1953.

The Director, Professor J. P. Baxter, attended as a delegate of the University the Congress of Universities of the British Commonwealth held in Britain from 13th to 17th July, 1953. Other approved delegates at the Congress were Professor A. E. Alexander, Head of the School of Applied Chemistry, and Mr. A. S. Hall, Senior Lecturer in Civil Engineering.

During the year study leave for the following members of the University staff was approved :---

- Professor A. E. Alexander, Head of the School of Applied Chemistry-six months' study leave from December, 1952.
- R. E. Corbett, Senior Lecturer, School of Mechanical Engineering-one year's study leave from August, 1952.
- A. S. Hall, Senior Lecturer, School of Civil Engineering-one year's study leave from September, 1952.
- A. K. Johnston, Senior Lecturer in Mechanical Engineering, Newcastle University College—one year's study leave from August, 1952.
- Associate Professor C. H. Munro, Head of the School of Civil Engineering—one year's study leave in 1954.
- Associate Professor F. H. Reuter, School of Chemical Engineering-four months' study leave from February, 1953.

Professor F. E. Towndrow, Head of the School of Architecture —one year's study leave in 1954.

G. E. Ferris, Lecturer, School of Mathematics.

J. J. H. Simes, Lecturer, School of Applied Chemistry.

J. R. Anderson, Technical Officer, School of Applied Chemistry.

### Courses of Study.

Following upon an earlier decision by Council that provision be made to enable students to proceed to degrees of the University by part-time study, Council approved the establishment of conversion courses in Applied Physics and Architecture from the commencement of the 1953 academic year. Approval was given for the establishment of a conversion course in Optometry to commence in 1954, and for the establishment of a degree (B.Sc.) in Optometrical Science. Council approved also the establishment of part-time degree courses in Applied Chemistry, Chemical Engineering, Industrial Chemistry, Food Technology, Applied Biology, Leather Chemistry and General Science. Council accepted consequent revisions in the existing Chemistry, Chemical Engineering, Food Technology and Leather Chemistry diploma courses, and the termination of the Bio-Chemistry, Geology-Chemistry and Physics-Chemistry diploma courses, in which the concurrence of the Technical Education Advisory Council was sought.

Minor revisions were made during the year to the Mining Engineering and Wool Technology degree courses, and to the Aeronautical Engineering, Naval Architecture and Physics diploma courses.

Council approved the addition of a fourth option of Materials to the elective subjects of the final year of the Civil Engineering degree course.

Humanities subjects were made uniform in all conversion courses. Instruction in these subjects is given to all first degree students.

Investigations by the Building Advisory Panel into the question of the establishment of a degree course in Building Science were authorised by Council.

Further consideration was given to the establishment of a Chair of Textile Technology and the inauguration of a Textile Technology degree course, approval being given for the commencement of these projects in the 1954 academic year, providing necessary funds were available.

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Recent Advances in Organic Chemistry.

Modern Methods in Analytical Chemistry.

Modern Views on Topics drawn from Secondary Schools' Chemistry Syllabuses.

J

School of Applied Physics— X-ray Diffraction Techniques.

School of Mechanical Engineering— Kinematics of Mechanisms. Automatic Control Engineering.

School of Civil Engineering-

Advanced Structural Design.

Hydrology.

;

Soil Mechanics B.

Experimental Stress Analysis.

School of Chemical Engineering-

Toxic Dusts and Fumes in Industry.

Solid Fuel Technology.

Series of special lectures covering-

Gas Absorption Accompanied by a Chemical Reaction, New Acetylene Processes, Chemical Engineering in Fermentation Plant, Applications of Phase Equilibria to Winning of Petroleum, Flows of Compressible Fluids, New Developments in Petroleum Chemistry, Rubber in Chemical Engineering, Coal Utilisation, Power Frequency Heating, High Frequency Heating.

School of Mathematics-

Statistical Methods in Experimental Design. Matrix Methods in Electrical Engineering.

# Research.

Council is pleased to report that the number and extent of research projects being undertaken in the various Schools continue to increase. Expanded research programmes are being followed by members of the staff and an encouraging feature is the number of graduate students now engaged on research. As shown in the enrolment figures, 103 students are working for higher degrees. Eighty-nine of these students are doing research within the University and the remainder are working externally, in industry, under the supervision of the Heads of Schools.

The facilities for undertaking specific research for industry have been added to and the volume of requests for such assistance showed an increase during the year.

A separate report on research activities of the University covering the period 1949 to 1953* is attached as Appendix VI to this report.

An outline programme of research being undertaken is given in Appendix V. A number of the projects listed are sponsored by industry or by Government departments.

# Laboratory Testing Service-School of Wool Technology.

In March, 1953, Council approved the provision of a laboratory testing service by the School of Wool Technology to the wool and textile industries. The service covers the testing of wool, in particular in relation to fibre fineness, the measurement of water content in wool and the amount of clean scoured material to be obtained from a greasy sample. The increase in the demand for this service resulted in the appointment of a technical officer to carry out the testing work. The receipt of fees from the wool industry in respect of the service covers. the cost of labour and materials required.

# **Buildings and Grounds.**

The major portion of the old Kensington Racecourse, consisting of 59 acres, 3 roods, 25 perches, was vested in the N.S.W. University of Technology on 12th December, 1952. Work on the first major University building on this site was continued during the year and all external brick work and roofing have been completed and the fitting out of the top floor commenced. A plan for the progressive occupation of the building by the Schools of Architecture, Humanities, Applied Physics, Mining Engineering and Geology and the University administration was approved by Council.

The construction of seven light framed buildings at the northern end of the University site was completed during the year and the buildings were occupied by the School of Chemical Engineering at the commencement of the first term in 1953. The erection of four additional light framed buildings was also commenced in the same area to house the School of Metallurgy.

Lawns have been laid over an area surrounding the Chemical Engineering buildings and a number of flower beds cultivated. Shrubs have been planted and the area already provides a pleasant expanse of lawn and garden.

^{*} The research report for the period 1949-1953 (Appendix VI) is not reprinted in this calendar; it has been published separately and copies may be procured on application to the Registrar.

With respect to the development of the University site at Kensington, Council on 9th March, 1953, approved the erection of a chain wire fence with ornamental gates to enclose the whole of the site, the putting down of a bore together with a suitable reticulation system, a programme of planting of lawns, shrubs and trees and the formation of a sports oval in the south-western portion of the site.

In conjunction with the Department of Technical Education, action was taken during the year to provide accommodation for student amenities at Broadway by the erection near Mews Street of two large pre-fabricated aluminium buildings for student assemblies, meetings, dances, plays, indoor games, etc. Approval was given also for the erection of an additional aluminium building in the same area to provide staff amenities accommodation and for ground improvements to be undertaken in the way of tree planting and the provision of seats, lawns and flower beds.

The new library building on the Thomas Street frontage, Broadway, the facilities of which are shared by the University and the Department of Technical Education, was completed and opened for the use of students at the commencement of second term, 1953.

#### Student Hostel.

As a first step towards the provision of a University residential college, Council decided to establish a student hostel at Kensington as from the beginning of the 1953 academic year. Buildings formerly occupied by migrants on the University site were taken over in February, 1953, and opened to students enrolling in University courses. Many students of the University from country districts in New South Wales and from overseas had previously found difficulty in obtaining suitable accommodation in Sydney and were quick to take advantage of the benefits provided by the hostel. By June, 1953, eighty students were in residence.

A further group of hostel buildings situated opposite the University site on Anzac Parade were made available by the Government in June. With these additions, the hostel will be able to accommodate nearly 300 boarders.

The quick action which enabled the hostel to be opened from the beginning of the academic year was made possible by the assistance of the Public Service Board and the co-operation of the State and Commonwealth Departments under whose control the hostels formerly had been. The Council is deeply appreciative of the Government's action and of the co-operation of the Public Service Board and the various State and Commonwealth Departments concerned. Council also appreciates the service rendered by the Department of Public Works in carrying out alterations to the hostel buildings. Students at the hostel are provided with facilities for study and for social and recreational activities. Rooms in which students may study privately and a hall equipped for social and entertainment purposes are available.

The hostel offers excellent opportunities for extra-curricula activities. Films are shown regularly and from time to time distinguished speakers address the students. A series of talks by overseas students on "My Country" has created wide interest and audiences have included many prominent citizens, including members of the Consular staffs.

The hostel is administered through the Amenities Service of the University under the supervision of Major R. K. Wilthew. A small staff is employed to carry out the duties connected with its maintenance. Soon after the opening of the hostel, a Students' House Committee was formed to serve as a liaison with the Amenities Service, to maintain discipline, prepare student duty rosters and organise recreational and other student activities. To assist the students, a resident Warden (Mr. G. H. Aylward of the School of Applied Chemistry) has been appointed.

# Student Organisations and Activities.

On 8th September, 1952, Council recognised the University of Technology Students' Union as the approved student organisation and approved the Constitution as the interim basis on which the Union should operate, subject to later review by Council. It was determined that membership of the Union should be compulsory for all registered students.

On 8th December Council approved the N.S.W. University of Technology Sports Association as the organisation to control and sponsor sporting activities within the University, membership of the Association to be compulsory for all registered students, except those attending courses at country centres, for whom membership should be on a voluntary basis.

Following consideration of views expressed by representatives of the University of Technology Students' Union, Council on 9th March, 1953, decided that the Union should be the approved student organisation at Sydney, and that authority be given for the formation of student organisations at centres other than Sydney. The Newcastle University College Students' Association was approved by Council as the student organisation at Newcastle.

Copies of the first issue of the "Engineering Yearbook", which was produced by students of the Faculty of Engineering, were received by Council at the July meeting. Congratulations were extended by Council to the editorial panel responsible for the publication. In September, 1952, Council granted recognition to the N.S.W. University of Technology Newman Society as a Society of the University, and approved the Society's Constitution.

The number of students actively participating in organised sport has steadily increased throughout the year. The assistance given to the various sporting clubs by the University of Technology Sports Association in providing extra equipment has resulted in a noticeable improvement in the general standard of performance. The University has been admitted to the Australian Universities Sports Association, and teams were entered in the majority of Association events held in Sydney during the year. At the Inter-'Varsity Carnival of 1953 several University teams competed with encouraging results.

The N.S.W. University of Technology Dramatic Society shows promise of becoming a valuable adjunct to the Humanities programme. The work of the Society during the year has been confined mainly to play-readings and rehearsals, under the direction of Mr. P. K. Elkin, Senior Lecturer in English. Arrangements are being made for a series of lunch hour performances to be given in the Theatrette during the second term, 1953.

# **Benefactions.**

The Council acknowledges with gratitude the following benefactions which were received during the year:--

- A. E. Goodwin Ltd.—On 8th September, 1952, Council accepted conditions relating to the award of a scholarship to be made available by A. E. Goodwin Ltd., Engineers and Shipbuilders, Glebe, for students enrolled in the Mechanical Engineering degree course. The total value of the scholarship is £90, payable at the commencement of the second, third and fourth years of the course at the rate of £30 per annum.
- Commonwealth Broadcasting Corporation Pty. Ltd.—The Commonwealth Broadcasting Corporation Pty. Ltd. donated to the University a 10,000 wolt rectifier and a water cooled valve stage. This equipment was adapted in the School of Electrical Engineering to form the basis of a 10 kW. high frequency induction heater for use in research on the development of self-heating thermionic valves.
- Cresco Fertilizers Ltd.—A grant of £600 was made by Cresco Fertilizers Ltd., Adelaide, S.A., to enable investigations to be undertaken in the School of Chemical Engineering of a problem arising from the use of Nairne pyrites.
- A. C. Willard & Co. Pty. Ltd.—A pilot scale evaporator, constructed in stainless steel, was donated to the University by A. C. Willard & Co. Pty. Ltd., Engineers, St. Peters, for use in processing foodstuffs in the Food Technology Laboratory.

