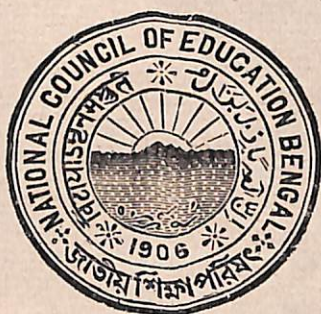


College of Engineering & Technology, Bengal



PROSPECTUS SESSION 1948-49

P. O. JADAVPUR COLLEGE, 24-PARGANAS, BENGAL

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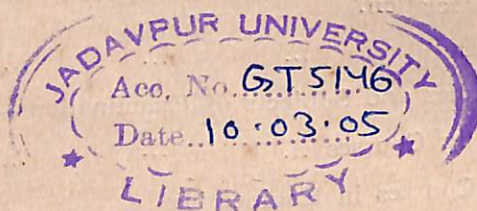
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(NICE)

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The College reserves the right to make changes in the regulations and courses announced in this prospectus.



378.6 : 62 (541.2)

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(NCE)

HISTORY OF THE COLLEGE

The years 1905-06 are memorable ones in the annals of Bengal and indeed in the annals of India. The attempt by the Government to partition Bengal led to a country-wide agitation and intense nationalist movement, which, although political at the outset, had important economic and cultural aspects as well. The economic aspect of the movement found expression in the production and use of "Swadeshi" goods. The cultural aspect found expression in many forms, in the regeneration of Indian art and music, but most of all in the boycott of the then prevalent system of education and the establishment of a new system based entirely on national lines and intended to serve only national purposes.

It was in this way that the National Council of Education was started in 1906 "to impart education—literary and scientific as well as technical and professional—on national lines and exclusively under national control, not in opposition to, but standing apart from the existing system of primary, secondary and collegiate education, attaching special importance to a knowledge of the country, its literature, history and philosophy, and designed to incorporate with the best Oriental ideals of life and thought the best assimilable ideals of West, and inspire students with the genuine love for and desire to serve the country." The foundation of the National Council of Education was rendered possible by the munificence of three generous donors, the late Raja Subodh Chandra Mallick, S. Brojendra Kishore Roy Choudhury of Gouripur and the late Maharaja Suryya Kanta Acharyya Choudhury Bahadur of Mymensingh. The first President of the Council was Sir Rash Behari Ghosh, and with the early days of the N. C. E. were associated nearly all the notable figures of the time, some of whom later won world recognition, men like Poet Rabindranath Tagore, Sri Aurobindo and others.

In 1906, the year of the foundation of the National Council of Education, Bengal, there was established another body known as the Society for the Promotion of Technical Education in

Bengal also under the Presidentship of the late Sir Rash Behari Ghosh, with the object of imparting scientific and technical education to the Indian people, calculated to further their industrial progress. Under the auspices of this Society there was started the Bengal Technical Institute (now known as the College of Engineering and Technology, Bengal), financed mainly by the late Sir Taraknath Palit. In 1910, the Society for the Promotion of Technical Education in Bengal was amalgamated with the National Council of Education.

The National Council at first maintained both Arts and Science and Technical Departments, but finding that public demand for Technical education was more insistent, the Council has been devoting for the last 30 years almost the whole of its resources to technical education through its College of Engineering & Technology.

In 1921 the Council had the good fortune to secure a donation of about 13 lacs (13,00,000) of rupees under the Will of the late Sir Rash Behari Ghosh. This princely bequest enabled the Council in 1924 to erect extensive buildings and workshops on its present site at Jadavpur. Besides the donations and endowments of the founders mentioned above, the Council has received up to date a sum of about 10 lacs of rupees as donations from various persons. The present site of the College of Engineering & Technology is a gift of the Corporation of Calcutta, which leased out to the Council 192 bighas of lands on a nominal rent. Besides this extensive plot of land, the Corporation has been making an annual grant of Rs. 30,000/- since 1927. Later on the Corporation made a non-recurring grant to the College of nearly 1½ lac of rupees, partly as a loan and partly as a gift.

The Government of Bengal have made a non-recurring grant of 3 lacs of rupees and a recurring one of 40 thousand rupees per annum from last year for the further development of the Chemical Engineering Department of this College.

The Government of India have made an interim grant to the College and there is a proposal for handsome recurring and capital grants for all three Engineering Departments from the same source. When the grants recommended by the Committee are received, the College will be able to serve the country in a far more effective way than she is doing now.

ADMINISTRATIVE COMMITTEE THE NATIONAL COUNCIL OF EDUCATION, BENGAL

MEMBERS OF THE EXECUTIVE COMMITTEE, 1948

Ex-officio Members :

Dr. B. C. Roy, M.D., M.R.C.P., F.R.C.S. (Eng.)—*President.*

Shri Nalini Ranjan Sarkar—*Vice-President.*

„ S. K. Acharyya, Bar-at-Law—*Hony. Secretary.*

„ Brajendra Kishore Roy Chowdhury of Gouripur—

Hony. Treasurer.

The Hon'ble Mr. Justice C. C. Biswas, M.A., B.L.—*Hony. Rector.*

Dr. Triguna Charan Sen, Dr. Ing. (Munich),

A.M.I.E. (Ind.) A.M.M.E.—*Principal.*

Shri Atul Chandra Dutta, A.M.Ch.E.

—*Hony. Secretary, Managing Committee, College of
Engineering & Technology, Bengal.*

„ Sudeb Chandra Dutta, A.M.E.E.,—*Hony. Secretary,*

Managing Committee, Dept. of General Education.

Donors' Nominees :

Shri Sarat Chandra Bose, Bar-at-Law.

„ Khitish Chandra Dutt, M.A.

Rai Bahadur Narendra Kr. Mitra, B.Sc. (Glas.), M.I.E. (Ind.).

Shri Ajendra Krishna Ghosh, B.L., Solicitor.

Elected Members :

Shri Haripada Bhaumik, B.A., M.I.E. (Ind.).

„ Sachin Bandopadhyaya, B.Sc. (Glasgow), A.M.I.E. (Ind.).

„ Surendra Nath Dutt, B.Sc. (Glasgow), M.I.E. (Ind.).

„ Sasanka Sekhar Bagchi, A.M.E.E.

„ Surendra M. Bose, A.B. (Stanford), M.S. (California).

„ Prafulla Kanta Banerjee.

Faculty Representative :

Prof. Baneswar Dass, B.S.Ch.E. (Illinois).

Representative of the Alumni Association :

Prof. Surendra Kumar Roy, M.E.E. (Harvard), M.A.I.E.E.,
M.I.E. (Ind.).

Co-opted Members :

Shri Mani Bhusan Majumdar, A.M.E.E.
,, Sachindra Bhusan Dutt, B.Sc., A.M.Ch.E.
,, Amarendra Nath Halder, A.M.E.E.

Representative of the Govt. of West Bengal :

Shri A. K. Chanda, M.A. (Oxon.), I.E.S.

THE NATIONAL COUNCIL OF EDUCATION, BENGAL

MEMBERS OF THE MANAGING COMMITTEE OF THE
COLLEGE OF ENGINEERING AND TECHNOLOGY,
BENGAL, 1948

EX-OFFICIO MEMBERS

The Hon'ble Mr. Justice C. C. Biswas, M.A., B.L.,
—President of the Managing Committee.

Shri Nalini Ranjan Sarker.
—Vice-President of the Executive Committee.

,, Snehangsu K. Acharyya, Bar-at-Law.
—Hony. Secretary of the Executive Committee.

,, Atul Ch. Dutta, A.M.Ch.E.—Hony. Secretary.

Dr. Triguna Charan Sen, Dr. Ing. (Munich), A.M.I.E. (Ind.),
A.M.M.E.—Principal.

Prof. Dr. Satish Chandra Bhattacharyya, M.Sc. (Cal.), Dr. Ing.
(Berlin), A.M.M.E., A.M.E.E. V.D.I., M.I.E. (Ind.).

Prof. Dr. Hira Lal Roy, A.B. (Harvard), Dr. Ing. (Berlin),
M.I.Ch.E., M.I.E. (Ind.).

Prof. Hem chandra Guha, B.Sc. (Edin.), A.M.I.E.E. (London),
A.M.I.E. (Ind.).

Representatives of the Alumni Association :

Shri Ugra Nath Banerjee, B.Sc. (Edin.).

,, Sachindra P. Saha, B.Ch.E.

Representatives of the Faculty :

Shri Sukumar Dutta, B.M.E.

,, Bireswar P. Ghosh, B.M.E.

Elected Members :

- Shri Haripada Bhaumik, B.A., M.I.E. (Ind.).
 „ Sachin Bandopadhyaya, B.Sc. (Glas.), A.M.I.E. (Ind.).
 Prof. Atul Ch. Roy, B.Sc. (Glas.)
 Prof. Purna Ch. Biswas, M.Sc.
 Dr. Kedareshwar Banerjee, D.Sc., F.N.I.
 Shri Kumarendra Bose, A.M.Ch.E., M.I.S.E., M.I.C. (Ind.).
 „ Netai Chand Mallik, A.M.M.E.
 „ Sachindra B. Dutt, B.Sc., A.M.Ch.E.
 „ Sisir Kr. Mitra, A.M.E.E.
 „ Akul Ch. Lahiri, A.M.E.E.

Co-opted Members :

- Shri B. N. Chaudhuri, B.E., M.R.S.I. (Lond.), A.M.I.E. (Ind.).
 „ Rash Behari Dey, V.D.E., A.A.I.E.E.
 „ Himangshu S. Sinha, A.M.E.E.

ACADEMIC BOARD, 1948

- The Hon'ble Mr. Justice Charu Ch. Biswas, M.A., B.L.—*Rector*.
 Shri Hari Pada Bhaumik, B.A., M.I.E. (Ind.).
 Rai Bahadur Narendra Kr. Mitra, B.Sc. (Glas.), M.I.E. (Ind.).
 Prof. Satyendra Nath Bose, M.Sc., F.N.I.
 „ Dr. Nikhil Ranjan Sen, D.Sc., Ph.D. (Berlin), F.N.I.
 Shri Sachin Bandopadhyaya, B.Sc. (Glas.), A.M.I.E. (Ind.).
 Dr. Chittaranjan Barat, M.Sc. (Cal.), Dr. Ing. (Munich).
 Shri Snehangsu K. Acharyya, Bar-at-Law,
 —*Hony. Secy., Ex. Committee*.
 „ Atul Ch. Dutta, A.M.Ch.E.,
 —*Hony. Secy., Tech. Mg. Committee*.
 „ Sudeb Chandra Dutta, A.M.E.E.,
 —*Hony. Secy., Gen. Mg. Committee*.
 Prof. Dr. Satish Ch. Bhattacharyya, M.Sc. (Cal.),
 „ Dr. Ing. (Berlin), A.M.M.E., A.M.E.E., V.D.I., M.I.E. (Ind.).
 „ Sudhir Kr. Chakravarti, B.S. (Worcester), M.S. (Michigan),
 A.M.M.E.
 „ Atul Ch. Roy, B.Sc. (Glas.),
 „ Dr. Hira Lal Roy, A.B. (Harvard), Dr. Ing. (Berlin),
 M.I.Ch.E., M.I.E. (Ind.).
 „ Baneswar Das, B.S.Ch.E. (Illinois).
 „ Hem Chandra Guha, B.Sc. (Edin.), A.M.I.E.E. (London),
 A.M.I.E. (Ind.).
 „ Manmatha Nath Chakrabarty, B.Sc., B.S. (Worcester),
 M.S. (Purdue), A.M.E.E.
 „ Purna Chandra Biswas, M.Sc.
 „ Satish Ch. Chakrabarty, M.Sc.
 „ Benoyendra Nath Mondal, B.Sc. (Wales).
 Dr. Pulin Behari Sarkar, D.Sc.
 „ Kedareshwar Banerji, D.Sc., F.N.I.
 „ B. C. Guha, D.Sc.
 „ Triguna Sen, Dr. Ing. (Munich), A.M.M.E., A.M.I.E. (Ind.)
 —*Principal*.

College of Engineering & Technology, Bengal

THE FACULTY

Principal :

Dr. Triguna Charan Sen, Dr. Ing. (Munich),
A.M.I.E. (Ind.), A.M.M.E.

DEPARTMENT OF MECHANICAL ENGINEERING

Professor-in-Charge :

Dr. Satish Chandra Bhattacharyya, M.Sc. (Cal.),
Dr. Ing. (Berlin), A.M.M.E., A.M.E.E., V.D.I.,
M.I.E. (Ind.)

Professors :

Dr. Jatindra Nath Basu, Dr. Ing. (Berlin),
A.M.M.E., A.M.E.E., M.I.E. (Ind.), V.D.I.
Sudhir Kumar Chakravarti, B.S. (Worcester),
M.S. (Michigan), A.M.M.E.
Satyendra Bimal Sen, B.Eng. (Sheffield),
A.M.I. MECh.E. (London).
Amiya Kumar Basu, B.Sc. (Cal), A.M.M.E.

Visiting Professor :

Jnan Ranjan Basu Mallick, M.Sc. (Cal.), M.S. (M.I.T.)

Asst. Professors :

Hari Gopal Ganguly, A.M.M.E.
Aswani Kumar Pal, A.M.M.E.
Nirendra Nath Chattopadhyay, B.Sc. (Cal.), A.M.M.E.

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Lecturers :

Sailaja Charan Sen Gupta, A.M.M.E.
Ananga Mohan Chatterjee, A.M.M.E.
Gopal Chandra Sen, M.S. (Michigan), A.M.M.E.
(on study leave).

Pravash Chandra De, A.M.M.E.
Binode Lal Das, A.M.M.E.
Girindra Nath Das, A.M.M.E.
Amulya Prosad Ghosh, A.M.M.E.
Bibhuti Bhusan Majumdar, A.M.M.E.
Protap Chandra Roy, A.M.E.E.
Samarendra Nath Halder

Foreman Instructor :

Hara Mohan Bose, A.M.E.E.

Instructors :

Charu Chandra Bhattacharyya, A.M.M.E.
Sudhir Kumar Das, B.M.E.
Bhabatosh Mukherjee, B.M.E.
Madhu Sudan Sen Gupta, B.Sc., B.M.E.
Bimaladas Banerjee, B.M.E.
Jnan Kumar Mukherjee, B.M.E.
Sukumar Datta, B.M.E.
Ashutosh Maity, B.M.E.
Santosh K. Banerjee, B.M.E.
Amarendra N. Chakraborty, B.M.E.
Haridas Banerjee, B.M.E.
Kali Prasad Chakraborty, B.M.E.
Bireswar Prasad Ghosh, B.M.E.
Sachindra Nath Bhaduri, B.M.E.
Joydeb Chandra Das, B.M.E.
Krishna Chandra Chatterji, B.M.E.
Jyotish Chandra Sarkar, B.M.E.
Anil Kumar Chowdhury, B.M.E.
Prakriti Bhushan Chatterji, B.M.E.
Narayan Chandra Kundu, B.M.E.
Rajat Kumar Chakraborty, B.M.E.
Chitta Ranjan Dutta Gupta, B.M.E.
Pulin Behari Bhattacharyya.

DEPARTMENT OF ELECTRICAL ENGINEERING

Professor-in-Charge :

Hem Chandra Guha, B.Sc., (Edin.),
A.M.I.E.E. (London), A.M.I.E. (Ind.),

Professor Emeritus :

Surendra Kumar Roy, M.E.E. (Harvard),
M.A.I.E.E., M.I.E. (Ind.).

Professors :

Manmatha Nath Chakraborty, B.Sc. (Cal.),
B.S. (Worcester), M.S. (Purdue), A.M.E.E.
Nandlal M. Shah, M.S. (M.I.T.).