- Commonwealth Scientific and Industrial Research Organization. —The Commonwealth Scientific and Industrial Research Organization provided a grant of £750 for the purchase of equipment to permit the continuation of research work being conducted in the School of Chemical Engineering on the gasification of high sulphur coals.
- Commonwealth Bank of Australia Rural Credits Development Fund Grant of £3,500.—The Commonwealth Bank on 10th November, 1952, provided a further grant of £3,500 which was distributed as indicated on research projects conducted at the University—

Investigation of composition of Australian fruits-£500. Studies of the vector of bean mosaic virus-£750.

Methods of flood estimation-£1,250.

Use of pozzolans as partial replacement of cement in mass concrete-£1,000.

- Wool Industry Fund Scholarships.—Two scholarships awarded by the Commonwealth Department of Commerce and Agriculture were granted for students enrolled in the Wool Technology degree course. Each scholarship is valued at £300 per annum in each of the four years of the course.
- Australian Leather Research Association.—The Australian Leather Research Association made available £1,500 to finance a two-year research programme by a Research Fellow on the fundamentals of chrome tannage.

#### Accounts.

Statements showing the position of the various funds of the University as at 30th June, 1953, duly certified by the Auditor-General, are appended to this report.

WALLACE C. WURTH, President.

#### APPENDIX I.

# The Council.

The Council held five ordinary meetings, one adjourned and one special meeting during the year. The attendance of members was as follows:

# President of the University.

WALLACE CHARLES WURTH, C.M.G., LL.B. Syd., Chairman of the New South Wales Public Service Board-seven meetings.

# Vice-President.

Rov WILLIAM HARMAN, M.Sc. N.Z., D.Sc. Lond., F.A.C.I., past General President, Australian Chemical Institute and past President, Sydney Division of the Australian Institute of Management; General Manager, Colonial Sugar Refining Co. Ltd.; Director, Courtaulds (Aust.) Ltd.—three meetings. (Resigned 6th March, 1953.)

THE HON. JOHN SYDNEY JAMES CLANCY, LL.B. Syd., Justice of the Supreme Court—six meetings. (Vice-President from 17th March, 1953.)

#### Director.

ARTHUR DENNING, B.Sc., Dip.Ed. Syd., A.S.T.C., F.R.S.A., Director, New South Wales Department of Technical Education—seven meetings. (Director of the University to 31st December, 1952. Member of Council from 3rd February, 1953.)

JOHN PHILIP BAXTER, O.B.E., B.Sc., Ph.D. B'ham., A.M.I.Chem.E., F.A.C.I., Professor of Chemical Engineering, the New South Wales University of Technology—seven meetings. (Director from 1st January, 1953.)

#### Members.

WILLIAM EDWARD CLECG, M.I.E. Aust., F.I.C.A., Chairman, Newcastle Technical Education District Council, and Director-Consultant, Commonwealth Steel Co. Ltd.; President, Newcastle Division, Australian Institute of Management—five meetings.

HAROLD GRAYDON CONDE, M.I.E. Aust., Manager, Electric Light and Power Supply Corp. Ltd.; Electricity Commissioner for New South Wales-three meetings.

GERALD KING CRANNY, Undergraduate representative, the New South Wales University of Technology-absent overseas.*

THE HON. FRANCIS JOSEPH FINNAN, M.L.A., Minister for Labour and Industry and Social Welfare-two meetings.* (Term of office expired 14th January, 1953.) JOHN PATRICK GLASHEEN, Dip.Ec. Syd., A.C.I.S., Member, New South Wales Public Service Board-seven meetings.

WILLIAM MCCULLOCH GOLLAN, M.L.A.—one meeting. (Appointed 11th March, 1953.)

ROBERT CARR HARRISON, Assistant Director, New South Wales Department of Technical Education—seven meetings.

WILLIAM GEORGE KETT, F.S.M.C., F.I.O. Lond., Member, Board of Optometrical Registration, and Director, Mark Foy's Ltd.—seven meetings.

THE HON. ROBERT ARTHUR KING, M.L.C., Secretary, Labor Council of New South Wales-three meetings.

JAMES NORMAN KIRBY, Managing Director, James N. Kirby Pty. Ltd.; Technical Director, Nuffield (Aust.) Pty. Ltd., and International Products Ltd.—three meetings.*

WILLIAM RAE LAURIE, B.Arch. Syd., F.R.I.B.A., F.R.A.I.A., past President, Royal Australian Institute of Architects-seven meetings.

JAMES KENNETH MACDOUGALL, M.I.E.E. Lond., A.M.I.E. Aust., Manager, Rylands Bros. Ltd., Newcastle-four meetings.

THE HON. JAMES JOSEPH MALONEY, M.L.C., Research Officer, Labor Council of New South Wales-seven meetings.

FRANCIS MACKENZIE MATHEWS, B.E. Syd., A.M.I.E. Aust., Chairman, Wollongong Technical Education District Council, and Chief Engineer, Australian Iron and Steel Ltd.—six meetings.

JOHN GORDON MCKENZIE, B.A., B.Ec. Syd., Director-General, New South Wales Department of Education—three meetings. (Deceased 29th November, 1952.)

RICHARD GODFREY CHRISTIAN PARRY-OKEDEN, Managing Director, Lysaghts Works Pty. Ltd.; President, Chamber of Manufactures of New South Wales—three meetings.

DAVID WATKIN PHILLIPS, B.Sc. Wales, Ph.D. Cantab., Dip.Met.Min., M.I.Min.E., F.G.S., Professor of Mining Engineering, the New South Wales University of Technology—seven meetings.

STEPHEN HENRY ROBERTS, M.A. Melb., D.Sc. Bristol, Litt.D. Melb., D.Sc. (Econ.) Lond., Vice-Chancellor, the University of Sydneytwo meetings.*

GREGORY BEDE THOMAS, LL.B., B.Sc., B.E. Syd., Barrister-seven meetings.

FREDERICK EDWARD TOWNDROW, F.R.I.B.A., F.R.A.I.A., F.T.C.P.I. Aust., Professor of Architecture, the New South Wales University of Technology—six meetings.

^{*} During the year leave of absence from Council meetings for varying periods was granted to Messrs. Cranny, Finnan, Kirby and Professor Roberts.

**BOBERT** JOSEPH WEBSTER, M.C., A.A.A., Chairman of Directors and Managing Director, Burlington Mills (Aust.) Ltd., and Managing Director, Bradford Cotton Mills Ltd.; Hon. Fellow, The Australian Institute of Management—six meetings.

FRED WILSON, O.B.E., F.I.O.B., President, Building Industry Congress of New South Wales; President, Federal Council, Building Industry Congress; and Director, Howie Moffat and Co. Pty. Ltd. four meetings. (Deceased 14th June, 1953.)

JOHN FELL DALRYMPLE WOOD, B.Sc., B.E. Syd., A.M.I.E. Aust., Associate Professor of Mechanical Engineering, the New South Wales University of Technology—six meetings.

HAROLD STANLEY WYNDHAM, M.A., Dip.Ed. Syd., Ed.D.Stan., Director-General, New South Wales Department of Education four meetings. (Appointed 1st December, 1952.)

### APPENDIX II.

#### Standing Committees of Council.

At the September meeting Council re-appointed for a further period of twelve months the existing standing committees of Council. Membership of the committees, including additional appointments made throughout the year, is as follows:—

Buildings and Equipment Committee:

W. E. Clegg (Chairman).

Dr. R. W. Harman (resigned 6th March, 1953).

The Director.

J. P. Glasheen.

The Hon. R. A. King.

W. R. Laurie.

Professor D. W. Phillips.

Professor F. E. Towndrow.

F. Wilson (deceased 14th June, 1953).

**Executive** Committee:

The President.

The Vice-President.

The Director.

Dr. R. W. Harman (resigned 6th March, 1953.)

W. G. Kett.

W. R. Laurie.

J. K. MacDougall.

Professor S. H. Roberts.

Library Committee:

W. G. Kett (Chairman).

The Director.

The Hon. J. J. Maloney.

Professor D. W. Phillips.

G. B. Thomas.

Professor R. M. Hartwell (co-opted member).

**Public** Relations Committee:

R. J. Webster (Chairman).

The Director.

H. G. Conde.

J. N. Kirby.

The Hon. J. J. Maloney.

F. M. Mathews.

Committee to advise on development of Newcastle University College:

W. E. Clegg (Chairman).

J. K. MacDougall.

R. G. C. Parry-Okeden.

# APPENDIX III.

# Scholarships, Bursaries and Exhibitions.

Awards as indicated hereunder were made during the year, or were in operation following awards in earlier years:---

The Broadcasting Radio Electrical Industries Fellowship Club, Sydney, Scholarships--

J. A. Dembecki-third year, Electrical Engineering.

A. Rosenauer-third year, Electrical Engineering.

The A. E. Goodwin Scholarship-

J. M. Savage-second year, Mechanical Engineering.

The John Heine Memorial Foundation Scholarships-

G. Crawford-third year, Mechanical Engineering.

R. L. Home-conversion course in Mechanical Engineering.

The Imperial Chemical Industries of Australia and New Zealand Research Fellowship-

A. R. Gilby, M.Sc. Melb.

The Monsanto Research Scholarship-

N. A. Warner, B.Sc.

The Wool Industry Fund Scholarships-

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J. P. Kennedy-first year, Wool Technology.

S. Chorlton-second year, Wool Technology.

The Zinc Corporation Scholarship-

C. N. Davison-conversion course in Mining Engineering.

#### Bursars.

J. P. Bolyai-second year, Applied Chemistry.

C. G. Cromarty-fourth year, Electrical Engineering.

P. E. Garrity-third year, Electrical Engineering.

G: A. McKenzie-fourth year, Civil Engineering.

J. H. Watson-first year, Mechanical Engineering.

#### Public Exhibitioners.

E. H. Brent-third year, Chemical Engineering.

D. B. Britten-third year, Electrical Engineering.

J. E. Cleary-third year, Applied Physics.

C. R. Dudgeon-fourth year, Civil Engineering.

M. R. Eagles-third year, Mechanical Engineering.

N. J. Ellem-second year, Electrical Engineering.

A. Kuru-second year, Civil Engineering.

R. C. Lesser-second year, Mechanical Engineering.

H. I. Maggs-first year, Electrical Engineering.

R. G. McCarthy-second year, Electrical Engineering.

R. S. McKilligan-second year, Electrical Engineering.

B. W. G. Penhall-third year, Electrical Engineering.

K. W. Potter-fourth year, Electrical Engineering.

G. R. Taylor-third year, Electrical Engineering.

Joint Coal Board Scholarships.

J. L. Beatty-first year, Mining Engineering.

J. J. Brooks-fourth year, Mining Engineering.

P. E. Cogar—third year, Mining Engineering.

W. J. Franklin-first year, Mining Engineering.

C. Harrison-fourth year, Mining Engineering.

D. J. Hay-third year, Mining Engineering.

A. J. M. Irving-first year, Mining Engineering.

F. E. Jaggar-first year, Mining Engineering.

J. N. Kay-second year, Mining Engineering.

M. O. Kefford-fourth year, Mining Engineering.

D. S. McCallum-third year, Mining Engineering.

#### Joint Coal Board Scholarships-continued.

- D. E. Morrow-fourth year, Mining Engineering.
- T. A. Nestel-fourth year, Mining Engineering.
  - R. C. Nolan-second year, Mining Engineering.
  - D. Saunders-third year, Mining Engineering.
  - J. W. Sticpewich-second year, Mining Engineering.
  - K. T. Tognetti-fourth year, Mining Engineering.
  - R. C. Williams-fourth year, Mining Engineering.

# Combined Colliery Proprietors' Association Scholarships.

- R. J. Buchhorn-fourth year, Mining Engineering.
- N. F. Owers-first year, Mining Engineering.
- F. N. Harpley-first year, Mining Engineering.
- O. J. Richards-fourth year, Mining Engineering.

#### Commonwealth Scholarships.

- D. B. Allen-second year, Architecture.
- H. J. E. Audova-first year, Civil Engineering.
- J. Baird-first year, Civil Engineering.
- S. E. Behne-first year, Architecture.
- C. Bennett-third year, Mechanical Engineering.
- J. P. Bolyai-second year, Applied Chemistry.
- A. F. Boyle-first year, Electrical Engineering.
- C. J. Brady-first year, Mechanical Engineering.
- E. H. Brent-third year, Chemical Engineering.
- D. B. Britten-third year, Electrical Engineering.
- D. N. Butler-first year, Applied Chemistry.
- L. A. Cambey-third year, Applied Physics.
- J. Carter-fourth year, Chemical Engineering.
- S. J. J. Cashman-fourth year, Civil Engineering.
- P. Chiswell-third year, Civil Engineering.
- S. H. Chorlton-second year, Wool Technology.
- G. Choy-fourth year, Electrical Engineering.
- K. G. Clancy-first year, Civil Engineering.
- A. G. Clarke-first year, Civil Engineering.
- J. E. Cleary-third year, Applied Physics.
- G. D. Cordingley-third year, Civil Engineering.
- R. A. Corin-third year, Electrical Engineering.
- A. J. Costoulas-second year, Applied Chemistry.
- J. P. G. Cox-first year, Electrical Engineering.
- J. Coyle-second year, Electrical Engineering.
- C. J. Cripps-Clark-first year, Chemical Engineering.

Commonwealth Scholarships—continued.

- C. G. Cromarty-fourth year, Electrical Engineering.
- J. P. Cudmore-second year, Applied Chemistry.
- R. H. Devine-second year, Architecture.
- J. P. Downey-third year, Civil Engineering.
- G. R. Draper-second year, Applied Chemistry.
- N. J. Ellem-second year, Electrical Engineering.
- B. S. Ellis-second year, Architecture.
- N. F. Enright-first year, Wool Technology.
- K. A. Faulkes-third year, Civil Engineering.
- L. S. E. Fennell-first year, Electrical Engineering.
- W. J. Foster-second year, Civil Engineering.
- R. J. Frost-second year, Civil Engineering.
- G. G. Fuller-first year, Architecture.
- P. E. Garrity-third year, Electrical Engineering.
- A. B. Goldhammer-second year, Electrical Engineering.
- M. E. F. Grace-first year, Civil Engineering.
- H. E. Hamilton-second year, Electrical Engineering.
- J. M. Higgins-first year, Civil Engineering.
- K. S. Houghton-second year, Architecture.
- A. G. Jacobs-first year, Civil Engineering.
- A. A. Jeffreys-second year, Civil Engineering.
- R. C. Johnson-first year, Electrical Engineering.
- T. Jumikis-third year, Civil Engineering.
- C. H. L. Kennard-second year, Applied Chemistry.
- J. P. Kennedy-first year, Wool Technology.
- P. Kenny-first year, Applied Physics.
- C. A. Kerr-first year, Chemical Engineering.
- Ago Kuru-second year, Civil Engineering.
- C. G. Lambert-first year, Chemical Engineering.

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- L. W. Langby-first year, Wool Technology.
- A. G. Leask-first year, Mechanical Engineering.
- W. N. Leng-second year, Civil Engineering.
- R. M. Lennon-second year, Electrical Engineering.
- C. S. Liston-fourth year, Electrical Engineering.
- J. R. Lowe-second year, Electrical Engineering.
- R. G. McCarthy-second year, Electrical Engineering.
- B. J. McCauley-first year, Civil Engineering.
- R. C. McEwen-first year, Civil Engineering.
- R. S. McKilligan-second year, Electrical Engineering.

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# Commonwealth Scholarships-continued.

I. P. MacPherson-first year, Civil Engineering. G. G. Madgwick-fourth year, Chemical Engineering. I. H. Maggs-first year, Electrical Engineering. J. A. Malins-second year, Civil Engineering. E. Mansberg-fourth year, Applied Chemistry. R. B. Meulman-first year, Mechanical Engineering. K. Midgley-second year, Civil Engineering. R. A. Mills-first year, Mechanical Engineering. J. L. Moloney-second year, Electrical Engineering. G. Monk-third year, Civil Engineering. K. H. Napier-first year, Applied Chemistry. G. Neu-second year, Applied Chemistry. M. J. Nicholls-first year, Civil Engineering. R. Nittim-second year, Civil Engineering. B. F. Norris-second year, Civil Engineering. B. J. Oglethorpe-fourth year, Chemical Engineering. P. J. O'Neill-first year, Electrical Engineering. J. Orlovich-first year, Mechanical Engineering. E. T. Page-first year, Electrical Engineering. L. Panozzo-second year, Mechanical Engineering. B. W. G. Penhall-third year, Electrical Engineering. W. Perm-second year, Architecture. P. P. Perry-fourth year, Chemical Engineering. B. P. Pfafflin-second year, Mechanical Engineering. M. T. F. Pines-second year, Mechanical Engineering. M. L. Pittaway-second year, Civil Engineering. J. A. Purnell-first year, Electrical Engineering. D. W. Ray-second year, Architecture. J. W. Ray-third year, Electrical Engineering. K. M. Ray-first year, Electrical Engineering. B. Rheinberger-third year, Electrical Engineering. K. J. Rice-fourth year, Architecture. L. P. Rossler-third year, Applied Chemistry. L. J. Salkeld-first year, Mechanical Engineering. J. R. Sands-second year, Civil Engineering. D. Savage-third year, Electrical Engineering. J. M. Savage-second year, Mechanical Engineering. G. B. Sharpe-third year, Electrical Engineering. R. L. Smythe-first year, Civil Engineering.

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# Commonwealth Scholarships—continued. J. W. Spratt—second year, Electrical Engineering. J. L. Stewart—first year, Electrical Engineering. G. R. Taylor—third year, Electrical Engineering. M. A. Taylor—fourth year, Architecture. S. R. Tibbles—first year, Chemical Engineering. C. L. Tompkins—second year, Electrical Engineering. R. Upjohn—fourth year, Chemical Engineering. A. Vainomae—third year, Mechanical Engineering. N. W. Walker—fourth year, Mechanical Engineering. A. M. Wallace—third year, Civil Engineering. H. L. Wallace—third year, Electrical Engineering. R. E. Wallyn—second year, Electrical Engineering. R. F. Warner—third year, Civil Engineering.

J. F. Williams-second year, Electrical Engineering.

# APPENDIX IV.

# Degrees in Engineering and Science Conferred on 21st March, 1953.

Master of Science (M.Sc.).

SCHOOL OF APPLIED CHEMISTRY.

John Ragnar Augustus Anderson, B.Sc., A.S.T.C.

Cyril Maxwell Martin, A.S.T.C.

Rodney Francis Powning, A.S.T.C.

Gervaise John Sutton, B.Sc., A.S.T.C.

Ronald Louis Werner, B.Sc., A.S.T.C.

SCHOOL OF CHEMICAL ENGINEERING.

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Geoffrey Harold Roper, A.S.T.C.

**B**achelor of Science (B.Sc.).

#### SCHOOL OF APPLIED CHEMISTRY.

# Honours. Charles James Miller, A.S.T.C. (Class II). David Henry Solomon, A.S.T.C. (Class II). Pass.

Herbert Beauchamp, A.S.T.C. Kenneth Robert Deane, A.S.T.C. Arthur Cole Filson, A.S.T.C. Walter Maurice Fletcher, A.S.T.C. James Herbert Hunt, A.S.T.C. SCHOOL OF APPLIED CHEMISTRY (Pass)-continued.

Murray Mead, A.S.T.C.

Maxwell George Morris, A.S.T.C.

Alexander John Morrison.

Barry Arthur Edward Paddison.

Alan Stanley Purss, A.S.T.C.

# SCHOOL OF CHEMICAL ENGINEERING.

#### Honours.

John Raymond Fenner (Class I). Noel Alfred Warner (Class I). Warwick Leonard Jones (Class II). Allen Roy King, A.S.T.C. (Class II). Joseph Norman (Class II). Robert George Robins (Class II). John Anthony Hayward Skidmore, A.S.T.C. (Class II). Jack Wolfenden, A.S.T.C. (Class II).

#### Pass.

Frederick Walter Purches. Bachelor of Engineering (B.E.).

#### SCHOOL OF CIVIL ENGINEERING.

Honours.

Eric Marwick Laurenson (Class I and University Medal (shared).) David Herbert Pilgrim (Class I and University Medal (shared).) Arthur William Manton-Hall (Class I). Peter Thorne Rossiter (Class I). Noel Lancelot De Ferranti, A.S.T.C. (Class II). Arthur Gordon Douglas (Class II).

#### Pass.

Pernard William Baker. John Douglas Stuart Brookes. Thomas Durkin. Leonard Excel Matthews. William John McGuinness. David George McPhee. Bruce Kennedy Noble. Gordon Anthony Sutherland. Edmund Young.

#### SCHOOL OF ELECTRICAL ENGINEERING.

Honours.

Donald John McNeill (Class I and University Medal). Bruce Francis Rabbidge (Class I). Lloyd Sydney Baker, A.S.T.C. (Class II). Alan Keith Hislop (Class II). David Lachlan Shaw (Class II). John Daniel Warren (Class II).

#### Pass.

Basil Wolfe Anderson. Pieter Van Louwersen.

### SCHOOL OF MECHANICAL ENGINEERING.

#### Honours.

Frederick Robert Wotton (Class I). Kenneth John Cooke, A.S.T.C. (Class II).

#### Pass.

Sidney Albert Dunk, A.S.T.C. Stuart McIntosh-Harris. Malcolm Richard McNeall. John Carlyle Southwell. Peter Thorpe.

# SCHOOL OF MINING ENGINEERING.

#### Honours.

Clem Newton Davison, A.S.T.S. (Class I). Keith Russell Jubelin (Class II). Albert Edward Reynolds McCoy (Class II). Malcolm John Smith (Class II).

Pass.

Donald Read Cooley. Cecil Frederick Forbes. David Harold Robinson.

Newcastle University College Degrees Conferred on 16th May, 1953. Bachelor of Science (B.Sc.).

SCHOOL OF CHEMICAL ENGINEERING.

#### Honours.

James Eshott Carr, A.S.T.C. (Class II). Ernest Allan Walpole, A.S.T.C. (Class II).

Pass.

James Alexander Mackie, A.S.T.C.

#### APPENDIX V.

#### **Research Activities.**

The following research projects are being conducted in the various Schools of the University:----

## SCHOOL OF APPLIED CHEMISTRY.

Department of Physical Chemistry.

(a) As a requirement for the degree of Doctor of Philosophy:-

- (i) Infra-red studies of molecular structure-R. L. Werner.
- (ii) Studies in chemical kinetics of gaseous reactions—E. Swinbourne.
- (iii) Studies on natural waxes by surface chemistry techniques—
   A. R. Gilby.