Asst. Professors :

Jatindra Mohan Palit, A.M.M.E., A.M.E.E.
Debendra Nath Chakrabarty, A.M.E.E.
Haripada Sen, M.Sc.

Lecturers :

Dhirendra Kumar Deb, A.M.E.E.
Mriganka Mohan Kar, B.Sc. (Cal.), A.M.E.E., B.E.E.
Benoy Krishna Sarkar, A.M.E.E.
Danindra Nath Roy Bardhan, A.M.E.E., B.E.E.

Instructors :

Prokash Chandra Mondal, B.Sc. (Cal.), A.M.E.E.
Probhat Kumar Sadhukhan, A.M.E.E., B.E.E.
Mohi Mohan Mukherji, M.S. (Washington), A.M.E.E.
(on study leave).
Mukul Mitra, B.E.E.
Rabindra Nath Ghose, B.E.E.
Arabinda Das, B.E.E., B.M.E.
Narahari Sarkar, B.E.E.

DEPARTMENT OF CHEMICAL ENGINEERING

Professor-in-Charge :

Dr. Hira Lal Roy, A.B. (Harvard),
Dr. Ing. (Berlin), M.I.Ch.E., M.I.E. (Ind.).

Professors :

Baneswar Dass, B.S.Ch.E. (Illinois, U.S.A.).
Sachindra N. Mukherjee, M.Sc.
Dr. Anil Kumar Mazumder, M.Sc., D.Sc.
Dr. Dilip Kumar Banerjee, M.Sc., D.Sc. (on study leave).
Gopal Chandra Banerjee, M.Sc.
Dr. Bidyut Kamal Bhattacharya, M.Sc., D.Sc.
Dr. Arabinda Nath Bose, M.Sc. (Cal.), Ph.D. (M.I.T.)

Visiting Professor :

Mahadeb L. Schroff, A.B. HONS. (Cornell),
M.S. (M.I.T.).

Asst. Professor :

Provat Kusum Ray, M.Sc.

Lecturers :

Kunja Lal Sen Gupta
Kamalendu Sen Gupta, M.Sc.
Sudhir Chandra Das Gupta, B.Sc.
Bimal Chandra Chanda, B.Ch.E., A.M.Ch.E.
Dilip Kumar Dutta, B.Sc. (Cal.), A.M.Ch.E.,
B.Ch.E. (on study leave).

Instructors :

Nalini Ranjan Mukherjee, B.Sc. (Cal.), A.M.Ch.E.,
B.Ch.E. (on study leave)
Tarun Kumar Ghosh, B.Ch.E.
Lochhu Pochhali, M.Sc.
Nitish Ch. Chakraborty, B.Ch.E.
Ramendra N. Sen Sarma, M.Sc.
Kshirod Ch. Roy Chaudhury, B.Sc. (Cal.), B.Ch.E.
Prasun Kumar Dey, M.Sc.

PHYSICS

Professor :

Purna Chandra Biswas, M.Sc.

Asst. Professor :

Naresh Chandra Sen, M.Sc., B.L.

Lecturers :

Upendra Nath Banerjee, M.Sc., B.A.
Harendra Nath Mukherjee.

Instructors :

Lakshmi Kanta Coondoo, M.Sc.
Mrityunjay Goswami, M.Sc.
Purnendu Kumar Banerji, B.Sc.

MATHEMATICS

Professor :

Satish Chandra Chakravarty, M.Sc.

Asst. Professors :

Amar Nath Pramanik, M.A.
Jagat Chandra Paul

Lecturers :

Sudhindra Nath Chaudhury, M.Sc.
(on study leave).
Dibendra N. Mukherjee, M.Sc.

Instructor :

Rampada Bhattacharyya, M.Sc.

DEPARTMENT OF OVERSEER

Asst. Professor :

Arun Kumar Basu, B.Sc. (Cal.), B.ENG. (Sheffield).

Lecturer :

Girindra Narayan Das.

Teachers of Survey & Drawing :

Pramatha Nath Roy.
Hari Pada Chakraborty.

DEPARTMENT OF AGRICULTURE

Farm Superintendent and Prof. of Agriculture :

Benoyendra Nath Mandal, B.Sc. (Wales).

Lecturer :

Harendra Kumar Mazumdar, M.Sc.

Instructor :

Subodh Chandra Das Gupta

HISTORY AND ENGLISH

Siva Pada Sen, B.A. Hon. (London).
Khagendra Nath Das Gupta, M.A.

ENGINEERING ECONOMICS

Abani Mohan Roy, M.A., B.Com. (Edin.),
F.S.A.A., C.A., R.A.

ENGINEERING GEOLOGY

Dr. Sivasundar Deb, Dr.-es-sc. (Paris).
Tarun K. Bhattacharyya, M.Sc.

TEACHER OF RELIGION

Pandit Heramba Nath Bhattacharyya,
Byakaran-Sankhya-Vedantatirtha.

PHYSICAL CULTURE

Instructors :

Baneswar Sarkar.
Jahar Paul.
S. O. Tota Singh.
Sundar Singha.

Students' Welfare Officer :

Debnath Das, A.M.E.E.

LIBRARY

Pranabesh Sinha Ray, M.A.—*Librarian.*
Purna Chandra Chakravorty—*Asst. Librarian.*

COLLEGE CAMPUS

Location. The College stands on a fine piece of land measuring 192 bighas at Jadavpur within 5 miles by rail from the Sealdah Railway Station (Calcutta). The location is in the immediate vicinity of the Jadavpur Railway Station and is also approachable by bus from Calcutta.

Buildings. The arrangements for instruction in the several departments of the College have been made in six spacious buildings. The main building, which is a three-storied one, occupies a floor space of 39,000 sq. feet. The Main Chemical Engineering Building has a total floor space of 15,000 sq. feet, and the Chemical Technology building covers a total floor space of 10,000 sq. feet. The Physics and the Electrical Engineering Departments are housed in a two-storied building ; the ground floor which has a total floor space of 12,000 sq. feet is occupied by the Electrical Engineering Laboratory and the first floor occupied by the Physics Laboratory has a floor space of 10,000 sq. feet. The Mechanical Engineering Laboratory and the Power Plant have a floor space of 15,000 sq. feet in another building. The workshops are in a large corrugated-shed with a floor space of 30,000 sq. feet. There is another corrugated-shed for Foundry and Smithy. Besides, there is a separate Store-shed.

There are also two hostel-buildings, one dining hall for the same and five staff quarters at present within the campus.

There is a two-storied building with a floor space of 4,000 sq. feet comprising the Old Boys' Home and the Pavilion of the College Sporting Club.

LIBRARY, LABORATORY AND WORKSHOP

Library. The Library which is located in the Main College Building contains 14327 volumes. There is a well-equipped Reading Room attached to the Library to enable the students to utilise their leisure hours for general study. Besides, there are Departmental Libraries in the Electrical Engineering

Department and in the Chemical Engineering Department mainly for the use of the students and staff of the two Departments.

The Electrical Engineering Laboratory is equipped with representative types of D.C. and A.C. machines. Bench Testing provisions include a Cathode Ray Oscillograph, an Electromagnetic Oscillograph, D.C. Potentiometer, etc.

The Mechanical Engineering Laboratory is equipped with representative types of Steam and Oil Engines, a Gas Engine, a Steam Turbine, a Gas Generator and two Boilers. There are various types of Calorimeters, equipment for calibration of gauges, a Universal Testing Machine, and accessories for running tests on pumps, boilers, engines, and the turbine.

The Chemical Engineering Laboratory equipments include an Oil Extraction Plant, a Soap Plant, an Electroplating Plant, a Water Distillation Plant, different types of furnaces, Equipment for Refining of Vegetable Oils, etc.

Arrangement has been made for a Unit Operations Laboratory of Chemical Engineering and an Electro-chemical Laboratory with funds offered by the Government of Bengal.

Students will also have facilities to work in the Laboratories of the Glass and Ceramic Research Institute which is being set up by the Government of India on a portion of the Campus.

The Workshop is well equipped with representative types of machine tools and accessories for providing workshop training in Carpentry, Smithy, Foundry, Pattern Making, Fitting and Machine Shop.

The Foundry and a portion of the Workshop is operated on commercial lines, manufacturing finished machine tools and other commercial products.

Besides, a large Machine Shop equipped with an overhead travelling Crane and a large number of most up-to-date machine tools has recently been acquired and will provide unusual facilities for machine tool work, electric and gas welding, etc.

COURSES OF STUDY

The College offers :

1. Degree Courses in Electrical, Mechanical and Chemical Engineering, leading to the Degrees of Bachelor of

Electrical Engineering (B.E.E.), Bachelor of Mechanical Engineering (B.M.E.) and Bachelor of Chemical Engineering (B.Ch.E.) respectively. Each of these is a four years' course.

2. A Diploma Course in Engineering of three years.
3. An Overseer Course of three years.
4. An Agriculture Course of two years.
5. An Automobile Engineering Course of one year.

ADMISSION REQUIREMENTS

1. ADMISSION TO THE DEGREE COURSES :

Students who have passed at least the I.Sc. or equivalent Examination in the First or Second Divisions of any recognised University with Physics, Chemistry and Mathematics are eligible for admission into the Engineering First Year Class of any of the three Degree Courses.

Candidates for the B.M.E. and B. E. E. degrees after obtaining one of the above degrees will be required to study for two years before they are allowed to go up for the examination for the other Degree subject.

Students who pass the Final School Standard Examination of the National Council of Education, Bengal, will be admitted to the Engineering First Year Class of the College after two years' training in the Diploma Course in Engineering provided they satisfy the Principal about their eligibility for admission after such training in the Diploma Course in Engineering.

Students who have passed the Matriculation Examination and have passed the Final Technical Course Examination or the Diploma Course in Engineering of the College at least in the Second Division will be eligible for admission into the First Year Class of the Engineering Course.

2. ADMISSION TO THE DIPLOMA COURSES :

The Engineering Course.

The Overseer Course.

The Agriculture Course.

The Automobile Engineering Course.

The minimum qualification for any candidate for admission into any one of the courses mentioned above is that he has

passed the Matriculation Examination of any recognised University or the Final School Standard Examination of the National Council of Education, Bengal, or any other School Final Examination of equivalent standard.

ADMISSION PROCEDURE

Candidates seeking admission in the College for any of the Courses should apply to the Principal giving particulars required in the printed Admission Form obtainable on application from the College Office.

The Admission Form, duly filled in, must be submitted with a Registration fee of Rs 5/- within the 31st of May.

Applicants considered suitable for admission are called upon to appear before a Selection Board.

Registration of names does not confer any right on the applicant for being called for interview: a candidate is called for an interview only when the Selection Board deem that an interview is warranted. Registration fee is not refunded under any circumstances.

Candidates selected for interview and coming from outside stations are informed that selection for interview is no guarantee nor even a formal promise that they will be selected for admission. Candidates are selected for admission when they can satisfy the Selection Board.

Candidates selected for interview will be informed at what time they are to appear before the Selection Board. Candidates not selected for interview will also be informed that they have not been selected; the Selection Board will not give any reason or explanation for such non-selection.

Interview cards are generally issued from the College Office by the middle of June or earlier or later according to the time of publication of the results of the local University. The College does not assume any responsibility for postal transit troubles, viz., delay or non-delivery.

Applicants must communicate to the College Office the results of their Examination, at which they appeared last, if not previously communicated, as soon as they are published. Certificates of any description (original or copy) excepting University Certificates, will not be returned.

FEES AND DEPOSITS

1. *Tuition Fee* for all students taking admission in the Engineering Courses of the College is Rs. 180/- per annum payable in monthly instalments of Rs. 15/- up to the month of February of each Academic Session. (Re: fees from March to June see Rule No. 5).

2. *Tuition Fee* for students in the Diploma Course in Engineering is Rs. 120/- per annum payable in monthly instalments of Rs. 10/- up to the month of February of each Academic Session. (Re: fees from March to June, see Rule No. 5).

3. *Tuition Fee* for students in the Overseer Course of the College is Rs. 120/- per annum payable in monthly instalments of Rs. 10/- up to the month of February of each Academic Session. (Re: fees from March to June, see Rule No. 5).

4. *Tuition Fee* for students in the Agriculture Course of the College is Rs. 60/- per annum payable in monthly instalments of Rs. 5/- up to the month of February of each Academic session. (Re: fees from March to June, see Rule No. 5).

5. *Tuition Fees* for the months of April, May and June of each Academic session must be paid along with the Tuition Fee for the month of March, failing which permission to appear in the Annual Examinations will be withheld.

6. (i) *Tuition Fee* must be paid on or before the 15th of every month submitting the acknowledgment Card which may be obtained from the Office on payment of annas four (-/4/-) per Card per year.

(ii) Defaulters shall pay a fine of annas two for each day after 15th till the day on which their fees are paid and their names are also liable to be struck off at the end of the month in which default has been made.

(iii) Defaulters whose names have been struck off may be re-admitted on payment of tuition fees for the session due up to and inclusive of the month of such re-admission together with a re-admission fee of Rs. 4/-.

(iv) Re-admission fee and fines may be remitted wholly or partly in special cases on good and sufficient grounds.

7. No student shall be permitted to appear in the Annual Examinations unless he has paid his tuition fees and other dues including Hostel charges, if any, for the whole session.

8. At the time of admission to the College the following fees are payable by new entrants:

	Admission Fee	Tuition Fee for July.	Magazine Fee	Contingency Fee	Students' Union Fee.	Sporting Fee.	Students' Aid Fee.	Caution money Deposit.	Medical Examination Fee.	Total.
New students admitted to the First Year Class:										
(I) Engineering Department ...	15/-	15/-	1/8	2/-	1/-	5/-	-8/-	10/-	1/-	51/-
(II) Diploma Course in Engineering	10/-	10/-	1/8	2/-	1/-	5/-	-8/-	10/-	1/-	41/-
(iii) Overseer Department ...	10/-	10/-	1/8	2/-	1/-	5/-	-8/-	10/-	1/-	41/-
(IV) Agriculture Department ...	5/-	5/-	1/8	2/-	1/-	5/-	-8/-	10/-	1/-	31/-
(V) Automobile Engineering Department ...	...	275/-	1/8	2/-	1/-	5/-	-8/-	15/-	...	800/-
9. All students shall pay the following fees in January every year along with the Tuition Fee for the month ...			1/8	2/-	1/-	5/-	-8/-	...	...	10/-

10. Admission once taken into any class shall be counted to be for one complete session.

When a student has been admitted he shall not ordinarily be allowed to take transfer or withdraw his name except on payment of tuition fees for the unexpired portion of the session and arrears of tuition fees and other charges if any.

Remission of tuition fees for the unexpired portion of the session and other charges, if any, may be made by the Managing Committee wholly or partly in special cases on good and sufficient grounds.

Note.—Caution money deposit for working in the laboratories, workshops and other practical classes is refundable at the end of the College career after deduction for breakage or dues if any. The Student must apply for its refund from the College within 31st December of the year in which he leaves the College and if he fails to do so, his deposit money will be forfeited.

11. Every new entrant must be prepared to provide himself with a Set of Drawing instruments and other requisites which will cost approximately Rs. 75/-.

STIPENDS, SCHOLARSHIPS & FREE STUDENTSHIPS

Stipends, Scholarships and Free Studentships are awarded to poor and meritorious students and the continuance of the same depends on good progress, regular attendance and good behaviour.

Scholarships in the form of Free Studentships are awarded to students who passing in all subjects, head the lists of successful candidates in the First and Intermediate Engineering Examination in the following way:

Examination	Position	Minm. Marks in Annual Examination	Tenure
<i>First Engineering—</i>			
Chemical ...	1st	70%	One year.
Mechanical & Electrical	1st, 2nd & 3rd	70%	One year.
<i>Intermediate Engineering—</i>			
Chemical ...	1st	70%	Two years.
Mechanical & Electrical	1st, 2nd & 3rd	70%	Two years.

Scholarships in the form of Free Studentship are awarded to students who head the lists of successful candidates in the Annual Examinations of the First and Second Year Classes of the Diploma Course in Engg. and Overseer Courses, securing not less than 70 per cent of the total marks.

Free-students, if they leave the College without sufficient and satisfactory reasons, must pay fees for the full period for which they were allowed exemption.

Loan scholarships, in lump sums, to meet Examination and College fees are awarded by the Alumni Association, N. C. E., Bengal, to deserving Final Year students under straitened pecuniary circumstances. Loans are also given to deserving students from the Students' Welfare Fund.

Deserving students may also avail of the following Stipends and Scholarships :

Goopee Kristo Bose Stipend.
Nemai Chand Chatterjee Stipend.
Kristo Mohon Bose Stipend.
Rasul Memorial Scholarship.
Dwijendra Memorial Scholarship.
Mani Lal Chatterjee Stipend.
Nabanalini Debi Stipend.
Mary K. Das & Taraknath Das Scholarship.
Sreemat Bhagabat Scholarship.
Jyoti Kumar Memorial Scholarship.

S. Ghose Memorial Scholarship of the value of not less than Rs. 700/- a year is awarded to a deserving Bengali Hindu candidate who has passed the Final Examination of the National Council of Education, Bengal, in Electrical Engineering to enable him to obtain practical training in the subject abroad.

Prizes are awarded to students who stand first in any paper of the First Engineering Examination securing not less than 80 per cent marks in the paper, and to those who stand first in any paper of the Intermediate and Final Engineering Examinations of the Third and Fourth Year Classes securing not less than 70 per cent marks in the paper.

Prizes are awarded to students who stand first in any paper in the Annual Examinations of the Diploma Course of Engg. First and Second Year Classes, and the overseer First Year and Second Year Classes, securing not less than 80 per cent marks in the paper.

Prizes are awarded only to those students who have passed in all papers of their respective examinations.

COLLEGE HOSTELS

1. There are College Hostels within the campus with accommodation for 100 students only. *Steps are being taken to provide Hostel accommodation for all students.*

2. Applications from new students for admission into the hostels will only be considered after they have been admitted into the College.

Every admission shall be subject to the approval of the Principal. Boarders are liable for all charges from the beginning of the session.

3. All admissions are understood to be for a complete session, and boarders are liable for all charges from the beginning of the session.

4. Caution money of the amount of Rs. 50/- is payable in advance with every application for admission. The sum will be refunded in case a seat is not provided or when a boarder finally leaves the Hostel but in the latter case only after all dues have been paid up by him.

5. Admission fee of Rs. 5/- for a complete term shall be paid by every student on admission into the Hostel. Substitutes, when permitted, may however be exempted from such fees.

6. Each boarder shall have to pay the following scale of rent including charges for light and medical attendance by the 10th of every month. For each day's delay, a fine of one anna per day will be realised, up to 20th of the month, after which his name will be struck off from the College register and he shall have to leave the Hostel.

Ground Floor ...	Rs. 84/- per annum
First Floor ...	Rs. 96/- „ „

7. The above rents will be realised in 10 monthly instalments beginning from the month of July in every session.

Monthly instalments of seat rent etc. for the current month and boarding charges for the previous month, must be paid at the office of the College in one sum.

8. The Hostel will remain closed during the Puja Holi-days and Summer Vacation.

9. Withdrawal from the Hostel will require the sanction of the Principal of the College. Application for withdrawal must be countersigned by the guardian of the boarder.

GENERAL INFORMATION

(a) College Regulations :—

(i) *The New Student's Responsibility.*—With a student's first registration in the College there begins for him a period

of great responsibility, greater, in most instances, than he has ever before been called upon to face. He should recognise that the success of his college career depends in large measure upon his own purpose, his own industry, and his own determination to make good use of his opportunities. The College offers instruction and the use of its equipments, teachers and other officers are ready to help with encouragement and advice ; but after all, the responsibility for success or failure must rest with the student himself.

(ii) *Discipline.*—All students are subject to the disciplinary control of the authorities of the College. In any case of serious breach of discipline, the student concerned may be suspended from attendance by the Principal, and the Managing Committee may at its discretion expel any student from the College without assigning any reason.

(iii) *Attendance.*—The normal hours of attendance during the session are from 10-30 A.M. to 5 P.M. with half an hour's recess.

Students must attend 70 per cent of the lectures in theoretical classes and 70 per cent of the exercises in practical classes. Percentage of attendance is strictly observed.

Percentage rules being binding on all students, applications for leave from the students or from the guardians on their behalf are unnecessary, as a student failing to be present in his class on any account has necessarily to be marked 'absent' in the Attendance Registers, and no commutation is permissible under any circumstances without contravention of the Rules.

(iv) *Damage to College Property.*—Each student is held accountable for any apparatus or equipment that may be assigned to him and for any damage to College Property for which he is responsible. Damage to property that cannot be charged to individuals will be charged against all the students in the class (or section) where the loss occurs.

(v) *Accidents.*—The College Authorities cannot accept any liability in respect of any accident which a student may sustain when engaged in practical work in the laboratories or workshops.

(b) *Students' Organisations and Activities:—*
Reasonable participation in extra-curricular activities is a

worthwhile part of a well rounded education. Opportunities for extra-curricular activities are provided through :

1. The Students' Union.
2. The Sporting Club.
3. The College Journal.

The Students' Union

All students of the College are members of the Students' Union. They meet and elect an Executive Committee of which the Principal is the President and two members of the *teaching* staff are Vice-Presidents. The Vice-Presidents act as Faculty Advisers to the Executive Committee of the Students' Union, while the management of the *Union's affairs* are left entirely to that body.

The Union control the disposal of the Students' Welfare Fund, organise debates, essay competitions, dramatics, and other literary activities and hold one 'social' every year.

The Sporting Club

Of the Sporting Club the Principal is the President and two members of the teaching staff act as Vice-President and General Secretary respectively. As in the Students' Union the Vice-President and the General Secretary act as Faculty Advisers leaving the management of the affairs of the Sporting Club to the elected student Secretaries of the various sections which comprise

1. The Football Section.
2. The Cricket Section.
3. The Hockey Section.
4. The Tennis Section.
5. The Gymnasium Section.

All students are expected to make use of the sports facilities provided for keeping themselves fit amidst a heavy academic programme and for recreation.

The College Journal

The College Journal is a four monthly publication managed by an elected student body under the guidance of a Faculty

Advisory Committee of which the Principal is the President and a member of the teaching staff is the Secretary.

A senior student is elected every year the Editor of the College Journal and is assisted by student sub-editors.

The 'Tech.'

The final year students publish every year a Year Book of their class called "TECH" containing life history and a photograph each, of the graduating students.

A Tech-Committee is elected every year from the final year classes and work under the guidance of a Tech Adviser who is the Chairman of the Committee.

(c) The Alumni Association :—

The Alumni Association is the Association of the "Old Boys" of the College. In addition to other activities directed to benefit the College the Loan Scholarship Fund for final year students of the College and the Placement Service may be specially mentioned. On the termination of their college career all students are eligible to be a member of the Association.

EXAMINATION RULES

1. Only those students who have satisfactorily completed their practical work, satisfied the attendance requirements and paid all dues for the whole session, are eligible to sit for the examination.

2. At the end of each Academic Session, all students must appear at the annual examinations held by the National Council of Education, Bengal, in papers as stated in the Prospectus.

3. In addition to the above Examination, every student shall, during each year of study, appear at three written periodical examinations in each theoretical paper. He shall also appear at periodical oral examinations, if such are held.

4. All examinations will be held on "Compartmental System". Students must pass separately in every paper in the above examinations. A student who has passed the examination in any paper will not have to sit for examination in that paper again.

5. Every candidate will be declared to have passed the examination in any paper if he obtains—

(a) 50 per cent of the total marks of periodical examinations in that paper, and

(b) 50 per cent of the marks at the annual examination.

Provided that if a candidate fails to obtain pass marks either at the periodical examinations or at the annual examination, he may be credited with not more than 5 marks transferred from either part of the examination, in excess of the pass mark in the paper, in order to enable him to pass.

6. Students, who have passed the Final Engineering Examination, will be declared to have graduated (i) with First Class Honours if they have obtained 70 per cent marks on the average in the Periodical Examinations and 70 per cent marks on the average in the Annual Examinations in the Final Engineering papers and 70 per cent in practical class works of the Third and Fourth Year Classes, (ii) with Second Class Honours if they have obtained 60 per cent marks on the average in the Periodical Examinations and 60 per cent marks on the average in the Annual Examinations in the Final Engineering papers and 60 per cent in practical class works of Third and Fourth Year Classes provided always that they have passed in all the papers of the Final Engineering Examinations in the first chance.

7. Students of the First Year Classes who fail to complete practical class work satisfactorily or fail to pass in more than four papers, will not be allowed to continue their studies in this College any further.

8. Except in part of the Final Engineering Examinations held at the end of the Engineering Third Year Classes, a student who fails to pass in not more than two papers will be promoted to the next higher class, but he will have to pass examinations in those papers before he can be promoted further.

9. Students, who have passed in all subjects of their regular year, but cannot be promoted in accordance with Rule 8 above, shall have to attend classes in those back-papers for the whole session and have to pass the annual Examination in those papers, failing which they will not be allowed to continue their studies

in this College any further. Such students will not be allowed to sit for the Supplementary Examinations in those papers.

10. If any student fails to get promotion to the next higher class he will be required to attend the classes and pay the regular tuition and other fees.

11. Students detained in any class for two consecutive years will not be allowed to continue their studies any further.

12. Students belonging to Engineering Third Year Classes, who have passed in all papers of the Intermediate Engineering Examination, will be promoted to the Engineering Fourth Year Classes with a maximum of three back-papers only.

13. Only those students of Final Year Classes, who fail to pass in not more than three papers of the Final Engineering Examination and in not more than two papers of the Final Examination of the Diploma Course, Final Overseer Course, and Final Agriculture Course, as the case may be, will be permitted to appear and pass in those papers in two subsequent and consecutive examinations, including Supplementary Examination, without attending the classes, provided they can satisfy the Authorities of the College that they are usefully employed in some recognised firm. Intimation of such employment should reach the College on or before the 1st day of September of the year in which they completed the study of the Final Year Class. They will also have to register their names in the College by paying an enrolment fee of Rs. 10/- (Rupees ten) only and will have to pay a fee of Rs. 25/- (Rupees Twenty-five) only for each examination they sit for. Students of this category not engaged in any factory will have to take admission in the College and attend classes and pay all fees for the session.

14. Students of the Final Year Classes, who fail to pass in more than three papers of the Final Engineering Examination and in more than two papers in the Final Examination of the Diploma Course, Final Overseer Course, and Final Agriculture Course as the case may be, will be required to attend the classes and pay regular tuition and other fees. They will have to pass in all remaining papers in the next Supplementary and annual examinations.

15. Those students who duly cleared their dues up to the end of the session and duly paid the examination fees, but owing

to some accident or unavoidable circumstances could not appear at all at the annual examinations of the Council, are allowed to appear in the next annual examination without attending the classes and without paying any further tuition fees, excepting the examination fees. But they will have to enrol their names for the classes with payment of a fee of Rs. 10/- Rupees ten only within a month after the beginning of the session.

16. A Supplementary Examination will be held each year between two Annual Examinations for the benefit of the students who, having failed to pass in one or more subjects at the Annual Examination, are permitted to prosecute their studies in the next higher class. Such students can appear only in back-papers in the Supplementary Examinations.

17. Students shall pay examination fees for Annual Examination as follows:—

(a) Agriculture 1st Year ...	Rs. 25/-
(b) Agriculture 2nd Year ...	„ 25/-
(c) Overseer 1st Year ...	„ 40/-
(d) Overseer 2nd Year ...	„ 40/-
(e) Overseer 3rd Year ...	„ 40/-
(f) Junior Technical 1st Year ...	„ 40/-
(g) Junior Technical 2nd Year ...	„ 40/-
(h) Junior Technical 3rd Year ...	„ 40/-
(i) First Engineering Examination ...	„ 50/-
(j) Intermediate Eng'g. Examination ...	„ 50/-
(k) Final Eng'g. Examination Part I (at the end of the 3rd Year) ...	„ 50/-
(l) Final Eng'g. Examination Part II (at the end of the 4th Year) ...	„ 50/-

For Supplementary Examinations and for Annual Examinations on back-papers only, candidates for the Engineering Courses, shall have to pay a fee of Rs. 20/- for each examination and those for other courses Rs. 15/- only for each examination.

18. Examination fees once paid shall in no case be refunded.

19. Applications for re-examination of answer papers will not be entertained if submitted later than a week of the commencement of the classes. Those candidates who intend to

have their papers re-examined may apply for the same with a fee of Rs. 5/- for each paper. Re-examination fees are never refundable.

20. No certificate will be issued by the Council on the results of the First and Intermediate Engineering Examinations. Degrees will be granted to students who pass the Final Engineering Examinations and Certificates to students who pass the Final Examinations of other courses.

21. Annual Examination fees must be paid within 18th February every year. Supplementary Examination fees must be paid within 30th September every year.

Fifteen day's grace with a penalty of Rs. 5/- may be allowed at the discretion of the Controller of Examinations.

PROGRAMME OF STUDY

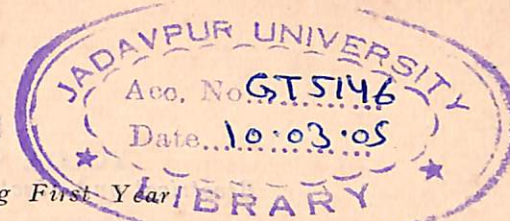
I. ENGINEERING COURSES

(1) FIRST YEAR CLASS

Students who are admitted to the First Year Class of the Electrical, Mechanical and Chemical Engineering Courses after passing the I.Sc. or B.Sc. examinations of any recognised University, study the following subjects in the Engineering First Year Class :

Electrical and Mechanical Engineering First Year

SUBJECTS OF INSTRUCTION	PERIODS PER WEEK	
	Theoretical	Practical
M. 1	Co-ordinate Geometry ...	2
M. 2	Differential & Integral Calculus ...	4
P. 1	Physics ...	3
E. M. I.	Engineering Mechanics I ...	3
E. M. 8	Engineering Computation ...	1
G. 1	English ...	1
G. 2	Modern World I ...	1
O. 1	Survey ...	1
D. 1	Drawing ...	6
W. 1	Carpentry ...	3
W. 1	Moulding ...	3
P. 1A	Physics Laboratory ...	4
	Practical Survey ...	3
	Physical Training ...	2
Total ...	16	21



Chemical Engineering First Year

SUBJECTS OF INSTRUCTION

PERIODS PER WEEK Theoretical Practical

M. 1	Co-ordinate Geometry	...	2	—
M. 2	Differential & Integral Calculus		4	—
P. 1	Physics	...	3	—
E. M. 1	Engineering Mechanics	...	3	—
Ch. 2	Inorganic Chemistry I	...	3	—
Ch. 3	Organic Chemistry I	...	3	—
G. 1	English	...	1	—
G. 2	Modern World I	...	1	—
D. 1	Drawing	...	—	6
P. 1A	Physics Laboratory	...	—	4
Ch. 2A	Qualitative Analysis	...	—	9
	Physical Training	...	—	2
			—	—
	Total	...	20	21

SUBJECTS OF EXAMINATION

I. ENGINEERING COURSES

(1) FIRST YEAR CLASS

Students of the First Year Class, who have completed the above Programme of Study and have obtained at least 50 per cent marks in each of the practical subjects of instruction, will be allowed to appear in the First Engineering Examination of the National Council of Education, Bengal, held annually at the end of the Academic session. The following are the subjects of the First Engineering Examination :

Electrical and Mechanical Engineering

SUBJECT	No. OF PAPERS	FULL MARKS
Modern World I } ...	1	100
English } ...	1	100
Co-ordinate Geometry ...	1	100
2		

Electrical and Mechanical Engineering—Contd.