(b) As a requirement for the degree of Master of Science:-

- (i) The effects of the structure of azo compounds on their adsorption, heat of adsorption and reduction potential—P. Beckmann.
- (ii) Studies on the nature of inorganic colloid formation with special reference to von Weimarn's Law-V. A. Pickles.
- (iii) The supercontraction of wool-Miss J. C. Griffith.
- (iv) Formation and properties of monodisperse sulphur sols-P. D. Lark.
- (c) Other Projects:-
  - (i) A.C. polarography.
  - (ii) Electron microscopy.
  - (iii) Insect cuticle waxes.
  - (iv) Surface studies of anti-tubercle drugs.
  - (v) The dielectric properties of complex salts.
  - (vi) Study of the electrical resistance of pure metals as a function of temperature.
- (vii) Determination of wetting agents.
- (viii) Preparation of change controlled colloids.
- (ix) Application of distribution functions to various physical properties.
- (d) Publications:-
  - (i) The Viscosity and Rigidity of Gelatin in Concentrated Aqueous Solutions. Part I. Viscosity. Part II. Rigidity.
    C. W. N. Cumper and A. E. Alexander, Aust. J. Sci.Res., 1952, 5, 146.
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- (ii) The Surface Chemistry of Proteins. Part III. Rigidity of Adsorbed Films at an Air/Water Interface.
  - C. W. N. Cumper and A. E. Alexander, Aust. J. Sci.Res., 1952, 5, 158.
  - (iii) Theory of the Vibrating Condenser Converter and Application to Contact Potential Measurement.

J. R. Anderson and A. E. Alexander, Aust. J. App.Sci., 1952, 3, 201.

(iv) Studies of Surface Potentials. Part I. Effect of Salts and the Nature of the Interface Upon the Surface Potentials of Insoluble Monolayers.

B. D. Powell and A. E. Alexander, J.Coll.Sci., 1952, 7, 482.

(v) Studies of Surface Potentials. Part II. Effect of Salts and the Nature of the Interface Upon the Surface Potentials of Soluble Monolayers.

B. D. Powell and A. E. Alexander, J.Coll.Sci., 1952, 7, 493.

vi) The Surface Tension and Surface Potential of Aqueous Solutions of Normal Aliphatic Alcohols.

A. M. Posner, J. R. Anderson and A. E. Alexander, J.Coll.Sci., 1952, 7, 623.

(vii) Study of Adsorption on Metals by the Contact Potential Technique.

J. R. Anderson and A. E. Alexander, Aust.J.Chem., 1953, 6, 109.

(viii) Studies of Aggregation in Soap Solutions Containing Salt and Simple Organic Molecules.

G. Stainsby and A. E. Alexander, Aust.J.Chem., 1953, 6, 123.

(ix) The Mobility of Oil Droplets, Interfacial Tension Measurements and Gegen Ion Adsorption in Soap Solutions.

B. D. Powell and A. E. Alexander, CanadianJ.Chem., 1953, 30, 104.

(x) The Tautomerism of N-Heteroaromatic Amines. Part II. Infra-red Spectroscopic Evidence.

C. L. Angyal and R. L. Werner, J.Chem.Soc., 1952, 2911.

(xi) The Structure of Dimedone and the Effects of Solvents on Keto-enol Tautomerism.

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C. L. Angell and R. L. Werner, *Aust.J.Chem.*, 1953, 6, 294.

- (xii) The Essential Oil of Myroporum crassifolium Forst.
  K. G. O'Brien, A. R. Penfold and R. L. Werner, Aust. J.Chem., 1953, 6, 166.
- (xiii) The N=N Stretching Frequency. R. J. W. Le Fevre, M. F. O'Dwyer and R. L. Werner, Chemistry and Industry, 1953, 16, 378.
- (xiv) The Infra-red Spectra of Compounds containing the Azo Group. B. L. W. L. Fourse, M. F. O'Duver and B. L. Werner.

R. J. W. Le Fevre, M. F. O'Dwyer and R. L. Werner, Aust.J.Chem. (in press).

(xv) A Recording A.C. Polarograph.

G. Buchanan and R. L. Werner, Aust.J.Chem., 1953, 6 (in press).

- (xvi) The Dipole Moment and Infra-red Spectra of Diosphenol. R. J. W. Le Fevre, F. Maramba, and R. L. Werner, J.Chem. Soc., 1953 (in press).
- (xvii) Metallurgical Applications of the Electron Microscope.
   V. A. Pickles, Australasian Engineer, 1953 (in press), also Trans. of Aust. Inst. of Metals, 1953.
- (xviii) Mathematical Chemistry.

E. Swinbourne and P. D. Lark, J.Chem.Ed., 1953 (in press).

Department of Inorganic Chemistry.

- (a) As a requirement for the degree of Doctor of Philosophy:-
  - (i) Studies in co-ordination chemistry with particular reference to bridge compounds of palladium—S. E. Livingstone.
  - (ii) Co-ordination compounds of groups 1B and VIII with chelate compounds of sulphur-J. R. Backhouse.
  - (iii) Researches on the co-ordination complexes of group 1B elements and related compounds—C. M. Harris.
  - (iv) Studies in magnetochemistry-B. N. Figgis.
  - (v) Ditertiary arsine complexes of ruthenium and osmium-G. J. Sutton.

(b) Other Projects:-

- (i) Complexes of vanadium.
- (ii) Five co-ordinate nickel.
- (iii) Investigation of the isomers of bis-pyridine cobaltous chloride.

- (iv) The oxidation of platinum II arsine complexes with nitrogen dioxides, nitrosyl chloride, etc.
  - (v) Investigation of nickel in its unusual valency states.
  - (vi) Application of infra-red spectroscopy to the study of the nature of the bonds in co-ordination complexes.
  - (vii) The preparation of polyarsine chelate groups and a study of their co-ordinating properties.
- (viii) Ditertiary arsine complexes of the elements ruthenium, osmium, rhodium and iridium.
- (ix) Metallo-porphyrin complexes.
- (c) Publications:-
  - (i) A Tritertiary Arsine and its Metal Complexes.
     G. A. Barclay and R. S. Nyholm, Chemistry and Industry, 1953, 378.
  - (ii) Palladium Complexes. Part V. Reactions of Palladium Compounds 2: 2 Dipyridyl.

S. E. Livingstone, J. Proc. Roy. Soc., N.S.W., 1953, 32.

(iii) The Detection and Estimation of Micro-quantities of Antimony.

B. N. Figgis and N. A. Gibson, Analyt.Chim.Acta., 1952, 313.

(iv) Studies in Co-ordination Chemistry. Part XII. A Ditertiary Arsine Nickel Carbonyl and Some Halogen Derivatives.

R. S. Nyholm, J.Chem.Soc., 1952, 2906.

(v) Part XIII: Magnetic Moments and Bond Types of Transition Metal Complexes.

F. H. Burstall and R. S. Nyholm, J.Chem.Soc., 1952, 3570.

(vi) Part XIV: The Magnetochemistry of Simple and Complex Fluorides of Transition Metals.

R. S. Nyholm and A. Sharpe, J.Chem.Soc., 1952, 3579.

(vii) The Raman and Infra-red Spectra of Germanium Tetrafluoride.

A. D. Caunt, L. N. Short and L. A. Woodward, Trans. Farad.Soc., 1952, 48, 873.

(viii) Simple Pyrimidines. Part 1. Spectroscopic Studies.

D. J. Brown and L. N. Short, J.Chem.Soc., 1953, 65, 331.

(ix) Magnetism and Inorganic Chemistry.

R. S. Nyholm, Quarterly Reviews, 1953 (in press).

- (x) The Stereochemistry and Valence States of Nickel. R. S. Nyholm, *Chemical Reviews*, 1953 (in press).
- (xi) The Structure of Nickel Tetracarbonyl and Some Disubstituted Derivatives.

L. N. Short and R. S. Nyholm, J.Chem.Soc., 1953 (in press).

(xii) The Orbital Contribution to Magnetic Moments and the Stereochemistry of Cobaltous Compounds.

B. N. Figgis and R. S. Nyholm, J.Chem.Soc., 1953 (in press).

(xiii) d Orbitals in Complex Formation.

R. S. Nyholm (in collaboration with D. P. Craig, A. Maccoll, L. E. Orgel and L. E. Sutton), J.Chem.Soc., 1953 (in press).

Department of Analytical Chemistry.

- (a) As a requirement for the degree of Doctor of Philosophy.
  - (i) Paper partition chromatography-E. C. Martin.
  - (ii) The effect of substituents in the naphthalene ring—A. Bryson.
- (b) As a requirement for the degree of Master of Science.
- (i) Some applications of controlled potential technique to analytical and preparative chemistry—G. H. Aylward.
  - (ii) Some aspects of nitration in the naphthalene nucleus-J. L. Garnett.
- (iii) Studies on anti-fouling paints-W. E. Goodin.
- (c) Other Projects.

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- (i) Chromatographic examination of permissible food dyes.
- (ii) Studies in the nitration of napnthalene nucleus.
- (iii) Kinetics of racemisation of optically active inorganic ions of the group 8 elements.
- (iv) Development of a new instrumental method for controlled potential in electrochemical analysis.
- (v) The volumetric determination of aldehydes and ketones.
- (vi) The analysis of zinc ores by use of activitated copper for the removal of interfering elements.
- (d) Publications.
  - (i) A Critical Examination of the Ferrocyanide Titration of Zinc.

Mrs. M. Richardson and A. Bryson, Analyst, 1953, 78, 291.

- (ii) The Separation of Cadmium and Zinc by means of Activated Copper.
  - A. Bryson and S. Lenzer-Lowy, Analyst, 1953, 78, 299.
- (iii) The Determination of Moisture in Coal by the Karl Fischer Reagent.

A. Bryson and W. F. Pickering, Journ.Inst.Fuel, 1952, 1. (iv) Detection and Determination of Thallium.

J. R. Anderson, Analyt. Chem., 1953, 25, 108.

(v) The Kinetics of Racemisation of Optically Active Complex Ions of Group 8 Elements. Part II.

N. R. Davies and F. P. Dwyer, Trans.Farad.Soc., 1953, 49, 180.

(vi) Induced Optical Activity of the Tris 1:10 Phenanthroline and Tris 2:2' Dipyridyl Copper II Ion.

N. R. Davies and F. P. Dwyer, J.Proc.Roy.Soc.N.S.W., 1952, 86, 64.

(vii) A New Reagent for Stannous Tin.

J. R. A. Anderson and J. L. Garnett, Analyt.Chim.Acta, 1953, 8, 393.

# Department of Organic Chemistry.

(a) As a requirement for the degree of Doctor of Philosophy.

- (i) Polystictin, a red pigment of *Coriolus sanguineus*, and studies in the hydroxybenzoate and naphthoate series—J. R. Tetaz.
- (ii) Synthetic plant hormones-Miss M. H. Maguire.

(iii) Triterpenoids from Siphondon australe-J. Courtney.

(b) As a requirement for the degree of Master of Science.

(i) Synthetic studies on plant hormones-D. L. Ford.

- (ii) Oxidations with lead tetra-acetate-H. E. Barron.
- (iii) Oxidation of active methylene systems-D. H. Solomon.
- (iv) Syntheses of heterocyclic compounds-Mrs. G. Sugowdz.
- (v) Triterpenoids from Ficus macrophylla-C. Miller.
- (vi) Conjugated acids from drying oils-H. Beauchar
- (c) Other Projects.

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- (i) Oxidation of phenols.
- (ii) Investigations of plants poisonous to stock.
- (iii) The chemistry of ants.
- (iv) Oxidation of hydrazines.
- (v) Studies on the freezing point of milk.