SUBJECT		NO. OF PAPERS	FULL MARKS
Differential Calculus	...	1	100
Integral Calculus	...	1	100
Heat & Light	} Physics	1	100
Electricity & Magnetism			
Engineering Mechanics I	...	1	100
Drawing (6 hours)	...	1	100
Descriptive Geometry (3 hours)	...	1	100
Survey	...	1	100
			900

Chemical Engineering

SUBJECT		NO. OF PAPERS	FULL MARKS
Modern World I	}	1	100
English			
Co-ordinate Geometry	...	1	100
Differential Calculus	...	1	100
Integral Calculus	...	1	100
Heat & Light	} Physics	1	100
Electricity & Magnetism			
Inorganic Chemistry I	...	1	100
Organic Chemistry I	...	1	100
Drawing (6 hours)	...	1	100
Engineering Mechanics I	...	1	100
			900

Students, who have passed in all subjects of the First Engineering Examination subject to Rules 3 and 5 of the Examination Rules, are promoted to the Engineering Second Year Classes.

Students, who fail to pass in not more than two papers in the above Examination, will be promoted to the Engineering Second Year Classes, but they will have to pass examinations in those papers before they can be further promoted.

PROGRAMME OF STUDY**I. ENGINEERING COURSES****(2) SECOND YEAR CLASSES**

Students, who have been promoted from the First Year Class, study the following subjects in the second Year Classes :

Electrical and Mechanical Engineering

SUBJECTS OF INSTRUCTION		PERIODS PER WEEK	
		Theoretical	Practical
E. M. 8	Engineering Computation	2	—
M. 3	Integral Calculus & Differential Equation	2	—
E. M. 2	Engineering Mechanics II	3	—
M. E. 2	Mechanism	2	—
M. E. 1	Applied Thermodynamics	3	—
E. E. 1	Principles of Electrical Engineering I	3	—
E. E. 2	Electrical Wiring & Installations	1	—
E. E. 3	Direct Current Machines	2	—
Ch. 1	Chemistry of Engineering Materials	2	—*
G. 3	Modern World II	1	—
M. E. 19	Machine Drawing	—	6
E. E. 22	Electrical Engineering Laboratory I	—	3
E. M. 7	Mechanism Drawing & Mechanics Laboratory	—	2
W. 2	Workshop—Smithy	—	3†
& part of	Pattern-making	—	3†
W. 3	Fitters' shop	—	3
O. 1	Survey	1	—‡
Total		22	17

* Omitted in Session 1948-49.

† For half year.

‡ One month in the year only for Session 1948-49.

Chemical Engineering

SUBJECTS OF INSTRUCTION		PERIODS PER WEEK	
		Theoretical	Practical
M. 3	Integral Calculus & Differential Equation ...	2	—
E. M. 3	Engineering Mechanics ...	3	—
M. E. 3	Heat Engines ...	2	—
E. E. 17	Electrical Engineering ...	3	—
Ch. 4	Inorganic Chemistry II ...	2	—
Ch. 5	Organic Chemistry II ...	3	—
Ch. 6	Physical Chemistry I ...	2	—
G. 3	Modern World II ...	1	—
M. E. 19	Machine Drawing ...	—	6
E. E. 17A	Electrical Engineering Laboratory ...	—	2
Ch. 4A	Quantitative Analysis ...	—	12*
Ch. 5A	Organic Preparations & Detec-tions ...	—	12*
Total ...		18	20

SUBJECTS OF EXAMINATION**1. ENGINEERING COURSES****(2) SECOND YEAR CLASS**

Students of the Engineering Second Year Classes, who have completed the above Programme of Study and have obtained at least 50 per cent marks in the Practical Subjects of Instruction, are allowed to appear in the Intermediate Engineering Examination of the National Council of Education, Bengal, held annually at the end of the Academic session. The following are the subjects of the Intermediate Engineering Examination :

Electrical and Mechanical Engineering

SUBJECT	No. OF PAPERS	FULL MARKS
Engineering Mechanics II ...	1	100
Applied Thermodynamics ...	1	100
Mechanism ...	1	100
Principles of Electrical Engineering ...	1	100

* For half year.

Electrical and Mechanical Engineering—Contd.

SUBJECT	No. OF PAPERS	FULL MARKS
Direct Current Machines ...	1	100
Engineering Computation ...	1	100
Integral Calculus & Differential Equa-tions ...	1	100
Modern World II ..	1	100
Electrical Wiring & Installations ...	1	100
Machine Drawing (6 hours) ...	1	100
Chemistry of Engineering Materials ...	1	100
		1100

Chemical Engineering

SUBJECT	No. OF PAPERS	FULL MARKS
Inorganic Chemistry II ...	1	100
Organic Chemistry II ...	1	100
Physical Chemistry I ...	1	100
Engineering Mechanics ...	1	100
Electrical Engineering ...	1	100
Heat Engines ...	1	100
Integral Calculus & Differential Equa-tions ...	1	100
Modern World II ...	1	100
Machine Drawing (6 hours) ...	1	100
		900

Students, who pass in all subjects of the Intermediate Engineering Examination subject to Rules 3 and 5 of the Examination Rules, are promoted to the Engineering Third Year Classes.

Students, who fail to pass in not more than two papers in the above Examination will be promoted to the Engineering Third Year Classes, but they will have to pass Examinations in those papers before they can be further promoted.

PROGRAMME OF STUDY**1. ENGINEERING COURSES****(3) THIRD YEAR CLASS**

Students, who have been promoted from the Second Year Classes, study the following subjects in the Third Year Classes :

Chemical Engineering Third Year

SUBJECTS OF INSTRUCTION	PERIODS PER WEEK	
	Theoretical	Practical
E. M. 5	Strength of Materials ...	3
Ch. 7	Physical Chemistry II ...	2
Ch. 8	Electrochemistry ...	3
Ch. 11	Industrial Chemistry I ...	2
Ch. 12	Metallurgy ...	2
Ch. 10	Chemical Engineering I ...	3
Ch. 13	Fuels & Their Combustion ...	2
Ch. 10A	Industrial & Chemical Engineering Calculations I ...	2
Ch. 9	Physico-Chemical Measurements ...	18*
Ch. 11A	Technical Analysis ...	18*
M. E. 9C	Machine Drawing & Design ...	3
Total ...		19

Electrical Engineering Third Year

E. M. 5	Strength of Materials ...	3
M. E. 8	Hydraulics ...	2
M. E. 7	Prime Movers ...	3
E. E. 5	Differential Equations & Operational Calculus ...	2
E. E. 6	Alternating Current Machines I ...	4
E. E. 7	A.C. Machines II ...	2
E. E. 4	Principles of Electrical Engineering II ...	3
E. E. 8	Electrical Measuring Instruments ...	1
E. E. 21	Electrical Engineering Calculations ...	2
E. E. 19	Electrical Drawing & Design ...	3
E. E. 23	Electrical Engineering Laboratory ...	3
M. E. 9B	Machine Drawing & Design ...	5
M. E. 21B	Mechanical Engineering Laboratory ...	3
W. 3 (part)	Machine shop ...	3
Total ...		20

* For half year.

Mechanical Engineering Third Year

SUBJECTS OF INSTRUCTION

PERIODS PER WEEK
Theoretical Practical

E. M. 4	Strength of Materials and Theory of Structures ...	4	—
M. E. 8	Hydraulics ...	2	—
M. E. 9	Theory of Machine Design ...	2	—
M. E. 4	Steam Engines & Boilers ...	4	—
M. E. 5	Steam Turbine ...	2	—
M. E. 6	Internal Combustion Engines	2	—
E. E. 16	A.C. Machines & Power Distribution ...	3	—
M. E. 9A	Machine Drawing & Design ...	—	8
M. E. 21A	Mechanical Engineering Laboratory ...	—	6
E. E. 23	Electrical Engineering Laboratory II ...	—	3*
W. 3	Workshop Practice—Machine-shop ...	—	6
		19	20

SUBJECTS OF EXAMINATION**1. ENGINEERING COURSES****(3) THIRD YEAR CLASS**

Students of the Engineering Third Year Classes, who have completed the above programme of study and have obtained at least 50 per cent marks in the Practical Subjects of Instruction, are allowed to appear in the following subjects of the Final Engineering Examination of the National Council of Education, Bengal, held annually at the end of the Academic Session :

Chemical Engineering

SUBJECT	No. OF PAPERS		FULL MARKS
Strength of Materials ...	1	1	100
Physical Chemistry II ...	1	1	100
Electro-Chemistry ...	1	1	100
Industrial Chemistry I ...	1	1	100
Metallurgy ...	1	1	100

* For half year instead of M. E. 21A.

Chemical Engineering—Contd.

SUBJECT	NO. OF PAPERS	FULL MARKS
Fuels & their Combustion ...	1	100
Industrial & Chemical Engineering Calculations I ...	1	100
Machine Drawing & Design (6 hours) ...	1	100
		800

Mechanical Engineering

SUBJECT	NO. OF PAPERS	FULL MARKS
Strength of Materials and Theory of Structures ...	1	100
Hydraulics ...	1	100
Theory of Machine Design ...	1	100
Steam Engines & Boilers ...	1	100
Steam Turbines ...	1	100
Internal Combustion Engines ...	1	100
A.C. Machines & Power Distribution ...	1	100
Machine Drawing & Design (6 hours) ...	1	100
		800

Electrical Engineering

SUBJECT	NO. OF PAPERS	FULL MARKS
Strength of Materials ...	1	100
Hydraulics ...	1	100
Prime Movers ...	1	100
Differential Equations & Operational Calculus ...	1	100
Alternating Current Machines I ...	1	100
Principles of Electrical Engineering II ...	1	100
Electrical Measuring Instruments ...	1	100
Machine Drawing & Design (6 hours) ...	1	100
		800

Students, who have passed in all subjects of the above Examination, subject to Rules 3 and 5 of the Examination Rules, are promoted to the Engineering Fourth Year Classes,

provided they have also passed in all subjects of the Intermediate Engineering Examination and have satisfactorily completed a factory training of three months, to be arranged for by the College.

Students, who have passed in all subjects of the Intermediate Engineering Examination and in at least four of the above subjects of the Final Engineering Examination, will also be promoted to the Engineering Fourth Year Classes, provided they have satisfactorily completed three months' factory training to be arranged for by the College. They will, however, have to pass in those subjects of the Third Year Class in which they failed to secure pass marks before they can be granted the Degree at the end of the Course.

PROGRAMME OF STUDY**1. ENGINEERING COURSES****(4) ENGINEERING FOURTH YEAR CLASS**

Students, who have been promoted from the Engineering Third Year Classes, study the following subjects in the Fourth Year Classes :

Chemical Engineering

SUBJECTS OF INSTRUCTION		PERIODS PER WEEK	
		Theoretical	Practical
Ch. 14	Chemical Engineering II ...	4	—
Ch. 15	Industrial Chemistry II ...	2	—
Ch. 14A	Industrial & Chemical Engineering Calculations II ...	2	—
G. 4	Engineering Economics ...	2	—
Ch. 16	Chemical Engineering Laboratory ...	—	20*
W. 3	Machine shop ...	—	3
	<i>Chemical Engineering Design</i> <i>—Home-task; Electives: Any one of the following two:</i>		
Ch. 17	Chemical Technology of Oils & Fats ... 3 }	3	—
Ch. 18	Glass Technology ... 3 }	3	—
	Total ...	13	23

* Students are required to work in the Mechanical Engineering Laboratory for eight weeks as part of the work in Ch. 16.

Mechanical Engineering

SUBJECTS OF INSTRUCTION		PERIODS PER WEEK	
		Theoretical	Practical
E. M. 6	Technical Dynamics ...	1	—
M. E. 11	Power Plant Engineering ...	2	—
M. E. 16	Factory Organization & Management ...	2	—
M. E. 15	Mechanical Handling of Materials ...	2	—
M. E. 14	Materials of Construction ...	1	—
M. E. 13	Machine Tools ...	2	—
G. 4	Engineering Economics ...	2	—
G. 5	General Geology ...	2	—
<i>Electives :</i>			
<i>Any two of the following six Subjects :</i>			
G. 6	Engineering Geology ...	2	4
M. E. 17	Refrigeration ...	2	
M. E. 18	Air Conditioning ...	2	
M. E. 12	Motor Car Engineering ...	2	
M. E. 10	Hydraulic Machines & Water Power ...	2	
M. E. 23	Railway Engineering ...	2	6
W. 4	Advanced Workshop Practice ...	—	
M. E. 21A	Mechanical Engineering Laboratory ...	—	3
M. E. 20	Machine Design ...	—	10
M. E. 22	Abstract ...	—	2
Total ...		18	21

Electrical Engineering

SUBJECTS OF INSTRUCTION		PERIODS PER WEEK	
		Theoretical	Practical
M. E. 24	Power Plant & Boiler ...	2	—
E. E. 7	Alternating Current Machines II ...	2	—*
E. E. 10	Electric Power Transmission ...	2	—
E. E. 12	Power Utilization & Traction ...	2	—
E. E. 11	Electric Power Generation ...	2	—
E. E. 13	Electrical Measurements ...	1	—
E. E. 14	Telegraphy & Telephony I ...	2	—
E. E. 15	Telegraphy & Telephony II ...	2	—
E. E. 9	Electric Power Distribution ...	2	—†
G. 4	Engineering Economics ...	2	—
E. E. 24	Electrical Engineering Laboratory III ...	—	6
E. E. 20	Electrical Project & Design ...	—	6
E. E. 25	Electrical Workshop ...	—	3
E. E. 26	Abstract ...	—	2
E. E. 18	Electrical Drawing ...	—	3†
W. 3	Work shop—Machine shop ...	—	3*
G. 5	General Study ...	2	—
Total ...		19	20

SUBJECTS OF EXAMINATION**1. ENGINEERING COURSES****(4) FOURTH YEAR CLASS**

Students of the Engineering Fourth Year Classes, who have completed the above Programme of Study and have obtained at least 50 per cent marks in the Practical Subjects of Instruction, are allowed to appear in the Engineering Examination of the National Council of Education, Bengal, held annually

* For session 1948-49.

† To be introduced from sessions 1949-50.

at the end of the Academic Session in the following remaining subjects of that Examination :

Chemical Engineering

SUBJECT	NO. OF PAPERS	FULL MARKS
Chemical Engineering I ...	1	100
Chemical Engineering II ...	1	100
Industrial Chemistry II ...	1	100
Industrial and Chemical Engineering Calculation II ...	1	100
Engineering Economics ...	1	100
Chemical Engineering Design ...	—	100
General knowledge in Chemistry and Chem. Engineering ...	1 (oral)	100

Electives :

Chemical Technology of Oils & Fats
or

Glass & Ceramic Technology ...	1	100
		800

Mechanical Engineering

SUBJECT	NO. OF PAPERS	FULL MARKS
Power Plant Engineering ...	1	100
Factory Organisation & Management ...	1	100
Mechanical Handling of Materials ...	1	100
Materials of Construction ...	1	100
Machine Tools ...	1	100
General Study (General Geology) ...	1	100
Engineering Economics ...	1	100
Advanced Workshop Practice ...	1	100
Mechanical Engineering Laboratory ...	1	100
Technical Dynamics ...	1	100

Mechanical Engineering—Contd.

SUBJECT	NO. OF PAPERS	FULL MARKS
<i>Electives : Any two of the following :</i>		
Engineering Geology ...	1	100
Refrigeration ...	1	100
Air Conditioning ...	1	100
Motor Car Engineering ...	1	100
Hydraulic Machines & Water Power ...	1	100
Railway Engineering Mechanical ...	1	100
	2	200
		1200

Electrical Engineering

SUBJECT	NO. OF PAPERS	FULL MARKS
Power Plant & Boiler ...	1	100
Alternating Current Machines II ...	1	100
Electric Power Transmission ...	1	100
Power Utilisation & Traction ...	1	100
Electric Power Generation ...	1	100
Electrical Measurements ...	1	100
Telegraphy and Telephony I ...	1	100
Telegraphy and Telephony II ...	1	100
General Study ...	1	100
Engineering Economics ...	1	100
Electrical Engineering Laboratory ...	1	100
Electric Power Distribution ...	1	100
		1200

Students, who have passed in all subjects of the Final Engineering Examinations, subject to Rules 3 and 5 of the Examination Rules, held at the end of the Third and Fourth Year Classes, are granted Degree in Chemical, Electrical or Mechanical Engineering, as the case may be, by the National Council of Education, Bengal.

PROGRAMME OF STUDY

II. DIPLOMA COURSE IN ENGINEERING

FIRST YEAR CLASS

SUBJECTS OF INSTRUCTION		PERIODS PER WEEK	
		Theoretical	Practical
D. G. 1	English ...	1	—
D. M. 1	Algebra & Trigonometry ...	4	—
D. P. 1	Physics ...	4	—
D. P. 3	Physics Laboratory ...	—	2
D. Ch. 1	Chemistry ...	2	—
D. Ch. 1A	Chemical Laboratory ...	—	2
D. D. 1	Drawing ...	—	9
D. W. 1	Carpentry ...	—	6
D. W. 1	Moulding ...	—	6
	Physical Training ...	—	2
Total ...		11	27

SECOND YEAR CLASS

SUBJECTS OF INSTRUCTION		PERIODS PER WEEK	
		Theoretical	Practical
D. M. 2	Practical Mathematics ...	3	—
D. P. 2	Physics ...	3	—
D. P. 4	Physics Laboratory ...	—	2
D. Ch. 2	Chemistry ...	2	—
D. E. E. 1	Electrical Engineering ...	2	—
D. E. M. 1	Mechanics & Mechanism ...	3	—
D. G. 2	Business English ...	2	—
D. D. 2	Drawing ...	—	6
D. W. 2	Smithy ...	—	6
D. W. 2	Pattern Shop ...	—	6
Total ...		15	20

THIRD YEAR CLASS

SUBJECTS OF INSTRUCTION		PERIODS PER WEEK	
		Theoretical	Practical
D. E. E. 2	Electrical Engineering I ...	2	—
D. E. E. 3	Electrical Engineering II ...	2	—
D. M. E. 1A	Heat Engines ...	2	—
D. M. E. 1B	Boilers, Pumps & Auxiliary Machines ...	2	—
D. E. M. 2	Applied Mechanics ...	3	—
D. D. 3	Drawing ...	—	9
D. E. E. 4	Electrical Engineering Laboratory ...	—	3
D. M. E. 2	Power House Practice ...	—	3
D. W. 3	Machine Shop ...	—	6
D. W. 3	Fitting Shop ...	—	6
Total ...		11	27

Students, who have completed the above Programme of Study and have obtained at least 50 per cent marks in the Practical Subjects of Instruction, are allowed to appear in the annual examinations of the respective classes held at the end of the Academic Session by the National Council of Education, Bengal.

SUBJECTS OF EXAMINATION

II. DIPLOMA COURSE IN ENGINEERING

Annual Examination at the end of the First Year Class

SUBJECT			NO. OF PAPERS	FULL MARKS
Theoretical :—				
Algebra & Trigonometry ...	...	1	100	
Physics (General Properties, Light, Sound & Elements of Electricity)	1	100		
Chemistry ...	...	1	100	
English ...	...	1	100	
Drawing ...	...	1	100	
Practical :—				
Carpentry ...	...	—	100	
Moulding ...	...	—	100	
				700

Students, who pass in all subjects of the above Examination subject to Rules 3 and 5 of the Examination Rules are promoted to the Diploma Course in Engineering Second Year Class.

Students, who fail to pass in not more than two papers in the above Examination will be promoted to the Diploma Course in Second Year Class, but they will have to pass examinations in those papers before they can be further promoted.

Annual Examination at the end of the Second Year Class

SUBJECT	NO. OF PAPERS	FULL MARKS
Theoretical :—		
Practical Mathematics ...	1	100
Physics (Heat, Electricity & Magnetism) ...	1	100
Chemistry ...	1	100
Mechanics & Mechanism ...	1	100
Electrical Engineering ...	1	100
Business English ...	1	100
Drawing ...	1	100
Practical :—		
Smithy ...	—	100
Pattern making ...	—	100
		900

Students, who pass in all subjects of the above Examination subject to Rules 3 and 5 of the Examination Rules are promoted to the Diploma Course in Engineering Third Year Class.

Students, who fail to pass in not more than two papers in the above Examination will be promoted to the Diploma Course in Engineering Third Year Class, but they will have to pass examinations in those papers before they can be granted Diploma by the National Council of Education, Bengal.

Final Examination at the end of Third Year Class

SUBJECT	NO. OF PAPERS	FULL MARKS
Theoretical :—		
Heat Engines ...	1	100
Boiler, Pumps & Auxiliary machines	1	100
Applied Mechanics ...	1	100
Electrical Engineering I ...	1	100
Electrical Engineering II ...	1	100
Drawing (6 hours) ...	1	100
Practical :—		
Machine shop (6 hours) ...	—	100
Fitters' shop (6 hours) ...	—	100
Electric wiring (6 hours) ...	—	100
		900

Students, who have passed in all subjects of the Final Examination of Diploma Course in Engineering subject to Rules 3 and 5 of the Examination Rules held at the end of the Third Year Class, are granted Diploma by the National Council of Education, Bengal, provided that they have passed in all subjects of the Second Year Class as well.

III. OVERSEER COURSE

(Three Years' Course)

PROGRAMME OF STUDY

First Year

SUBJECTS OF INSTRUCTION		PERIODS PER WEEK	
		Theoretical	Practical
O. S. M. 1	Trigonometry & Mensuration	4	—
O. S. P. 1	Elementary Physics	4	—
O. S. E. M. 1	Applied Mechanics I	3	3
O. S. 1	Surveying I	2	—
O. S. 4	Civil Engineering I	4	—
O. S. 11	Drawing I	—	12
O. S. 14	Office Work I	—	6
O. S. 16	Practical Survey I	4 to 6 weeks	—
Total ...		17	21

Students are required to do field-work whole day in the months of November and December.

Second Year

SUBJECTS OF INSTRUCTION	PERIODS PER WEEK	
	Theoretical	Practical
O. S. E. M. 2 Applied Mechanics II	... 3	—
O. S. 2 Surveying II	... 2	—
O. S. 5 Civil Engineering II	... 4	—
O. S. 7 Highways & Irrigation	... 4	—
O. S. 8 Estimates & Specification I	... 4	—
O. S. 3A Principles of Surveying Instruments	... 2	—
O. S. 12 Drawing II	... —	12
O. S. 15 Office Work II	... —	6
O. S. 17 Practical Survey II	... 4 to 6 weeks	—
Total	19	18

Third Year

SUBJECTS OF INSTRUCTION	PERIODS PER WEEK	
	Theoretical	Practical
O. S. 10 Sanitary Engineering	... 4	—
O. S. 3 Surveying III	... 3	—
O. S. 6 Civil Engineering III	... 4	—
O. S. M. E. 1 Elementary Mechanical Engineering	... 3	—
O. S. E. E. 1 Elementary Electrical Engineering	... 3	—
O. S. 13 Drawing & Design	... —	12
O. S. 9 Estimates & Specification II	... 2	—
O. S. W. 1 Laboratory E. E. & M. E.	... —	6
O. S. 18 Practical Survey III	... 4 to 6 weeks	—
Total	19	18

Students, who have completed the above Programme of Study and have obtained at least 50% marks in the Practical subjects of Instruction, are allowed to appear in the Annual examination of the respective classes held at the end of the Academic Sessions by the National Council of Education, Bengal.

SUBJECTS OF EXAMINATION

Annual Examination at the end of First Year Class

SUBJECT	NO. OF PAPERS	FULL MARKS
Theoretical :—		
Trigonometry & Mensuration	... 1	100
Elementary Physics	... 1	100
Applied Mechanics I	... 1	100
Surveying I	... 1	100
Civil Engineering I	... 1	100
Drawing I (6 hours)	... 1	200
Practical & Class Works :—		
Physics Laboratory	... 1	100
Office Work	... 1	100
Class Drawing	... 1	200
Practical Survey	... 1	100
		1200

Students, who pass in all subjects of the above Examination subject to Rules 3 and 5 of the Examination Rules, are promoted to the Overseer Second Year Class.

Students, who fail to pass in not more than two papers in the above Examination, will be promoted to the Overseer Second Year Class, but they will have to pass Examination in those papers before they can be further promoted.

Annual Examination at the end of Second Year Class

SUBJECT	NO. OF PAPERS	FULL MARKS
Theoretical :—		
Applied Mechanics II	... 1	100
Surveying II	... 1	100
Civil Engineering II	... 1	100
Highways & Irrigation	... 1	100
Estimates & Specifications I	... 1	100
Drawing II (6 hours)	... 1	200
Principles of Survey Instruments	... 1	100

Annual Examination at the end of Second Year Class—Cont.

SUBJECT	NO. OF PAPERS	FULL MARKS
Practical & Class Works :—		
Class Drawing ...	...	200
Office Works ...	...	100
Practical Survey ...	...	100
		1200

Students, who pass in all subjects of the above Examination, subject to Rules 3 and 5 of the Examination Rules, are promoted to the Overseer Third Year Class.

Students, who fail to pass in not more than two papers in the above Examination, will be promoted to the Overseer Third Year Class, but they will have to pass Examination in those papers before they can be granted Certificate by the National Council of Education, Bengal.

Final Examination at the end of Third Year Class
(From 1949)

SUBJECT	NO. OF PAPERS	FULL MARKS
Theoretical :—		
Sanitary Engineering ...	1	100
Surveying III ...	1	100
Civil Engineering III ...	1	100
Elementary Mechanical Engineering ...	1	100
Elementary Electrical Engineering ...	1	100
Drawing & Design (6 hours) ...	1	200
Estimates & Specifications II ...	1	100
Practical & Class Works :—		
E. E. Laboratory ...	...	100
M. E. Laboratory ...	...	100
Practical Survey ...	...	100
		1100

Students, who have passed in all subjects of the Final Examination of Overseer Course, subject to Rules 3 and 5 of the Examination Rules, held at the end of the Third Year Class, are granted Certificates by the National Council of Education, Bengal, provided that they have passed in all subjects of the Second Year Class as well.

PROGRAMME OF STUDY

IV. AGRICULTURE COURSE

FIRST YEAR CLASS

SUBJECTS OF INSTRUCTION		PERIODS PER WEEK	
		Theoretical	Practical
Ag. Ch. 1	Elementary Farm Chemistry ...	2	4
Agri. 1	Agricultural Botany ...	2	4
Agri. 2	Farm Crops (Vegetable Gardening) ...	2	16*
Agri. 4	Animal Husbandry I (first half year) ...	2	—
Agri. 5	Animal Husbandry II (second half year) ...	2	—
Agri. 7	Soils and Fertiliser (first half year) ...	2	—
Agri. 3	Farm Crops II (second half year) ...	2	—
Shop Works—			
Ag. W. 1	Carpentry (first half year) }	—	6
Ag. W. 1	Smithy (second half year) }	—	—
		—	—
	Total ...	10	30

Second Year Class

SUBJECTS OF INSTRUCTION		PERIODS PER WEEK	
		Theoretical	Practical
Agri. II	Agricultural Zoology (first half year) ...	2	4
Agri. 6	Animal Husbandry III (Poultry) (first half year) ...	2	6
Agri. 10	Horticulture and Floriculture (first half year) ...	2	4
Agri. 3	Farm Crops II (first half year) ...	2	10
Agri. 12	Irrigation and Drainage (first half year) ...	2	—
Agri. 13	Agricultural Economics (first half year) ...	2	—
Agri. 9	Farm Machinery (first half year) ...	2	—
		—	—
	Total ...	14	24

* First half year

During second half year students will specialise in one of the following subjects:—(a) Farm Crops, (b) Horticulture and Vegetable Gardening, (c) Dairy Husbandry, (d) Poultry Husbandry, (e) Animal Husbandry.

Students, who have completed the above programme of study and have obtained at least 50 per cent marks in the practical Subjects of Instruction, are allowed to appear in the Annual Examinations of the respective classes held at the end of the Academic Session by the National Council of Education, Bengal.

SUBJECTS OF EXAMINATION

IV. AGRICULTURE COURSE

Annual Examination at the end of First Year Class

SUBJECT	No. OF PAPERS	FULL MARKS
Chemistry	... 1	100
Agricultural Botany	... 1	100
Animal Husbandry	... 1	100
Agriculture	... 1	100
Oral and Practical	... —	100
		500

Students, who pass in all subjects of the above Examination, subject to Rules 3 and 5 of the Examination Rules, are promoted to the Agriculture Second Year Class.

Students, who fail to pass in not more than two papers in the above Examination, will be promoted to the Second Year Class, but they will have to pass Examinations in those papers before they can be granted Certificate by the National Council of Education, Bengal.

Final Examination at the end of Second Year Class

SUBJECT	No. OF PAPERS	FULL MARKS
Animal Husbandry	... 1	100
Agriculture	... 1	100
Horticulture & Floriculture	... 1	100
Agricultural Engineering	... 1	100
Oral and Practical	... —	100
		500

Students, who have passed in all subjects of the Final Examination of Agriculture Course, subject to Rules 3 and 5 of the Examination Rules, held at the end of the Second Year Class, are granted Certificate by the National Council of Education, provided that they have passed in all subjects of the First Year Class as well.

MATHEMATICS

M. 1. Co-ordinate Geometry :

Chem. Eng.
& Eng. 1st
Year; 2 hrs.
a week;
Lectures.

Co-ordinates, Cartesian and Polar. Lengths of straight lines and areas of triangles. Point of division of a straight line. Definition of the Equation to a Locus. Equations of straight lines. Transformation of co-ordinates. Change of axes. Circle, Parabola, Ellipse and Hyperbola—their equations and properties with simple examples. Tangents and normals. Relation between a line and a conic. Tracing some commonly occurring curves whose equations are simple form in Cartesian or Polar co-ordinates. Cartesian co-ordinates in space. Direction-cosines of a line. Length between two points in space. Angle between two lines in space. Point of division of a line in space. Definition of the equation to a locus in space. The plane and the general equation of the first degree in three variables. The straight line in space and its general equations. The projecting planes of a line.

Special Surfaces:—Spheres, cylinders, the projecting cylinder of curve, cones, surfaces of revolution and ruled surfaces.

Tacing of curves will receive considerable attention throughout the whole course.

M. 2. Differential Calculus :

Chem. Eng.
& Eng. 1st
Year; 4 hrs.
a week;
Lectures.

Constants and variables. Functions. Limits and infinitesimals. Physical meaning of Differentiation. First Principle. Various methods of differentiation. Differentiation of constant, sum, product, and quotient of functions, function of a function, inverse function, logarithmic and trigonometrical function. Differentiation of function of several variables. Partial differentiation. Euler's theorem. Differentials. Successive differentiation. Taylor's and Maclaurin's theorems.