- (vi) Modification of Field's Stain.
- (vii) Syntheses in the penicillin field.
- (viii) Chemistry of Persooria species.
- (ix) Ultra-violet absorption of unsaturated ketones.
- (x) Triterpenoids from higher fungi.
- (xi) Survey of the occurrence of saponins in Australian plants.
- (xii) The chemistry of Dracaena angustifolia.
- (xiii) The chemistry of Doryanthes Palmeri.
- (xiv) The triterpenes of Ternstroemia Cherryi.
- (d) Publications.
  - (i) The Hydroxynaphthoate Series. Part I. Synthesis of 4-Hydroxynaphthoic Acid and its Simple Esters.
    - G. W. K. Cavill and J. R. Tetaz, J.Chem.Soc., 1952, 3634.
  - (ii) The Isolation of a "Ceryl" Alcohol from Threlkeldia proceriflora (Soda bush).

G. W. K. Cavill, Aust.J.Sci., 1952, 15, 67.

(iii) The Chemistry of Mould Metabolites. Part I. Isolation and Characterisation of a Red Pigment from Coriolus sanguineus.

G. W. K. Cavill, B. J. Ralph, J. R. Tetaz and R. L. Werner, J.Chem.Soc., 1953, 525.

(iv) The Chemistry of Ants.

G. W. K. Cavill, Chem. and Ind., 1953, 351.

(v) Synthetic Plant Hormones. Part I. Some Esters of Phosphoric Acid.

M. H. Maguire and G. Shaw, J.Chem.Soc., 1953, 1479.

(vi) Aryloxymethanephosphonates. Some New Analogues of 2:4-D.

M. H. Maguire, G. Shaw and C. G. Greenham, Chem. and Ind., 1953, 668.

(vii) The Chemistry of Fungi. Part XVII. Dehydroeburicoic Acid.

R. M. Gascoigne, Alexander Robertson and J. J. H. Simes, J.Chem.Soc., 1953 (in press).

- (viii) The Shape and Reactivity of the cyclo Hexane Ring.
  S. J. Angyal and J. A. Mills, Rev.Pure and Appl.Chem., 1953, 2, 185.
- (ix) H. G. Smith, Pioneer of Australian Chemistry.
   W. J. Dunstan, Aust.J.Sci., 1952, 15, 12.

 (x) The Sommelet Reaction. Part IV. The Preparation of Aliphatic Aldehydes.
 S. J. Angyal, D. R. Penman and G. P. Warwick,

J.Chem.Soc., 1953, 1737.

- (xi) The Sommelet Reaction. Part V. N-Heteroaromatic Aldehydes.
   S. J. Angyal, G. B. Barlin and P. C. Wailes, J.Chem.Soc.,
  - 1953, 1740.
  - (xii) The Sommelet Reaction. Part VI. Methyleneamines. A Proposed Mechanism for the Reaction.
     S. J. Angyal, D. R. Penman and G. P. Warwick.

J.Chem.Soc., 1953, 1742.

#### Department of Tanning.

- (a) As a requirement for the degree of Master of Science.
  - (i) The chemical constitution of the tannins of *Eucalyptus* redunca-B. Player.
  - (ii) Mechanism of chrome tannage-M. Rauf.
- (b) Other Projects.
  - (i) Investigation of potentialities of the tannin of *Eucalyptus* sieberiana and related species.

#### (c) Publications.

- (i) The Tannins of Certain Eucalypt Species and Pinus radiata.
   H. Anderson, J.Int.Soc.Leath.Chem., 1952, 36, 306.
- (ii) The Classification and Properties of Halophylic Organisms.
   H. Anderson, J.Bact.(Amer.), (in press).

Department of Biological Sciences.

- (a) As a requirement for the degree of Master of Science:-
  - (i) The production of organic acids by *Polyporus tumulosus*. (M.Sc.--University of Sydney)--G. Moir.
- (ii) Studies on bean aphids (M.Sc.—University of Sydney)---Mrs. B. M. Errey.
- (b) Other Projects :---
  - (i) Growth characteristics of wood-rotting fungi on various media.
  - (ii) New metabolites of wood-rotting fungi.
  - (iii) The growth of basidiomycete fungi in submerged culture.
  - (iv) Studies on Australian lichens.
    - (v) Cytology of wood-rotting fungi.
  - (vi) Mutation rates to Streptomycin resistance by Staphylococcus pyogenes.

- (vii) A study of milk organisms prior and subsequent to treatment with quaternary ammonium salts.
- (viii) The ecology and systematics of New South Wales Drosophilidae.
- (c) Publications:-
  - (i) The Chemistry of Mould Metabolites. Part I. Isolation and Characteristics of a Red Pigment from Coriolus sanguineus (Fr.).

G. W. K. Cavill, B. J. Ralph, J. R. Tetaz and R. L. Werner, J.Chem.Soc., 1953, 525.

- (ii) The Growth Promoting Effect of Indole-3-Acetic Acid and Certain Vitamins on the Common Cultivated Mushroom, *Psalliota hortensis*.
  - I. Fraser, Aust.J. Eiol. Sci., 1953, 6.

SCHOOL OF APPLIED PHYSICS.

- (a) As a requirement for the degree of Doctor of Philosophy:-
  - (i) Metal spectroscopy--S. C. Baker.
  - (ii) Theoretical studies relating to the physics of the solid state
     --E. R. Lanczi.
  - (iii) Sonic and ultrasonic characteristics of timber-H. F. Pollard.
- (b) As a requirement for the degree of Master of Science:-
  - (i) X-ray diffraction study of the stretching of wool-E. G. Bendit.
  - (ii) Nuclear magnetic resonance-L. O. Bowen.
- (iii) X-ray applications of proportional counters-N. R. Hansen.
- (iv) Studies in physiological optics-J. Lederer.
- (v) Magnetic properties of ilmenite-L. G. Parry.
- (vi) Electronic techniques applied to spectroscopy-W. G. Walker.
- (c) Other Projects:-
  - (i) Spectroscopic and X-ray diffraction testing and a "physical analysis service".
  - (ii) A review of the fundamentals of colour printing.
- (iii) Development of spectrographic analytical techniques (New-castle).
- (iv) Absorption spectrophotometry in the ultraviolet (Newcastle).

(d) Publications:—

- (i) A Laboratory Galvanometer Stand.
  - S. C. Baker, J.SciInstrum., 1952, 29, 299.

- (ii) Sensitising Photographic Plates to the Ultraviolet.
   E. V. Campbell, Aust.J.Sci., 1952, 14, 198.
- (iii) Lead Sulphide Photocells.
   C. J. Milner and B. N. Watts, *Research*, London, 1952, 5, 267.
- (iv) A Camera for Texture Mapping by X-ray Diffraction.
   C. J. Miller and J. A. James, J.Sci.Instrum., 1953, 30, 77.
  - (v) Clinical Aspects of Duction Measurements.J. Lederer, Aust.J.Opt., 1952, 35, 441.
  - (vi) Visual Performance.

J. Lederer, Aust.J.Opt., 1952, 35, 345; also Building, Lighting, Engineering, July, 1952, 34.

SCHOOL OF CHEMICAL ENGINEERING.

- (a) As a requirement for the degree of Doctor of Philosophy:-
  - (i) The kinetics of the decomposition of titanium tetra iodide —K. McG. Bowling.
  - (ii) Study of anhydrous metal chlorides production in fluidised beds—W. R. S. Briggs.
  - (iii) The effect of vibration on the rate of mass transfer in liquidliquid extraction and gas absorption-R. H. Buchanan.
  - (iv) Heat transfer studies in liquids and vapours-R. C. P. Cairns.
  - (v) The effect of conditions of growth on crystal form-E. R. McCartney.
- (vi) Studies of the adhesion of polyester resins to glass surfaces —R. Robins.
- (vii) Simultaneous gas absorption and chemical reaction-G. H. Roper.
- (viii) The development of fluorination processes-J. D. Smith.
  - (ix) Absorption of zinc vapour in molten lead-N. A. Warner.
  - (x) Studies in liquid-liquid extraction of inorganic compounds with organic solvents-R. K. Warner.
- (b) As a requirement for the degree of Master of Science:-
  - (i) Bacteriological aspects of process evaluation in vegetable products-J. C. Anand.
  - (ii) Studies in the polymerisation of vinyl chloride-P. D. Antoniades.
- (iii) Researches in the field of electroplating-B. W. Armstrong.
- (iv) The fluidised roasting of sulphide ores-F. W. Ayscough.

- (v) The properties, fabrication and application of rigid thermoplastic materials to chemical engineering equipment—F. L. Connors.
- (vi) Phase equilibrium and solid state reaction in the system Al₂O₃-ZrO₂-SiO₂-H. Fowler.
- (vii) Study of the drying characteristics of gels composed of sugar and gelatine-D. W. Grover.
- (viii) The design of stirrer shafts-C. H. Hopkins.
  - (ix) The causes and mitigation of the corrosion of town's gas distribution systems—T. M. Hughes.
  - (x) The investigation of the manufacture and uses of plaster of Paris for the building industry-C. H. Hunt.
  - (xi) Studies in food chemistry-N. S. Kapur.
- (xii) Studies on the hydraulic gradients across bubble plates in fractionating columns-W. G. Kirchner.
- (xiii) Studies in fluorination-J. Macmillan.
- (xiv) Submerged combustion-H. F. Melouney.
- (xv) Studies in the crystallization of industrially important chemicals-M. I. M. A. Mirza.
- (xvi) Studies in fixed oils-H. S. Nathan.
- (xvii) Studies in heat transfer and sublimation at low pressures-J. Norman.
- (xviii) Side chain chlorination of toluene-J. S. Ratcliffe.
  - (xix) Studies on the extrudability of thermoplastic resins-N. I. Sorokin.
  - (xx) Atmospheric pollution in N.S.W. industrial areas-J. L. Sullivan.
  - (xxi) The formation of resin-alum size on paper-N. A. Whiffen.
- (xxii) The science of spray drying-J. Willis.
- (c) Other Projects:-
  - (i) The oxidative stability of lemon butter (in collaboration with D. W. Grover, Food School, N.S.W. Department of Technical Education).
- (d) Publications:---

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- (i) Dew Point Determination by Visible Wetting.
  - R. H. Buchanan and A. R. King, Aust.J.Appl.Sci., 1952, 3, 14.

(ii) Liquid-liquid Equilibrium Data for the System Carbon Tetrachloride-Acetone-water.

R. H. Buchanan, Ind. Eng. Chem., 1952, 44, 2449.

- (iii) Methods of Analysing Aldehydes, Ketones and Combined Carbinols in the Presence of Each Other.
  - R. H. Buchanan, Aust.J.Appl.Sci., 1951, 2, 276.
- (iv) Drop Formation in Liquid-liquid Systems when the Orifice is Wet with the Dispersed Phase.
  - R. H. Buchanan, Aust.J.Appl.Sci., 1952, 3, 233.
- (v) The Welding of Thermoplastics.

F. L. Connors, 1952 Welding Engineering Convention, Australasian Engineer, March, 1953, 55.

- (vi) The Absorption of Chlorine from Air by the Solution of 2-Ethyl Hexene-1 in Carbon Tetrachloride. G. H. Roper, Chem. Eng. Sci., 1953, 2, 18.
- (vii) The Kinetics of the Addition of Chlorine to Olefins in Carbon Tetrachloride.
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- G. H. Roper, Chem. Eng. Sci., 1953, 2, 27.
- (viii) The Distribution of Uranyl Nitrate between Organic Solvents and Water.