Rates. Maxima and minima. Curvature. Radius and centre of curvature. Convexity and concavity and points of inflexion on a curve. Equations of tangents and normals. Subtangents and subnormals. Study of important technical curves as Cycloid Involute, Epi- and Hypo-cycloid. Calculation of small corrections and percentage errors. Applications of differential calculus from the Engineers' point of view.

Integral Calculus :

Meaning of Integration. Integration of standard elementary forms. Integration by substitution of a new variable; Integration by parts. Integration by resolution into partial functions. Lengths and areas of plane curves. Volumes of solids of revolution; simple cases of definite integrals. Mean values. Root mean square values. Successive and partial integration.

M. 3. Integral Calculus and Differential Equations:

Fourier's series. Differential equations of the first order and of the first degree. The operator D. Differential equations of the n th order and the first degree. Simple Geometrical and Physical applications chiefly from the Engineer's point of view.

Chem. Eng.
& Eng. 2nd
Year; 2 hrs.
a week;
Lectures.

D. M. 1. Algebra and Trigonometry :

Algebra—Equations, Simultaneous and Quadratic; Equational Problems, Graphs; Simple cases of Surds; Ratio and Proportion; Variation; Elimination, Miscellaneous Exercises; Binomial theorem, Logarithm, and Use of Logarithmic Tables. Arithmetical and Geometrical Progressions.

D. 1st
Year; 4 hrs.
a week;
Lectures.

Trigonometry—Units and Measures; Measurements of Angles; Trigonometrical Ratios; Relation between Trigonometrical Ratios and easy identities; Solution of right-angled triangles, and easy problems on heights and distances.

D. M. 2. Practical Mathematics :

D. 2nd
Year; 3 hrs.
a week;
Lectures.

Problems on Heights and Distances ; Solution of Triangles ; Field Book ; Area of plane rectilineal figures ; Circles and ellipses ; Length of chord ; Circular arc ; Surface and volumes of solids, viz., prism, cylinder, pyramid, cone, prismoid, and sphere. Graphs of equations and Trigonometrical ratios.

O. M. 1. Trigonometry and Mensuration :

O. 1st
Year; 4 hrs.
a week;
Lectures.

Trigonometry—Trigonometrical ratios—measurement of angles, Logarithmic series, Cosines etc. Use of logarithmic tables, Solution of triangles. Problems of heights and distances.

Mensuration—Solution of triangles—area of plane figures field-book—surface and volume of solids and frustum of solids—Duodecimals.

PHYSICS**P. 1. Physics :**

Ch. E. &
Eng. 1st
Year; 3 hrs.
a week;
Lectures.

Heat:—Expansion of gases ; Absolute temperature ; Gas thermometer ; Kinetic theory of gases ; Two specific heats of gases ; Characteristic equations ; Heat as energy ; First Law of thermodynamics ; Gas constant ; continuity of state—Andrew's and Amagat's experiments ; Critical temperature ; Liquefaction of gases ; Relative humidity ; Hygrometers ; Dalton's Law ; Mixture of gases and vapours. Conduction, Convection and Radiation of heat.

Light:—Wave theory of light ; Laws of reflection and refraction by Corpuscular and Wave theories of light ; Wave length of colours ; Refractive index of different colours ; Dispersion ; Spectrum Analysis ; Spherical and Chromatic Abberation, Optical Instruments ; Photometry ; Velocity of light propagation ; Spectrometer ; Polarisation ; Planes of polarisation ; Potarisation by some crystals ; Polarimeter and Saccharimeter.

Magnetism:—Laws of attraction and repulsion ; Unit pole ; Magnetic Field ; Intensity ; Potential ; Tan A & Tan B positions of Gauss ; Magneto-meter ; Moment of magnets ; Determination of H ; Permeability and Hysteresis of iron ; Magnetic Maps.

Static Electricity:—Electric field ; Intensity ; Potential ; Gauss's theorem and its implications ; Condenser ; Capacity of condensers ; Unit capacity ; Specific Inductive Capacity ; Condensers in series and parallel ; Energy of a charged condenser ; Residual charge ; Electro-meters ; Fundamental Electric Particles.

Dynamic Electricity:—Electric current ; Laplace's Law ; Magnetic field due to current ; C. G. S. unit of current ; Action of currents on magnets ; Action of magnets on currents ; Galvanometers ; Conductors ; Resistance of conductors ; Effect of temperature on resistance ; Resistance of conductors in series and parallel ; Measurement of resistance ; Comparison of E. M. F. ; Wheatstone's bridge ; Potentiometer ; Kirchhoff's Law ; Electromagnetic induction ; Faraday's Law ; Lenz's Law ; Eddy current ; Solenoids and electro-magnets ; Magnetomotive force ; Magnetic flux ; Self induction ; Ruhmkorff's Coil ; Transformer ; Thermal effects of current ; Electrical energy ; Conversion of electrical energy into heat ; Electric power ; Incandescent and arc lamps ; Conversion of heat into electrical energy ; Thermopyle ; Thermocouple ; Electrolysis and laws of electrolysis ; Electro-chemical equivalent of elements ; Electroplating.

Elementary treatment of the following ; Conduction through gases ; Electrical discharge ; Kathode rays ; X-rays ; Radio-activity ; Electric waves ; Wireless Telegraphy. Photo electricity and Peezo-electricity.

P. 1A. Physical Laboratory :

1. Determination of specific heat of a solid with radiation correction.

Ch. E. &
Eng. 1st
Year; 4 hrs.

a week ;
Practical.

2. Determination of latent heat of fusion of ice.
3. Determination of latent heat of vaporisation of water with radiation correction.
4. Determination of co-efficient of linear expansion of a solid.
5. Verification of Boyle's Law.
6. Determination of volume co-efficient of air.
7. Determination of pressure co-efficient of air.
8. Determination of Relative humidity of atmospheric air.
9. Measurement of Thermal conductivity of a metal.
10. Measurement of Refractive Index by microscope.
11. Spectrometer, its adjustment and use.
12. Measurement of indices of refraction by spectrometer.
13. Comparison of moments of bar-magnets, by
 - (a) Tan A method of Gauss.
 - (b) Tan B method of Gauss.
14. Determination of 'H' in the laboratory.
15. Determination of Inclination by Dip-circle.
16. Measurement of resistance of a coil by
 - (a) Wheatstone's Bridge.
 - (b) Post Office box.
17. Determination of resistance of a galvanometer by
 - (a) Thompson's method.
 - (b) Half deflection method.
18. Determination of resistance of a battery by
 - (a) Mance's method.
 - (b) Ammeter and Voltmeter method.
19. Measurement of low resistance.
20. Measurement of Resistance of an electrolyte.
21. Comparison of E. M. F. by Potentiometer.
22. Determination of electro-chemical equivalent of a metal.
23. Determination of Mechanical equivalent of heat.

24. Determination of Reduction factor of a galvanometer.
25. Determination of Temperature co-efficient of resistance.
26. Verification of Fleming's rule.
27. Measurement of Commercial efficiency of lamps.

D. P. 1. Physics :

General Physics :—Fundamental units ; Density and Specific gravity ; Fluid Pressure ; Pascal's Law ; Archimedes' Principle ; Compressibility and Expansion of air ; Air pressure ; Barometer ; Air pump ; Force ; Composition and Resolution of forces ; Gravitation ; Centre of gravity ; States of equilibrium ; Velocity ; Acceleration ; Laws of falling bodies ; Newton's laws of motion ; Work, Energy and Power ; Lever ; Efficiency of simple machines.

Sound :—Nature of Sound, Characteristics of Sound, Velocity of Sound ; Reflection of Sound, Resonance, Nodes, Antinodes, Overtones, Harmonics, Sonometer, Organ pipes, Ear.

Light :—Transmission of light ; Illumination and Photometry ; Reflection and Refraction ; Prisms and Lenses and Simple Optical Instruments ; Nature of light and colour.

Magnetism :—General properties of magnets ; Magnetic Induction ; Magnetic lines of force ; Terrestrial Magnetism and Magnetic Compasses.

Electricity :—Statical Electricity, Charge, Potential, Cell, Electric current, E. M. F., Resistance. Ohm's Law.

D. P. 2. Physics :

Heat :—Thermometry ; Expansion and co-efficients of expansion of solids and liquids ; Expansion of gases ; Boyle's Law ; Charles' Law ; Absolute temperature ; Specific heat ; Fusion ; Evaporation and Boiling ; Latent heat ; Calorimetry ; Moist air

and Humidity ; Regelation ; Nature of heat ; Mechanical Equivalent of heat ; Radiation ; Conduction ; Convection.

Electricity and Magnetism :—Magnetic Field, Magnetic moment ; Tan A & B position of Gauss ; Capacity ; Condenser ; Atmospheric Electricity ; Magnetic effect of currents ; Electromagnets ; Measurement of currents ; Heating effect ; Chemical effect ; Induction ; Ruhmkroff's coil ; Electric Energy and Power ; Conversion of Electric Energy ; Invisible radiation.

D. P. 3. Physical Laboratory :

D. 1st
Year ; 3 hrs.
a week ;
Practical.

1. Use of scales ; Dividers ; Vernier scales ; Sliding calipers, Screw gauge.
2. Determination of volume and height.
- 2a. Use of balance.
3. Determination of centre of gravity.
4. Determination of density of solid by
 - (a) Hydrostatic Balance,
 - (b) Nicholson's Hydrometer,
 - (c) Specific Gravity Bottle.
5. Comparison of density of two liquids.
6. Reading of Barometer.
7. Verification of the laws of Pendulum.
8. Determination of the value of "g".
9. Verification of the laws of Reflection and Refraction of light.
10. Tracing of Magnetic lines of force
 - (a) by iron filings,
 - (b) by magnetic needle.

D. P. 4. Physical Laboratory :

D. 2nd
Year ; 2 hrs.
a week ;
Practical.

1. Determination of fixed points of a Thermometer.
2. Determination of water equivalent of a calorimeter.
3. Determination of Specific heat of a solid.
4. Determination of Latent heat of fusion of ice.

5. Determination of Latent heat of steam.
6. Co-efficient of linear expansion of a solid.
7. Verification of Boyle's Law.
8. Lines of force of a bar magnet, poles, and neutral point.
9. Comparison of moments of two magnets.
10. Measurement of dip.
11. Preparation of cells.
12. Setting up of Galvanometer.
13. Measurement of Resistances.
14. Comparison of Electromotive forces.

O. P. 1. Elementary Science :

General Measurement :—Fundamental units in O. 1st
C.G.S. and F.P.S. systems. Mass, density and Year ; 4 hrs.
specific gravity. Air pressure, Barometer, Centre of a week ;
gravity. Boyles law, Syphon, Pressure gauges and Lectures.
Water pumps.

Heat :—Thermometry—Expansion of Solids, liquids and gases—Charles' law, specific heat, Fusion, evaporation and boiling. Latent heat. Radiation—conduction. Heat and Work—Calorific value of coal.

Light :—Transmission of light. Illumination and photometry. Reflection and Refraction, mirrors and lenses.

Magnetism :—General properties of magnets. Magnetic Induction, magnetic lines of force. Terrestrial magnetism.

Electricity :—Statistical electricity, charge, potential, cell, electric current, E.M.F., Resistance, Ohm's law.

Physical Laboratory :

1. Use of Scales, Dividers, Vernier Scale, Screw gauge.
2. Use of Balance.
3. Determination of Centre of gravity.

O. 1st
Year ; 3 hrs.
a week ;
Practical.

4. Determination of density of Solids
 - (a) by Hydrostatic balance,
 - (b) by Specific gravity Bottle.
5. Reading of Barometer.
6. Determination of fixed points of thermometer.
7. Determination of specific heat of solid.
8. Verification of laws of reflection and refraction.
9. Photometry.
10. Measurement of Dip.

CHEMISTRY AND CHEMICAL ENGINEERING

Ch. 1. Chemistry of Engineering Materials :

Water for steam generation and industrial purposes ; Fuels and principles of combustion ; lime and gypsum products, sand, cement ; refractory materials ; furnace types ; metallurgical terms and processes ; Extraction of iron and manufacture of various kinds of iron, steel and their alloys ; extraction of Common non-ferrous metals as *Al, Cu, Pb, Sn, Zn*, and their properties, including those of their principal alloys ; properties of *Ag, Au* and *Pt* ; methods of protection of metals, specially iron and steel ; paints and varnishes ; lacquers and enamels ; lubricants ; electrical insulating materials such as glass, porcelain, mica, rubber, plastics, nitro-cellulose products, etc.

M.E. &
E.E. 2nd
Year ; 2 hrs.
a week ;
Lectures.

Ch. 2. Inorganic Chemistry I :

An introduction to the classification of elements ; Combining weights ; Atomic weights and molecular weights ; Valency ; The periodic system ; The inactive elements ; The halogens ; Oxygen, Sulphur, Selenium and Tellurium ; Air and the nitrogen family of elements, N, P, and As ; Carbon, carbon monoxide ; Carbon dioxide, Coal and coalgas, Combustion and structure of flame ; Silicon, Silica and Silicates ; Boron and Borax ; Hydrogen, Deuterium, Water ; The peroxides and peracids including hydrogen peroxide and ozone ; Introduction to the principles of qualitative analysis and chemical calculations.

Ch. E. 1st
Year ; 3 hrs.
a week ;
Lectures.

Books Recommended :—As in Ch. 4.

Ch. 2A. Qualitative Analysis :

Dry tests for bases and acids. Practice with blow pipe, reduction, borax bead test, flame test and fusion. (This may be omitted here if the student has

Ch. E. 1st
Year ; 9 hrs.
a week ;
Practical.

already acquainted himself fully with the above methods).

Insoluble substances, simple methods of solution for insolubles—double decomposition, fusion, extraction with strong acids, etc., etc.

A few preliminary lectures will be given to enable the students to follow the different operations in a systematic analysis for the separation and identification of groups and radicals. The aim should be to impress on the students the necessity of adhering to the required minimum of reagents and chemicals in the manipulation, and to bring home to them the fact that qualitative analysis leads to quantitative if only a balance is used.

The theory of electrolytic dissociation, Osmotic pressure, law of mass action balanced reactions, solubility product, colloidal solutions.

Individual tests of metals. Division of metals into groups. Systematic analysis of the metals in each group. Reactions in the dry way. Wet reactions. Separation of bases into groups. Detection of acids. Systematic analysis of unknown substances, containing not more than 6 of the following radicals: Ag, Pb, Hg, Cu, Bi, Cd, Sn, As, Sb, Fe, Al, Cr, Zn, Mn, Co, Ni, Ca, Sr, Ba, Mg, Li, K, Na, NH_4 , OH, CrO_4 , AsO_4 , AsO_3 , S_2O_3 , PO_4 , BO_3 , C_2O_4 , CO_3 , Cl, Br, I, F, S, $\text{Fe}(\text{Cy})_6$, CHO_2 , SO_4 , SO_3 , NO_3 , NO_2 , ClO_3 , ClO_4 , OCl, $\text{C}_4\text{H}_4\text{O}_6$ and silicates.

Complete analysis of a few naturally occurring ores and substances.

Ch. 3. Organic Chemistry I :

Ch. E. 1st
Year; 3 hrs.
a week;
Lectures.

The growth and the scope of organic chemistry; Purification of organic compounds—solids and liquids. Analysis of organic compounds—qualitative and quantitative. Determination of molecular weights of organic acids and bases by chemical methods. Classification of organic compounds.

Detailed study of Aliphatic or Open-chain compounds:—Saturated hydrocarbons, unsaturated hydrocarbons—Olefines and Acetylenes. Halogen derivatives of the paraffins and unsaturated hydrocarbons. Alcohols—Monohydric saturated alcohols and Monohydric unsaturated alcohols. Ethers, Aldehydes and Ketones. Mono-basic Fatty Acids—Saturated acids and unsaturated acids. Acid Chlorides, Anhydrides and Amides. Esters—Esters of organic and inorganic acids. Mercaptans, Sulphonic Acids and Sulphonates, Thio-ethers. Amines. Cyanogen compounds—Cyanogen and Hydro-cyanic acid. Halogen compounds of cyanogen—Cyanic and Cyanuric acids—Thiocyanic acid, Thiocyanates—Nitrites—Carbamines.

Alkyl derivatives of Phosphorus, Arsenic, Silicon, etc. Organometallic compounds—Synthetic uses of Zinc Alkyl compounds and Grignard's Reagents. Polyhydric Alcohols, Carbohydrates.

Hydroxy Monobasic Acids and compounds related to them—Monohydroxy fatty acids—Stereoisomerism of Lactic acids—Amino Acids—Dialdehydes—Diketones—Monobasic Aldehydic and Ketonic Acids—Synthetic uses of Aceto-acetic Ester. Diabasic acids—Carbonic acid derivatives—Saturated and unsaturated Dibasic acids—Monohydroxy and Dihydroxy Diabasic acids—Stereoisomerism of the Tartaric acids and Stereoisomerism of unsaturated acids—Hydroxy poly-basic acids.

Ch. 4. Inorganic Chemistry II :

In continuation of Ch. 2, a detailed study of the metals and their important compounds in the light of the periodic classification of elements, including the alkalimetals, electrolysis and electro-chemical methods; Cu, Ag, and Au; the alkaline earth metals, Be, Mg, Zn, Cd, and Hg; Al, glass and ceramics; Ti, Zr, Ce, and Th; Sn, Pb; Sb, Bi, V; Cr, Mo, W; Se, Te; Mn; Fe, Co, Ni; the platinum metals, the

Ch. E. 2nd
Year; 2 hrs.
a week;
Lectures.

rare earths elements ; the radio elements and radio-activity, isotopes and atomic number ; the periodic law, polar and non-polar bonds, valency-nuclear, atomic and molecular structure ; artificial radio-activity and transmutation of elements. The latter portion may be extended to the 4th year class in order to cover the common topics in the physical chemistry.

Detailed descriptions of metallurgical and industrial processes are omitted from this course as they will be more adequately treated in Ch. 11, Ch. 12 and Ch. 15.

Books Recommended :—Text book of Inorganic Chemistry—J. R. Partington ; Inorganic Chemistry—Sherwood Taylor ; Modern Inorganic Chemistry—Mellor.

Ch. 4A. Quantitative Analysis :

Ch. E. 2nd
Year ;
12 hrs.
a week ;
(Half year)
Practical.

Gravimetric Analysis :—Standardisation of a set of Weights ; Determination of water of crystallization in BaCl_2 or CuSO_4 ; Determination of Barium, Sulphur and chlorine ; Estimation of iron as Fe_2O_3 ; Separation of iron from Manganese and from Zinc. Separation of calcium and magnesium in an unknown solution ; Separation of Silica, iron, aluminium, calcium and magnesium in an unknown sample ; Separation of Copper and Nickel electrolytically ; Estimation of nickel by organic reagent Dimethylglyoxime.

Volumetric Analysis :—Standardisation of measuring vessels ; Preparation of standard solutions of acids and alkali ; Estimation of Na_2CO_3 in presence of NaHCO_3 ; Estimation of acetic acid in vinegar ; Standardisation of KMnO_4 solution ; Preparation of standard solution of $\text{K}_2\text{Cr}_2\text{O}_7$; Estimation of Iron in an iron ore ; Estimation of manganese in Pyrolusite ; Preparation of standard thiosulphate solution ; Determination of available Chlorine in bleaching powder ; Estimation of Copper by iodometric methods ; Estimation of Chromium.

Complete Analysis of a few ores and alloys by gravimetric and volumetric methods.

One lecture a week upto December on the methods and principles of quantitative analysis.

Ch. 5. Organic Chemistry II :

Detailed study of the Chemistry of the Cyclic compounds :—(a) Carbocyclic Compounds—Polymethylenes. Aromatic Hydrocarbons including structure of Benzene etc. Aromatic halogen derivatives ; Aromatic Nitro-compounds ; Aromatic Amines, Diazo- and Azo-compounds ; Aromatic Sulphonic acids ; Phenols ; Aromatic Alcohols, Aldehydes and Ketones ; Quinones ; Aromatic Acids ; Aromatic compounds containing two or more Benzene nuclei. Naphthalene and its derivatives. Anthracene and its derivatives. Phenanthrene. (b) Hetero-cyclic compounds—An elementary study of the Hetero-cyclic Compounds with special reference to Furfurane, Thiophene, Pyrrole, Pyrazole, Pyrazolone, Indole, Carbazole, Pyridine, Quinoline, Isoquinoline and Acridine.

Ch. E. 2nd
Year ; 3 hrs.
a week ;
Lectures.

Synthetic Dyes :—Classification of dyes—Important Dye-stuffs of each class with special reference to Azo-dyes and Triphenylmethane Dye-stuffs.

Ureids :—Parabanic Acid, Barbituric Acid, Alloxan, Allantoin, Veronal, Uric Acid, Theophylline, Caffeine, Theobromine, Purine, Xanthine, Guanine.

Terpenes and Camphors :—Monocyclic Terpenes—Terpineol—Limonene—Menthone—Menthol. Dicyclic Terpenes—Camphor—Pinene—Borneol. Olefinic Terpenes—Isoprene—Citral—Geranial—Linalool.

Alkaloids :—Classification of Alkaloids. An elementary study of the following Alkaloids : Piperine, Conine, Nicotine, Atropine, Cocaine, Quinine, Cinchonine, Morphine, Strychnine and Brucine.

Synthetic Drugs:—Important compounds of Arsenic. Important members of the following classes of drugs—Antiseptics, Hyponotics and Anaesthetics, Antipyretics, Diuretics and Uric Acid Eliminants. Sulpha drugs and anti-malarial drugs.

Ch. 5A. Organic Preparations and Detections :

Ch. E. 2nd.
Year;
12 hrs.
a week;
(Half year)
Practical.

(1) *Detection of the following elements in organic compounds:*—Carbon, Hydrogen, Nitrogen, Halogens, and sulphur. (2) *Detection of the following organic compounds:*—Methyl alcohol, Ethyl alcohol, Glycerine, Formic Acid, Acetic Acid, Oxalic Acid, Tartaric Acid, Citric Acid, Lactic Acid, Benzoic Acid, Salicylic Acid, Cane Sugar, Glucose, Starch, Benzene, Aniline, Phenol, Urea, Uric Acid, Formaldehyde, Acetone. (3) *Preparation of the following Organic Compounds:*—Methyl Iodide, Methyl Oxalate, Allyl Alcohol, Nitrobenzene, Aniline, Acetanilide, Para nitraniline, Para red, Naphthol Orange, Malachite Green, Sulphonamide, Malonic ester, D.D.T., Benzoin, Dibenzyl, Phenylhydrazine, Anisole, Picric Acid, Nitro-phthalic acids, Aspirin, Caffeine from tea dust, sodium benzenesulphonate.

Ch. 6. Physical Chemistry I :

Ch. E. 2nd.
Year; 2 hrs.
a week;
Lectures.

Units and Dimensions—Gases:—Postulates of the kinetic theory, the average velocities, mean free path, viscosity, ideal and real gases, Van der waal's equation, specific heats, concept of the distribution of velocity and energy—Liquid state of matter: continuity of states, the corresponding state, the critical state, liquefaction of gases, vapour pressure and vapour density, surface tension and surface energy, and viscous properties—Solid state of matter: Types of crystals, isomorphism, Miller index, unit cell, lattice energy and specific heats—Atomic theory and atomic weights—Thermodynamics: First and Second laws, concept of maximum work, reversibility, Carnot's cycle, Kelvin scale of temperature, entropy,

thermodynamic potentials, free energy, equilibrium, chemical potential, Gibbs-Helmholtz equation, Gibbs-Duhem equation, Duhem-Margule's equation, Clausius-Clapeyron equation, Joule-Thomson effect and the cooling coefficient—Solutions: Thermal properties, distillation of binary mixtures, azeotropism, Fractional distillation, Dilute solutions and their colligative properties, Osmotic pressure and Van't Hoff's 'i'—Colloids: Their nature, properties, classification and preparation—Thermochemistry: Hess's law and Kirchhoff's equation.

Ch. 7. Physical Chemistry II :

Chemical Equilibrium: Homogeneous systems, law of mass action, the equilibrium constant, free energy of a chemical reaction, effect of temperature, pressure, etc. on the chemical equilibrium, applications to some technical gas reactions—The Phase Rule: one component systems, two component systems, binary alloys, three component systems—Chemical Kinetics: Reactions of the first and second orders, activation theory, order of a reaction, catalysis, chain reactions, explosions—Photochemistry: Lambert and Beer's laws, Einstein's law of photochemical equivalence, hydrogen-chlorine reaction—Radioactivity and Subatomic phenomena: Discovery of radio-elements, the disintegration theory, the properties of α and β -rays, Fajan's and Soddy's displacement law, the atomic structure, isotopes, the nucleus and the artificial disintegration—Chemical Thermodynamics: Affinity and its measurement, the Third law of Thermodynamics, the chemical constant, absolute values of entropy and free energy and their application to actual reactions.

Ch. E. 3rd
Year; 2 hrs.
a week;
Lectures.

Ch. 8. Electrochemistry :

A. Theory:—Electrical conductance: the Ionic theory, transport number of ions, the ionic conductance, the complete dissociation theories of Ghosh

Ch. E. 3rd
Year; 3 hrs.
a week;
Lectures.

and Debye and Hückel, applications of conductance measurements—Equilibrium in Electrolytes: Ostwald's dilution law, activity of ions, buffer solutions, avidity, hydrolysis, neutralisation, solubility product, the theory of indicators, modern concepts of acids and bases—Electromotive Force: Electrical and chemical energies, concentration cells, liquid-liquid potential, redox potential, redox indicators, the quinhydrone electrode, the pH scale, electrodes used for pH measurement.

B. *Applications.* Electrolysis and Polarisation: Decomposition potential, Overvoltage, different types of polarisation,—Primary and secondary cells, the standard cell—Electroplating, electro-typing, electro-refining and electro-metallurgy,—Electrolysis of molten electrolytes: Sodium and Aluminium—Electrolysis of aqueous solutions: hypochlorites, chlorates, alkali-chlorine cells,—Electrochemical preparation of permanganates, perchlorates, hydrogen and oxygen and hydrogen peroxide—Electric Furnaces: Arc, Resistance and Induction types—Electrochemical Industries: Manufacture of calcium carbide, cyanamides, cyanides, carborundum, graphite, sodium sulphide, carbon bisulphide and phosphorus—Fixation of atmospheric nitrogen—Electrolytic oxidation and reduction.

Ch. 9. Physico-chemical Measurements :

Vapour density determination—Adjustment of thermostats—Determination of density and relative viscosity—Absolute viscosity of a liquid by the flow method—Surface tension by drop method and by capillary rise—Phase diagrams of the phenol-water system and of binary alloys by thermal analysis—Estimations by refractometry and polarimetry—Conductometric experiments on specific conductance, acid-base titrations and solubility of sparingly soluble salts,—Potentiometric measurements of the pH of a buffer solution, titration of a mono-basic strong acid

Ch. E. 3rd
Year;
18 hrs.
a week;
(Half year)
Practical.

by a strong monacid base and evaluation of the standard potential of a redox system—Colorimetric estimation of pH—Electro-analysis of copper and zinc in a mixture of their salts—Electrochemical preparation of potassium perchlorate and hydrazo-benzol—Purification and distillation of mercury—Transition temperature by the dilatometric method—Rate of hydrolysis of an ester—Heat of neutralisation of a strong acid by a strong base—Experiments based on the Distribution Law.

(The course is covered by 24 experiments).

Ch. 10. Chemical Engineering I :

Flow of Fluids ; Transportation of liquids and solids ; Flow of heat ; Combustion, Furnaces and Kilns ; Gas-producers ; Crushing and Grinding ; Principles and methods of mechanical separation. Filtration ; Evaporation and Evaporators.

Books recommended: Principles of Chemical Engineering by Walker, Lewis and AcAdams ; Chemical Engineers' Handbook—J. H. Perry ; Heat Transmission—McAdams ; Evaporating, Condensing, and Cooling Apparatus—Hansbrand ; Industrial Filtration—Wright ; Industrial Furnaces 2 vols—Trinks ; Chemical Engineering Economics—Tyler ; Industrial Chemical Calculation—Howgen and Watson ; Transactions of the Institute of Chemical Engineers—England ; Transactions of the American Institute of Chemical Engineers ; Chem. Plant Design—Vilbrandt.

Ch. 10A. Industrial and Chemical Engineering Calculations I :

Stoichiometry ; Ideal behaviour of gases ; Thermo-physics ; Thermo-chemistry at standard condition ; Thermo-chemistry of Industrial reactions and fuels ; Flow of fluids ; Flow of heat, Weight and Heat balances of Chemical processes ; Chemical equilibrium.

Books recommended: See under Ch. 15A.

Ch. E. 3rd
Year; 2 hrs.
a week;
Computation.

Ch. 11. Industrial Chemistry I :

Ch. E. 3rd
Year; 2 hrs.
a week;
Lectures.

Chemical Industries: Dry distillation of wood; Dry distillation of Coal; Col tar and its distillation products; Sulphuric acid; Nitric acid; Hydrochloric acid; Sodium hydroxide; Bleaching Powder; Liquid Chlorine; Sodium Carbonate.

Ch. 11A. Technical Analysis :

Ch. E. 3rd
Year;
18 hrs.
a week;
(Half-year)
Practical.

Analysis of the following substances:—Coal; Iron ores; Pig iron and Steel; Slag; Vegetable and animal oils; Lubricants; Gases; Boiler water, Sanitary water; Soaps; Paints; Fertilisers; Milk; Cement, Sugar and Rubber.

Books recommended: Technical Analysis—Aungst; Standard Methods of Chemical Analysis—Scott; Analytical Chemistry—Treadwell and Hall.

Ch. 12. Metallurgy :

Ch. E. 3rd
Year; 2 hrs.
a week;
Lectures.

(a) Metallurgical Fuels; Metallurgical terms and processes; Metallurgical Furnaces; Refractory materials. (b) Metallurgy of Iron and Steel; Mechanical treatment of Steel; Heat treatment of Steel; Alloys of Steel; Corrosion of Iron and Steel. (c) Metallurgy of the following common metals;—Copper, Lead, Zinc, Aluminium, Tin, Gold.

Books recommended:—The Metallurgy of Iron and Steel by Bradley Stoughton; The Metallurgy by Rhead; The Metallurgy of Common Metals by Austin; Engineering Materials by G. C. Banerjee.

Ch. 13. Fuels and their Combustion :

Ch. E. 3rd
Year; 2 hrs.
a week;
Lectures.

Industrial fuels; Origin, Composition, Classification and Storage of Coal; Chemistry of Combustion Reaction; Combustion Calculations; Combustion of Coal on Grates; Operation of hand-fired Furnaces; Mechanical stokers and Furnaces; Powdered Coal as Fuel. Liquid Fuels and their combustion. Gaseous Fuels, their production, properties and

combustion. Synthetic Fuels. Furnace efficiency and distribution of heat losses. Different types of furnaces, their design and construction.

Books recommended:—Fuels and their Combustion—Haslam and Russel; Industrial Furnaces, 2 vol.—Trink.

Ch. 14. Chemical Engineering II :

(a) Continuation of Ch. 10. Drying; Driers and Humidifiers; Distillation; Diffusional processes for separation of components from a mixture, e.g., Absorption, Adsorption etc. Refrigeration; Crystallisation; Temperature measurements; Chemical Engineering Economics. (b) Cost calculation and preparation of balance-sheets. (c) Materials of construction.