R. K. Warner, Aust.J.Appl.Sci., 1952, 3, 156.

- (ix) Solvent Extraction of Uranyl, Thorium and Copper Nitrates. R. K. Warner, Aust.J.Appl.Sci., 1953, 4 (in press).
- (x) Correlation of the Solubility of Uranyl Nitrate Hexahydrate in Organic Solvents with Solvent Structure.

R. K. Warner, Aust.J.Appl.Sci., 1953, 4, (in press).

(xi) The Condensation of Vapour from Gas-vapour Mixtures. R. C. P. Cairns, Chem. Eng. Sci., 1953, 2, 127.

SCHOOL OF MATHEMATICS.

- (i) Some aspects of finite strain theory with possible applications to geophysics-A. Keane.
- (b) As a requirement for the degree of Master of Science.
  - (i) Economy of sample size in quality control-H. Weiler.
- (c) Other Projects.
  - (i) The application of a calculus based on the Laplacian operator to the solution of the equations of classical mathematical physics. . . .
  - (ii) Further work on ionospheric physics.

⁽a) As a requirement for the degree of Doctor of Philosophy.

(d) Publications.

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- (i) Some Interpretations of Laplacian Operator Functions. J. L. Griffith, J.Proc.Roy.Soc.N.S.W., 1953, 87.
- (ii) On Current Systems Proposed for S_D in the Theory of Magnetic Storms.
  - C. B. Kirkpatrick, J. Geophys. Res., 1952, 57, 4.

# SCHOOL OF WOOL TECHNOLOGY.

- (a) As a requirement for the degree of Master of Science.
  (i) A genetic study of fleece—carcass relationships in the Australian Merino—G. C. Taneja.
- (b) Other Projects.
- (i) Wool survey—a study of environmental suitability of different wool types.

SCHOOL OF CIVIL ENGINEERING.

- (a) As a requirement for the degree of Doctor of Philosophy.
  - (i) Investigations of stresses in concrete members-H. Hodson.
  - (ii) Development of a steady magnetic field electro-magnetic flow meter—H. W. Holdaway.
- (b) As a requirement for the degree of Master of Engineering.
  - (i) Influence of electro-osmosis activity upon the shear characteristics of soils—A. F. S. Nettleton.
  - (ii) Possible relationship between the Atterberg limits and unconfined compression strength of saturated clays—A. W. Manton-Hall.
  - (iii) Studies in the field of concrete technology with particular reference to the use of pozzolanic materials as replacements for Portland cement in concrete mixes—E. E. Peacock.
  - (iv) Analysis and application of thin concrete slabs pre-stressed in two directions with special reference to deck systems and roof shells-P. S. Balint.
  - (v) Electrical analogue computers for the solution of tidal movements in rivers and estuaries-H. A. Scholer.
  - (vi) Photo-elastic investigation of soil and foundation behaviours
     —A. G. Douglas.
  - (vii) Behaviour and analyses of slabs-R. W. Woodhead.
- (c) Other Projects.

## Hydrology.

(i) Relation between rainfall and run-off on small experimental catchments.

(iii) Development of synthetic unitgraphs.

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- (iv) Variation of temporal and areal pattern of intense storms.
- (v) Derivation of infiltration indices under N.S.W. conditions.
- (vi) A modified "rational" method for flood estimation.

# Soil Mechanics.

(i) Relation of physical and chemical properties of soils (Newcastle).

# Concrete Technology.

- (i) Use of fly ash as a partial replacement of cement in mass concrete.
- (ii) Shrinkage stresses in concrete.
- (iii) Development and testing of light-weight aggregates.

#### Photogrammetry.

(i) Short range photogrammetry applied to the membrane analogy.

#### Experimental Stress Analysis.

- (i) Investigation of the physical properties of commercial adhesives.
- (ii) Investigation of the structural properties of rubber, mechanically and photoelastically.
  - (ii) Manufacture and application of wire resistance strain gauges for the purpose of structural analysis.

#### Structures.

- (i) Effect of bi-axial pre-stressing on the strength of flat slabs.
- (ii) Pre-stressed concrete beams.

#### Hydraulics.

- (i) Application of the soap film analogy to flow under dams.
- (ii) An electro-hydraulic analogue for investigating co-ordinated hydro-electric system operation.
- (iii) An investigation of wave filters.
- (iv) Transportation of sediment in a pipe.

# Materials.

(i) Determination of certain properties of some Australian rocks. (In co-operation with the School of Mining Engineering and Applied Geology.)

# Applied Mechanics.

- (i) Stresses in a loaded elastic sphere in an elastic continuum.
- (ii) Stresses in a loaded disc.
  - (iii) Buckling of a rectangular plate under certain conditions of loading.
  - (d) Publications.
    - (i) Light Weight Aggregates.
      - H. Hodson, Construct. Rev., 1953, 24, 12, 19.
    - (ii) Buckling of Rectangular Plates.
      - P. Shuleshko, J.Inst. Eng. Aust., 1953, 25, 4-5.

- (a) As a requirement for the degree of Doctor of Philosophy:-
  - (i) Vacuum tube development-E. G. Hopkins.
  - (ii) Investigations into the climatic properties and behaviour of electrical materials-R. M. Huey.
- (b) As a requirement for the degree of Master of Engineering:-
  - (i) Research into some phases of operation or design of saturated core reactors--R. II. J. Clarke.
  - (ii) V.H.F. and U.H.F. aerials and associated transmission systems and filters-A. H. Hean (Newcastle).
  - (iii) Oxide cathode emission-K. K. Shrivastava.
  - (iv) Electrical solution of non-electrical problems-S. Hariharan.
- (c) Other Projects:-

Measurement of dielectric constants.

Properties of gases and mixtures.

(d) Publications:-

Self-heating Thermionic Vacuum Tubes.

E. G. Hopkins, J.A ppl. Phys., 1952, 23, 9, 1055.

SCHOOL OF MECHANICAL ENGINEERING.

(a) As a requirement for the degree of Doctor of Philosophy:-

- (i) The derivation and evaluation of design data for rubber components under shear, compressive and complex loading systems—A. J. Carmichael.
- (ii) Hydraulic model studies related to erosion problems at Stockton Beach (Newcastle)—A. K. Johnston.

(b) As a requirement for the degree of Master of Engineering:-

(i) The mechanical properties of rubber under slow cyclic loading conditions—E. Betz.

SCHOOL OF ELECTRICAL ENGINEERING.
- (ii) The effect of geometrical form on the efficiency of a nozzle
  -S. E. Bonamy.
- (iii) The design, construction and experimental testing of a high pressure quick-steaming boiler-K. R. Bridger.
- (iv) Investigation of phenomena occurring in pneumatic transmission lines-J. M. Carswell.
- (v) Pneumatic phenomena in automatic control mechanisms-K. J. Cooke.
- (vi) Transitory conditions in flow processes involving energy transfer-R. E. Corbett.
- (vii) Small scale utilisation of solar energy-C. M. Sapsford.
  - (viii) Original design and construction methods for axial flow fans-R. A. Wallis.
- (c) Other Projects:-

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- (i) Philosophical studies in kinematics of mechanisms.
- (ii) Heat transfer to a high velocity stream of air.
- (iii) The measurement of surface finish.
- (iv) Development of automatic speed control apparatus.
- (d) Publications:-
- An Analysis of the Forces and Pressure Distribution in Brake Shoes.
  - J. Hirschhorn, Engineering, 1952, 173, 418.
  - Stressed Rubber.
    - A. H. Willis, Trans.Inst.Mar.Eng., October, 1952.

Kinematics of Mechanisms.

N. Rosenauer and A. H. Willis, Associated General Publications, Sydney, 1953.

- Stroboscopic Images and the Determination of Angular Speed. W. Dollar (with J. A. Macinante), Engineering, January, 1953.
- The Technical Lecture—A Guide to Authors and Chairman. A. H. Willis, Quest Publications, Sydney, 1953.

SCHOOL OF MINING ENGINEERING AND APPLIED GEOLOGY.

(a) As a requirement for the degree of Doctor of Philosophy:-

- (i) The nature and genesis of the ore deposits of the Mole Tableland with special reference to tin and tungsten-L. J. Lawrence.
- . (ii) The effect of thermal conductivity of rocks on geothermic gradient and associated environmental conditions in mines --J. C. Webb.

- (b) As a requirement for the degree of Master of Engineering:-
  - (i) The mining and milling of Australian tin ores-R. G. Burdon.
  - (ii) The composition and distribution of gases behind seals in mines-H. A. Donegan.
  - (iii) Investigation of the high sulphur content coal of the upper portion of the Greta Seam-L. F. D. Cane.

Other Projects:---

- (i) Investigation of the physical properties of rock materials for use in mine stowage operations.
- (ii) Field and laboratory investigations on pyrophyllite and related economic minerals.
- (iii) Investigation on the crystallographic orientation of electric meter jewels (sapphire bearings).
- (iv) A new find of zeolite from the Hartley district.
- (v) Mineralogical and optical investigation of fly ash.
- (vi) Sub-surface geology of Bauloora Mines, Cootamundra.
- (vii) Investigation of possible quarry sites for Bauloora Mines.
- (viii) Magnetometer survey of Breccia type road metal quarry at Erskine Park near St. Mary's.
- (ix) The petrology of Upper Burragorang.
- (x) Determination of the optimum operating conditions for the concentration of the heavy mineral content of Australian beach sands.
- (xi) Recovery of nickel from New Caledonia garnierite.
- (xii) Treatment of lead-zinc concentrates from Bauloora Mines, Cootamundra.
- (xiii) Beneficiation of sulphur coal from the Greta Seam.
- (xiv) Concentration of wolfram from ore mined at Snowy Mountains mines.
- (xv) Assaying-
  - 1. Beach sands from Budgewoi, N.S.W.
  - 2. Cobaltiferous ore from Queensland.
  - 3. Monozite-tin ore from Emmaville, N.S.W.
- (xvi) The nature and origin of the Tomago sand beds.
- (xvii) Sources of foundry sands in the Newcastle area.
- (xviii) The glaciology and geology of a portion of the Snowy Mountains.

Publications :---

(a) The Replacement of Crinoid Stems and Gastropods by Cassiterite. J.Proc.Roy.Soc., N.S.W., 1953, 86, 119.

(b) The Geology of the Yerranderie Silver-Lead Field. Proc. Fifth Empire Mining and Metallurgical Congress, 1953, 1.

(c) A Contribution to the Geology and Glaciology of the Snowy Mountains. J.Proc.Roy.Soc., N.S.W., 1953, 86, 88.

SCHOOL OF ARCHITECTURE AND BUILDING.

- (a) Sunlight and daylight in building design-R. O. Phillips.
- (b) Publication :---

Research and Building Regulations.

SCHOOL OF HUMANITIES AND SOCIAL SCIENCES.

### History.

- (i) Lachlan Macquarie and the Anglo-Indian expedition, 1801.
- (ii) The growth of the labour movement in New South Wales to 1900.
  - (iii) David Syme and Victorian history, 1850-1900.
  - (iv) Land and sea communications between Melbourne and Sydney to 1883.

Publications.

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(i) The First Cambridge Newspaper.

G. A. Cranfield, Proc. Cambridge Antiq. Soc., 1952, 45.

(ii) A Hand-list of English Provincial Newspapers and Periodicals, 1700-1760.

G. A. Cranfield, Bowes and Bowes, Cambridge, 1952.

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### English.

- (i) The Storm of Creation.
- (ii) Stories within Stories.
- (iii) Satire from Juvenal to George Orwell.
- (iv) Jargon in the social sciences.
- (v) The novels of Joyce Cary.

### Philosophy.

- (i) Materialism and its critics.
- ² (ii) Science in England at the time of the Coronation of Elizabeth I.

R. O. Phillips, Proc.Inst.Health Surveyors (in press).

(iii) Why not caloric?

(iv) Universals and atoms.

- (v) A critical examination of the philosophy of science of Emil Myerson.
- (vi) Explanation in the physical sciences.
- (vii) A critical examination of the philosophy of science of William Whewell.
- (viii) The concept of activity.

Publications.

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- (i) Scientific Entities. Part I.
  - J. B. Thornton, Aust.J.Phil., 1953, 31, 1, 1.
- (ii) Scientific Entities. Part II.
  - J. B. Thornton, Aust.J.Phil., 1953 (in press).

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- (iii) The Teaching of Scientific Method.
  - J. B. Thornton, Forum of Educ. (in press).

### Economics.

- (i) The theory and practice of index number construction.
- (ii) Taxation and bank yields.
- (ii) Central banking operations in Australia, 1945-53.
- (iv) The rate of interest in Great Britain in the nineteenth century.
- (v) Popular political economy in Australia, 1927-37.
- (vi) Classical economics.

### Government.

- (i) The theory of politics.
- (ii) The origins and development of Trade Unionism in New South Wales.

## NEW SOUTH WALES

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## FINANCIAL

### STATEMENT OF INCOME AND EXPENDITURE FOR

G	Е	N	Έ	R	A	L	
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EXPENDITURE
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			שתמנו	a DIT C	10.0							
Salarias and Staff Charges							£	8.	đ.	£	8.	đ.
Pauroll Tax	•••	•••	•••	•••	•••	•••	636,617	17	7			
Employer's Superspruction	d:	n	•••	•••	•••	•••	15,984	7	- 4			
Employer a Superannuation	COLL	ibution	•••	•••	•••	•••	48,132	6	5			
Printing Stationery Postag	on ote					-				700,734	11	- 4
Telephones Advertising	ев, ею	• • • •	•••	•••	•••	•••				7,846	13	8
Examination Expenses	•••	•••	•••	•••	•••	•••				2,711	9	5
Teaching Departments		Maintor			Dunahaaa					2,940	14	4
Annaratus		mainter	lance	anu	rurchase	OI					_	-
Administrative Travelling		h		•••	•••	•••				51,585	- 7	0
Plant	and Or	net trat	e mes	•••	•••	•••				2,632	1	10
Furniture	•••	•••	•••	•••	•••	•••				2,005	- 8	- 4
Books, Periodicals and Pam	nhlata	•••	•••	•••	•••	•••				3,161	9	6
Repairs and General Mainte	nanca	of Build	inga	•••	•••	•••				11,796	2	10
Rates and Property Insuran	668	or Duite	unga	•••	•••	•••				15,928	14	3
Power, Lighting and Heatin	n	•••	•••	•••	•••	•••				1,596	5	8
Bursaries	8	•••	•••	•••	•••	•••				4,411	ц	8
Contribution Vice-Chancello	r's Soc	rotoriot.	•••	•••	•••	•••				183	6	8
Expenses of New Appointme	ente		•••	••••	•••	•••				300	<u>0</u>	0
Expenses of Motor Vehicles		•••	•••	•••	•••	•••				6,201	9	10
Expenses of Transfer of Sch	nois to	Kensin	oton	•••	•••	•••				904	1	IŬ.
Miscellaneous Expenses			9*0u	••••	•••	•••				3,609	19	Š.
p		•••	•••	•••	•••	•••				949	τĻ	
									_			_

£819,558 15 2

### SPECIAL PURPOSE

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#### Students' Hostel-

Salaries and	Staff Charges		•••	•••				642	13	0			
Maintenance	Expenses	•••	•••	•••	•••	•••	•••	1,319	16	2			
Commonwealth Projects	Scientific a	nd 1	Industrial	Res	earch (	)rganis	ation				1,962	9	2
Salaries and	Staff Charges	•••	•••	•••				1.987	0	4		•	
Maintenance	Expenses	•••	•••	•••	•••			141	19	8			
Commonwealth Fund for 1	n Bank Gran Research—	ts fi	rom Rura	l Cr	edits D	evelop	ment				2,129	0	0
Salaries and	Staff Charges		•••					487	10	4			
Maintenance	Expenses	•••		•••	•••			392	īě	4			
* Equipment	••• •••	•••	•••	•••	•••	•••		704	7	- <del>4</del>			
Commonwealth in Food Te	Grant for the school of the sc	е Тг	aining of	Colo	mbo Pla	an Stud	lents			—	1,584	14	0
Salaries and	Staff Charges		•••	•••	•••	•••		36	12	10			
Maintenance	Expenses	•••		•••				775	3	8			
Furniture an	a Equipment	•••	•••	•••	•••	•••	•••	4,224	17	9			
Nuffield Found Mechanical	ation Grant ? Engineering	Fowa	ards Rese	arch	Chair i	n Scho	ol of				5,036	14	3
Salaries and	Staff Charges		•••					2.356	5	0			
Equipment	••• •••	•••	•••	•••	•••		•••	44	13	2			
											2,400	18	2
C	arried forward	!	•••	•••		•••				-	832,672	10	9

# UNIVERSITY OF TECHNOLOGY STATEMENT

## THE PERIOD 1st JULY, 1952 TO 30TH JUNE,1953.

FUNDS.			• •		IN	COM 18.			£	в.	đ.	£	1	đ.
Fees Other Income	 	•••	 		•••	•••• •••	•••	•••	46,307 1,712	8 8	02	49.010	18	-
State Grants (	Consoli	dated	Reven	ue)		•••	•••					604,115	19	õ
Basic Grant Second Leve	d Assis	t			•••	•••	•••	•••	111,244 46,239	0	0 0		-	
Commonwealt	h Gran	t—C.I	R.T.S	-				•				157,483	0	•0

- N

£819,558 15 2

÷	GRANTS.											
	Students' Hostel											
	Balance brought forward, Income Received, 1952–1953	•••	 	 	••• •••		411 7,312	0 13	0 6	7.723	13	6
	Commonwealth Scientific and In	dustria	al Rese	arch C	rganisa	ation				.,.==		
	Projects— Balance brought forward Income Received 1952–1953	•••	 	····	 	•••	1,048 2,237	14 1	6 7	3 285	18	1
	Commonwealth Bank Grants fro	m Ru	ral Cre	dits D	evelop	ment				0,200	10	-
	Balance brought forward	•••		•••	•••	•••	2,458 3,500	1 0	5 0			
	Grants during 1002-1000	•••								5,958	1	5
	Commonwealth Grant for the Tra	ining (	of Color	nbo Pl	an Stud	lents				10.000	•	^
	in Food Technology	•••	•••	•••	•••	•••				18,000	v	v
	Nuffield Foundation Grant towar Mechanical Engineering— Balance brought forward Grant during 1952–1953	ds Re: 	search (	Chair i	n Scho 	ol of 	1,809 8,750	000	1 0	F 550	0	
	<b>.</b>									5,559	0	-
	Carried forward	•••		•••	•••	•••			£	860,085	6	3

529

### STATEMENT OF INCOME AND EXPENDITURE FOR

				Type	***			8	PE	CIA	L PUB	PO	SE
				LAPL	ADITURI			£	8.	đ.	£	8.	đ.
Sulphuric Acia Constituer	Brought forwar d Ltd. Grant nt in Nairne F	d for In yrites (	vestig loncen	ation : trate-	into the	Ünst	able	004	-	•	832,672	10	9
Maintenance Equipment	Expenses	•••	···· ····		···· ···	···· ···	···	220 81 23	11 7	0 6	991	Q	R
School of Civil Maintenance Equipment	Engineering Expenses	Researc	h Fun 	d 				2 18	13	7	401	0	v
	···· ···		••••			••••	<u> </u>	10		_	16	3	7
Imperial Chem for Resea Imperial Chem for Purch	ical Industries rch in Produ ical Industries	tion of Aus of Aus	tralia : f Viny tralia :	and No 1 Chlo and No f. Cher	ew Zeala oride—E ew Zeala picel E	and Gi quipn and Gi	ant ent ant				391	6	11
Library-	Expenditure					uginee	··· <u>·</u>				74	7	9
Research :	nical Industr Fellowship Gr	ies or antSa	Austra laries	····	nd New 	··· Zeal	and				592	17	2
Electricity Me equipping Equipmen Joint Coal Bc Engineerir B.R.E.I.F. Clu Commonwealt Monsanto Scho	ter and Allie School of Ap t aard Grant to ng—Equipmer tb Scholarship h Wool Indus blarship—Allo	d Indus plied Pl  wards it Fee I try Fur wances	Equip Payme Contraction	Ltd. I Resea ping f nts olarsh	Donation rch Lab School (  ip—Allo	n towa orator of Min  owance	ards y				7,079 3,946 30 207 629	7 1 10 6 17	7 205 1
Chemistry Kit	Deposits Trus	t Fund	—Refi	unds o	f Depos	lts					2,116	8	4
Students' Unio	n Fees Trust	Fund	Paym	ents to	o Studer	ats' Ui	lion				4,652	6	0
Students' Spor Students' :	rts Associatio Sports Associa	n Fees	Trus	t Fur	nd Payı 	nents	to 				1,469	10	0
c	arried forward	;	•••	•••	•••	•••	•••			£	854,159	16	3

THE PERIOD 1ST JULY, 1952 TO 30TH JUNE, 1953.

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GBANTS—continued.		INCO	ome.			e		A	e		a
Brought forward						~	0.	u.	860,085	6	3
Sulphuric Acid Ltd. Grant for In Constituent in Nairne Pyrites (	vestigat Concent	ion ir rate	nto the	Unsta 	ble 				598	10	0
School of Civil Engineering Researc	ch Fund								52	10	0
Imperial Chemical Industries of Au for Research in Production	stralia a of Vi	nd Ne nyl C	ew Zeals hloride-	and Gr —Balai	ant ace				400	0	0
Imperial Chemical Industries of Au	stralia a	nd Ne	w Zeala	and Gra	ing				400	U	Ŭ
Library—Balance brought for Imperial Chemical Industries of Research Fellowship Grant	ward Austra	lia ar	d New	Zeals	nd				82	7	1
Balance brought forward Grant during 1952-1953	•••	•••	···	•••	•••	317 600	17 0	2 0			_
Electricity Meter and Allied Indu	ustries ]	Ltd. I	Donation	n towa	rds				917	17	2
Balance brought forward	Fuysics	nesea	School	of Min	y <u>—</u> 				9,690	15	9
Engineering—Balance brough	t forwar	d d							9,006	6	1
B.R.E.I.F. Club Scholarship-Bala	ance bro	ught i	forward		•••				55	0	Ő
Commonwealth Wool Industry Fu Monsento Scholarshin	nd Scho	larshij	p	•••	•••				600	U	U
Balance brought forward						380	17	1			
Income received 1952-1953	•••	•••	•••	•••	•••	600	0	0			
Chemistry Kit Deposits Trust Fun	d					1 0 4 0			980	17	1
Balance brought forward	•••	•••	•••	•••	•••	1,842	18	4			
Income received 1852–1855	•••	•••	•••	•••		4,101	10		4,336	18	4
Students' Union Fees Trust Fund-	-										
Balance brought forward	•••	•••	•••	•••	•••	1,848	10	0			
Income received 1952–1953	•••	•••	•••	•••	•••	3,452	a	0	5 900	10	6
Students' Sports Association Fees	Trust F	und	•••	•••					1,524	10	ŏ
Carried forward		•••	•••						£893,631	17	3

## STATEMENT OF INCOME AND EXPENDITURE FOR

### SPECIAL PURPOSE.

### EXPENDITURE.

Suspense Account—Payments <t< th=""><th>Brought forward</th><th></th><th></th><th></th><th></th><th></th><th>£</th><th>8.</th><th>đ,</th><th>£</th><th>В.</th><th>d.</th></t<>	Brought forward						£	8.	đ,	£	В.	d.
Balances of Special Purpose Grants—Carried Forward— Students' Hostel    5,761    4      Students' Hostel    5,761    4      Commonwealth Scientific and Industrial Research Organisation    1,156    16      Projects    1,156    16    1      Commonwealth Bank Grants from Rural Credits Development    4,373    7    5      Commonwealth Grant for the Training of Colombo Plan    12,963    5    9      Students in Food Technology    1    12,963    5    9      Nuffield Foundation Grant for the Training of Colombo Plan    3,158    1    11      Suphuric Acid Ltd. Grant for Investigation Into the Unstable    3,158    1    11      Suphuric Acid Ltd. Grant for Investigation Into the Unstable    317    6    6      Constituent in Nairne Pyrites Concentrate    317    6    6      Imperial Chemical Industries of Australia and New Zealand    317    1    1      Grant for Purohase of Books for School of Chemical    7    19    4      Imperial Chemical Industries of Australia and New Zealand    325    0    0      Research Fellowship Grant      2,211    8    2	Suspense Account-Payments	•••	•••		••••	•••				854,159 593	10	7
Students' Hostel and Lindustrial Research Organisation    5,761    4      Commonwealth Scientific and Industrial Research Organisation    1,156    16      Projects    1,156    16    1      Commonwealth Bank Grants from Rural Credits Development    4,373    7    5      Commonwealth Grant for the Training of Colombo Plan    1,156    16    1      Students in Food Technology    12,963    5    9      Nuffield Foundation Grant Towards Research Chair in School    3,158    1    11      Sulphuric Acid Ltd. Grant for Investigation into the Unstable    317    6    6      School of Civil Engineering Research Fund    317    6    6      Imperial Chemical Industries of Australia and New Zealand    317    6    6      Grant for Purchase of Books for School of Chemical    7    19    4      Imperial Chemical Industries of Australia and New Zealand    7    19    4      Research Fellowship Grant    325    0    0    18    2      Joint Coal Board Grant towards Equipping School of Mining    322    10    0    0    10    0    0      Research Fellowship Grant	Balances of Special Durness Grant		dođ Tr									
Commonwealth Scientific and Industrial Research Organisation Projects    1,156    16    1      Commonwealth Bank Grants from Bural Credits Development Fund for Research    1,156    16    1      Commonwealth Bank Grants from Bural Credits Development Fund for Research    1,156    16    1      Commonwealth Bank Grant for the Training of Colombo Plan Students in Food Technology    1,2963    5    9      Nuffield Foundation Grant Towards Research Chair in School of Mechanical Engineering Research Fund    317    6    6      Suphuric Acid Ltd. Grant for Investigation into the Unstable Constituent in Nairne Pyrites Concentrate    317    6    6      School of Civil Engineering Research Fund    316    6    5      Imperial Chemical Industries of Australia and New Zealand Grant for Purchase of Books for School of Chemical    8    13    1      Imperial Chemical Industries tid. Donation towards Equipping School of Applied Physics Research Laboratory Joint Coal Board Grant towards Equipping School of Mining Engineering    325    0    0      R.E.I.F. Club Scholarship       24    10    0      Commonwealth Wool Industry Fund Scholarship        55    0      Students' Union Fees Trust	Students' Hostel		neu ru	Jr warq.			5 761	4	4			
Projects1,15616Commonwealth Bank Grants from Rural Credits Development1,15616Fund for Research14,3737Commonwealth Grant for the Training of Colombo Plan12,9635Students in Food Technology12,9635of Mechanical Engineering3,1581Sulphuric Acid Ltd. Grant Towards Research Chair in School3,1581of Mechanical Engineering3176School of Civil Engineering Research Fund3176Grant for Research in Production of Vinyl Chloride813Imperial Chemical Industries of Australia and New Zealand Grant for Research in Production of Vinyl Chloride813Imperial Chemical Industries of Australia and New Zealand Grant for Purchase of Books for School of Chemical Engineering Library719Imperial Chemical Industries of Australia and New Zealand Research Fellowship Grant3250Imperial Chemical Industries tid. Donation towards Equipping School of Applied Physics Research Laboratory Uoint Coal Board Grant towards Equipping School of Mining Engineering5,0604B.R.E.I.F. Club Scholarship23510Commonwealth Wool Industry Fund Scholarship3510Commonwealth Wool Industry Fund Scholarship3510Chemistry Kit Deposits Trust Fund550Students' Sports Association Fees Trust Fund3411Food Technology Association Grant for Investigation into the Uses of Antioxidants in Food1000Students' Sports Association	Commonwealth Scientific and In	dustria	l Rese	arch O	rganisa	tion	0,.01	-	-			
Fund for Research    4,373    7    5      Commonwealth Grant for the Training of Colombo Plan    12,963    5    9      Nuffield Foundation Grant Towards Research Chair in School    3,158    1    11      Subdents in Food Technology.    3,158    1    11      Sulphuric Acid Ltd. Grant for Investigation Into the Unstable    3,158    1    11      Constituent in Naime Pyrites Concentrate    317    6    6      School of Civil Engineering Research Fund    317    6    6      Imperial Chemical Industries of Australia and New Zealand    36    6    5      Grant for Purohase of Books for School of Chemical    8    13    1      Imperial Chemical Industries of Australia and New Zealand    7    19    4      Research Fellowship Grant    7    19    4      Imperial Chemical Grant towards Equipping School of Mining    2,611    8    2      Joint Coal Board Grant towards Equipping School of Mining    351    0    0      Commonwealt Wool Industry Fund Scholarship    361    0    0      Commonwealt Wool Industry Fund Scholarship    2,220    10    0	Projects						1,156	16	1			
Commonwealth Grant for the Training of Colombo Plan Students in Food Technology    12,963 5 9      Nuffield Foundation Grant Towards Research Chair in School of Mechanical Engineering    3,158 1 11      Sulphuric Acid Ltd. Grant for Investigation Into the Unstable Constituent in Nairne Pyrites Concentrate    317 6 6      School of Civil Engineering Research Fund    317 6 6      Imperial Chemical Industries of Australia and New Zealand Grant for Purchase of Books for School of Chemical Engineering Library    8 13 1      Imperial Chemical Industries of Australia and New Zealand Grant for Purchase of Books for School of Chemical Engineering Library    7 19 4      Imperial Chemical Industries of Australia and New Zealand Grant for Books for School of Chemical Engineering Library    7 19 4      Imperial Chemical Industries of Australia and New Zealand Research Fellowship Grant    325 0 0      Electricity Meter and Alled Industries Itd. Donation towards Equipping School of Applied Physics Research Laboratory Joint Coal Board Grant towards Equipping School of Mining Engineering    5,060 4 11      B.R.E.I.F. Club Scholarship    351 0 0    0      Commonwealth Wool Industry Fund Scholarship    351 0 0    0      Chemistry Kit Deposits Trust Fund    33 6    55 0 0    0      Students' Sports Association Fees Trust Fund    134 11 9    9      Food Technology Association Grant for Investigation Into the Uses of	Fund for Research	m Kui	al Cre	ans D	evelopi	nent	4 979	7	5			
Students in Food Technology    12,963 5 9      Nuffield Foundation Grant Towards Research Chair in School of Mechanical Engineering    3,158 1 11      Sulphuric Acid Ltd. Grant for Investigation into the Unstable Constituent in Nairne Pyrites Concentrate    317 6 6      School of Civil Engineering Research Fund    317 6 6      School of Civil Engineering Research Fund    30 6 5      Imperial Chemical Industries of Australia and New Zealand Grant for Purchase of Books for School of Chemical Engineering Library    7 19 4      Imperial Chemical Industries of Australia and New Zealand Research Fellowship Grant    325 0 0      Electricity Moter and Allied Industries Ltd. Donation towards Equipping School of Applied Physics Research Laboratory Joint Coal Board Grant towards Equipping School of Mining Engineering    5,060 4 11      B.R.E.I.F. Club Scholarship    351 0 0    0      Commonwealth Wool Industry Fund Scholarship    351 0 0    0      Students' Union Fees Trust Fund    2,201 0 0    0      Students' Sports Association Fees Trust Fund    55 0 0    0      Students' Sports Association Grant for Investigation into the Uses of Antioxidants in Food    100 0 0    0	Commonwealth Grant for the	Train	ing o	f Colo	mbo 1	Plan	3,010	•	v			
Numerical Foundation Grant Towards Research Char in School    3,158    1      of Mechanical Engineering    3,158    1    11      Sulphuric Acid Ltd. Grant for Investigation into the Unstable Constituent in Nairne Pyrites Concentrate    317    6    6      School of Civil Engineering Research Fund    30    6    5      Imperial Chemical Industries of Australia and New Zealand Grant for Purchase of Books for School of Chemical    8    13    1      Imperial Chemical Industries of Australia and New Zealand Grant for Purchase of Books for School of Chemical    7    19    4      Imperial Chemical Industries of Australia and New Zealand Research Fellowship Grant    325    0    0      Electricity Meter and Allied Industries Ltd. Donation towards Equipping School of Applied Physics Research Laboratory Joint Coal Board Grant towards Equipping School of Mining Engineering    5,060    4    11      B.R.E.I.F. Club Scholarship       2,220    10    0      Commowealth Wool Industry Fund Scholarship        55    0    0      Students' Union Fees Trust Fund	Students in Food Technolog	y					12,963	5	9			
Sulphuric Acid Ltd. Grant for Investigation into the Unstable Constituent in Nairne Pyrites Concentrate	of Mechanical Engineering	ards R	esearc	n Chan	r in Sc	hool	9 150	4				
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### THE PERIOD 1ST JULY, 1952 TO 30TH JUNE, 1953.

#### GRANTS-continued.

		IN	COMB.			£	E	đ.	£	8.	đ.
Brought forward	••••	•••	•••	•••		-			893,631	17	8
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Uses of Antioxidants in Food	•••			•••	•••				100		

£894,459 14 7

J. P. BAXTER, Director.

E. H. DAVIS, Accountant.

The books and accounts of the New South Wales University of Technology have been audited for the year ended 30th June, 1953, in accordance with the provisions of Section 43 of the Technical Education and New South Wales University of Technology Act, 1949.

In my opinion this statement exhibits a true and correct view of the financial position of the University as at 30th June, 1953, and of the transactions for the year ended at that date, according to the best of my information and the explanations given to me and as shown by such books and accounts.

Sydney, 3rd November, 1953.

(Sgd.) W. J. CAMPBELL, Auditor-General of New South Wales.

# STATEMENT OF BALANCES AND

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Uses of Antioxidants in Food	100	0	0			
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J. P. BAXTER, Director.

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								469 769	А	u. 5	~		-
Buildings (at cost) of	n land	vested	for Uni	versity	purpo	ses	mtri-	002,700					
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								791.371	13	6			
Diant (at cost)								318,085	16	4	-		
Plant (at cost)	•••	•••	•••	•••	•••	••••		32,611	3	6			
Furniture (at cost)	•••	•••	•••	•••	•••	•••	••••			]	1,142,068	13	- 4
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E. H. DAVIS, Accountant.

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