Ch. E. 4th
Year; 4 hrs.
a week;
Lectures.

Ch. 14A. Industrial and Chemical Engineering Calculations II :

Applications of phase rule to chemical processes; Vaporization and condensation; Refrigeration, Air-Conditioning and Drying; Distillation; Crystallization; Mechanical separation; Filtration; Extraction; Crushing and Grinding; Sedimentation.

Ch. E. 4th
Year; 2 hrs.
a week;
Computation.

Books recommended: (1) Stoichiometry—Lewis and Radasch, (2) Industrial Chemical Calculations—Hougen and Watson, (3) Principles of Thermodynamics—Goodenough, (4) Thermodynamics for Chemical Engineers—Weber, (5) Text-books of Chemical Engineering as mentioned under Ch. 10.

Ch. 15. Industrial Chemistry II :

Technological Industries: Pulp, paper, Nitro-cellulose, Artificial Silk; Starch, Glucose, Dextrin; Cane Sugar, Gurrh, Molasses; Alcohol; Tanning; Glue and Gelatine; Plastics; Matches; Fertilisers; Glass, Enamel, Pottery; Lime, Cement Plaster.

Ch. E. 4th
Year; 2 hrs.
a week;
Lectures.

Books recommended: Industrial Chemistry by Rogers and Aubert ; Industrial Chemistry by Martin ; Industrial Chemistry by Thorp ; Principles of Applied Electrochemistry by Allmond ; Industrial Chemistry by Riegel ; Synthetic Resins by Ellis ; Vegetable Casein.

Ch. 16. Chemical Engineering Laboratory and Plant Operations :

Ch. E. 4th
Year ;
20 hrs.
a week ;
Practical.

(1) Measurement of flow of fluids with orifice meters, venturimeters, rotameters, weirs etc.; (2) Flow of fluids through paths with bends, loops, expansions, contractions, etc., and through packed columns ; (3) Measurement of the approximate critical velocity of a liquid ; (4) Measurement of pump efficiency ; (5) Gage testing with deadweight testers and calibration ; (6) Measurement of heat transfer coefficients ; (7) Determination of liquid and vapour phase equilibrium of binary liquid mixtures ; (8) Determination of efficiency of a gas-fired boiler-furnace, and that of an ordinary furnace ; (9) Rate of filtration under different pressures in a recessed plate filter press, and a leaf press. More experiments will be added when equipments are available. At least one complete run of the following plants in the laboratory :—

Oil Extraction Plant, Soap plant ; Water-Distillation plant, etc.

Visits to various industrial plants.

Ch. 17. Technology of Oils and Fats :

Ch. E. 4th
Year ; 3 hrs.
a week ;
Lectures
(Elective).

Classification of Oils and Fats (Vegetable and Animal) ; Composition of Oils and Fats ; Analysis of Oils and Fat ; Recovery of Oils (Vegetable and Animal) ; Refining of Oils ; Hydrogenation of Oils ; Edible fats such as vegetable Ghee, Margarine etc. ; Soap—toilet, washing and industrial ; Fat splitting ; Application of fats to surface coverings such as Paints, Enamels, Varnishes, Polishes, Printing Ink,

Linoleum, Water-proofing, Insulating Fabrics and Oil cloth ; Fatty Lubricants ; Fat as fuel.

Books recommended: Chemical Technology and Analyses of Oils, Fats and Waxes, Vols, I, II and III by Lewkowitsch ; Industrial Chemistry (Organic) by Martin ; Hydrogenation of Oils by Ellis ; Animal and Vegetable Oils, Fats and Waxes by Martin ; Industrial Chemistry of fats and Waxes by Hilditch.

Ch. 18. Glass and Ceramic Technology :

General study of different types of refractory materials and their classification and properties with special reference to Indian fireclays. Treatment and testing of fireclays. Ch. E. 4th
Year ; 3 hrs.
a week ;
Lectures
(Elective).

Manufacture, properties and uses of :—

- (a) Fire bricks and fireclay products such as crucibles, glass house pots, furnace blocks and muffles.
- (b) Silica and sillimanite refractories.
- (c) Bauxite bricks.
- (d) Insulation bricks.
- (e) Refractory mortars and cements.

Specifications and tests for refractories with special regard to suitability for the glass industry.

Brief history of the glass industry.

Definition of glass and characteristics of the vitreous state.

Common glass forming oxides and raw materials.

General formulae for glass compositions and simple batches—

Calculation of glass composition from batches and vice versa.

Processes of melting and refining.

Outlines of glass manufacturing processes : hand methods of production.

A general treatment of glass melting furnaces, annealing kilns and lehrs, pot arches and glory holes.

Important properties of glasses as related to chemical composition.

- (a) Mechanical properties: Sp. gravity, elasticity and strength.
- (b) Thermal properties: Expansion, sp. heat and conductivity.
- (c) Viscosity: Adaptability of chemical composition to manufacturing processes.
- (d) Thermal Endurance.
- (e) Chemical durability.
- (f) Optical properties: refractive index, dispersion and absorption.

Decolorising of glass.

Annealing of glass.

Batches and compositions for various types of glasses, such as bottles, tableware, sheet glass, chemical ware etc.

Classification of glassware.

Outlines of important manufacturing processes: Mechanical and automatic methods for bottles, pressed ware, sheet and plate, tubing etc.

Decorative processes: enamelling, etching, frosting etc.

Devitrification and common defects in glassware.

Books recommended:

1. Textbook of glass technology—Hodkin & Cousen.
2. Modern Glass Practice—S. R. Scholes.
3. Defects in glass—C. J. Peddle.
4. Glass: The Miracle Maker—C. J. Phillips.
5. Properties of Glass—G. W. Morey.
6. Manufacture, Properties and Uses of Refractory Materials—A. B. Searle.
7. Refractories—Norton.

Soap Technology :

A special course of 15 to 20 lectures is arranged every year.

For the laboratory courses Ch. 2A, Ch. 4A, Ch. 5A and Ch. 9. 30 per cent of the total marks will be allotted to a written examination to be held immediately at the end of the laboratory course by the teachers in charge of the course.

D. Ch. 1. Chemistry :

Fundamental units ; Ordinary laboratory processes for purification of substances ; Pure substances ; Elements and compounds ; Symbols, Formulae ; Terminology and Nomenclature ; Three states of matter ; Gas Laws ; The Study of air and water ; Oxygen and combustion ; Hydrogen and water ; Solutions ; Nitrogen and Atmosphere ; Oxides of Nitrogen and Nitric acid ; Atoms and molecules ; Chlorine ; Hydrochloric acid ; Ammonia ; Acids, Bases and Salts ; Simple idea of laws of Chemical Combinations ; Chemical equations.

D. 1st
Year ; 2 hrs.
a week ;
Lecture.

D. Ch. 1A. Chemical Laboratory :

Simple laboratory methods of purification of substances, *e.g.*, filtration, evaporation, distillation, sublimation and crystallisation ; fitting up of a wash bottle, simple methods of glass blowing.

D. 1st
Year ; 2 hrs.
a week ;
Practical.

Preparation and study of the properties of the following gases :—Hydrogen, Oxygen, Chlorine, Ammonia and Carbon dioxide.

Determination of the solubility and yield of a crystalline substance like copper sulphate or potassium nitrate.

D. Ch. 2. Chemistry.

Carbon and its allotropic forms ; Oxides of Carbon ; Methane ; Ethylene ; Acetylene ; Coal

D. 2nd
Year; 2 hrs.
a week;
Lecture.

Gas; Sulphur and its allotropic modifications; Hydrogen sulphide; Oxides of sulphur; Sulphurous and sulphuric acids; Phosphorus; Metals and non-metals; Elementary study of the following metals and their salts of common acids—Sodium, Potassium, Calcium, Magnesium, Iron, Copper, Zinc, Lead.

Ag. Ch. 1. Elementary Farm Chemistry :

Agri 1st
Year; 2 hrs.
a week;
Lecture
& 4 hrs.
a week;
Practical.

A study of the general principles underlying the science, and detailed study of the occurrence, properties and uses of the more important metallic and non-metallic elements and their compounds with special reference to Agricultural problems. Common saturated hydrocarbons, fats, oils, carbohydrates, proteins and other organic compounds are also studied.

ELECTRICAL ENGINEERING

E. E. 1. Principles of Electrical Engineering I :

A detailed study of the Units and laws of Electric and Magnetic Circuits; Chemical effect of Current; Principles of Storage Batteries; D. C. Circuits and Networks; Elements of measuring Instruments; Vector Algebra; the Elementary Alternator; Effective Current and Voltage; Complex Quantities used in Electrical Engineering; Circuits containing Resistance, Inductance and Capacity; Series, Parallel and Series-parallel Circuits; Power-factor.

E.E. &
M.E. 2nd
Year; 3 hrs.
a week;
Lecture.

E. E. 2. Electric Wiring and Installations :

Conductors; Insulators; Installation Materials; Industrial Lighting and Domestic Wiring installations; Lighting and Illumination; Domestic Loads; Determination of size of Conductor; Voltage Drop; Heating; Switching and fusing; I.E.E. and Indian Electricity Rules; Design and Estimating of a Domestic Installation.

E.E. &
M.E. 2nd
Year; 1 hr.
a week;
Lecture.

E. E. 3. Direct Current Machines :

Principles of Generation of Direct Current. Armature Windings; Magnetisation Curve; Armature Reaction; Operating Characteristics of D. C. Generators; Compensation of Armature Reaction; Commutation; D. C. Motors; Efficiency; Rating and Heating; Generators for special purposes; Parallel Operation of Generators.

E. E.E. &
M.E. 2nd
Year; 2 hrs.
a week;
Lecture.

E. E. 4. Principles of Electrical Engineering II :

Balanced and Unbalanced Polyphase Circuits; Measurement of Power in Polyphase Circuits; Mutual Induction; Non-Sinusoidal Waves; Harmonic Analysis; Growth and Decay of Current in D.C. and A.C.

E.E. 3rd
Year; 3 hrs.
a week;
Lecture.

Circuits ; Magnetic Circuit and Inductance of Cables and Overhead Lines ; Dielectric Circuit and Capacitance of Cables and Overhead Lines.

E. E. 5. Differential Equations and Operational Calculus :

E.E. 3rd
Year ; 2 hrs.
a week ;
Lectures.

Differential equations of the second order and of the second degree. Homogenous equations with constant Coefficients. Heavysides' Operator, Direct Operational Methods, Series expansion of operators, Special circuit problems and artifices, Solution of networks with constant parameters or problems of a sudden short-circuit, a sudden discharge of a line, lightning surges, transients etc. study of Hyperbolic functions.

E. E. 6. Alternating Current Machines I :

E.E. 3rd
Year ; 4 hrs.
a week ;
Lectures.

Alternators ; Transformers ; Induction Motors ; Synchronous Motors ; Parallel Operation of Alternators.

E. E. 7. Alternating Current Machines II :

E.E. 4th
Year ; 2 hrs.
a week ;
Lecture.

Single-phase Induction, Series and Repulsion Motors ; Rotary Convertors ; Motor Convertors ; Frequency Convertors ; Phase Advancers ; Mercury Arc Rectifiers.

E. E. 8. Electrical Measuring Instruments :

E.E. 3rd
Year ; 1 hr.
a week ;
Lecture.

Ballistic Galvanometer ; Flux meter ; Photo-electric Photo-meter ; Ohm-meters ; A. C. Wattmeters ; Asiatic Indicating Ammeters, Voltmeters and Wattmeters ; Single-phase and Polyphase Watt-hour meters ; Reactive K. V. A. Meter ; K. V. A.-meter ; Demand meter ; Instrument Transformers ; Frequency Meter ; Power-factor meter ; Phase Rotation Indicator ; Synchroscope ; Recording Instruments ; Study of Methods of Control ; Damping ; Response, Bearing, etc.

E. E. 9. Electric Power Distribution :

D. C. Distribution Systems ; Boosters and Balancers ; Low-Tension and Medium-Tension A. C. Distribution Systems ; Line Insulators ; Poles and Masts ; Approximate Sag-tension Calculations ; A.C. Distribution Voltage Regulators ; High Voltage A. C. Distribution over short Transmission Lines ; Approximate Method of Solution ; Distribution System Design Economics ; Indian Electricity Rules and other Regulations. Sub-Stations.

E.E. 4th
Year ; 2 hrs.
a week ;
Lecture.

E. E. 10. Electric Power Transmission :

Hyperbolic Functions ; Long Transmission Line with uniformly distributed Resistance, Inductance and Capacitance ; Transmission Line Conductors ; High Voltage Line Insulators ; Extra High Voltage Cables ; Mechanical Design of Transmission Lines ; Economics of Span Design ; Corona Effect ; Inductive Interference ; Line Performance diagrams ; Power Limits and Stability ; Travelling Waves ; Transmission Line Protection.

E.E. 4th
Year ; 2 hrs.
a week ;
Lecture.

E. E. 11. Electric Generating Station :

General layout of Dissel, Steam and Hydraulic Power Plants. Location of Generating Units and Auxiliaries, Switchgear, Transformers and Control. Principles of paralleling Alternators, Generating Stations and Sub-Stations. Voltage and Frequency Control of Alternators, and Stations and Sub-Stations. Base-load and peak-load units. Scheduling and transferring loads amongst alternators in a station, amongst generating stations in a grid system.

E.E. 4th
Year ; 2 hrs.
a week ;
Lecture.

Calculation of short-circuit currents. Methods of limiting short-circuit currents by reactors. Determination of circuit-breaker capacity. Choice of circuit-breakers and relays for protection of generators and transformers. Layout of bus-bars and switchgear.

Generating Stations Logs ; Load Curves—Chronological load curve, load duration curve and energy load curve ; Load Topographs. Station Factors—Load Factor, Capacity Factor, Utilization Factor, Demand Factor, Peak Diversity Factor. Cost of power generated.

Principles of Rate-making for different kinds of consumers.

Principal Tariffs—Flat Rate Tariff (Two-rate, Multi-rate), Block Rate (Sliding Scale) Tariff, Maximum Demand Tariff, All-in-Tariff etc. Rate Adjustments.

E. E. 12. Power Utilisation and Traction :

E.E. 4th Year ; 2 hrs. a week ; Lecture.
Characteristic Curves of Motors. Mechanical features of motors. Types of drives. Winding Insulation of Motors. Bearings.

Kinds of service—Constant duty, varying load duty, pulsating load, impulse load, short-time load and intermittent duty. Methods of determining power requirements.

Suitability of different kinds of motors for different services. Principal limitations of motor rating.

Electric Railways, Tramways and Trolley Buses. Systems of Power supply. Speed-time Curves, Acceleration, Train Resistance, Energy Consumption. Characteristics of Traction Motors. Regenerative and other Braking.

E. E. 13. Electrical Measurements :

E.E. 4th Year ; 1 hr. a week ; Lecture.
Principles of Selection of Instruments ; Standardising Laboratory Technique ; Calibration of Instrument Transformers ; Technique of Meter Testing ; Verification of Polyphase Meter Connections ; Load Totalising and Telemetering ; D. C. and A. C. Bridges ; Principles and Applications of D. C. and A. C. High Voltage Testing ; The Sphere Gap ; Electrostatic Voltmeter ; Surge Testing ; Clydonograph ;

Kathode-Ray Oscillograph ; Magnetic Measurements ; Photometric Measurements.

E. E. 14. Telegraphy and Telephony I :

E.E. 4th Year ; 2 hrs. a week ; Lecture.
Transmitter ; Receiver ; Induction Coil, its uses ; Classification of Telephone Installations ; Signalling ; Magneto-telephone system ; Central Battery Telephone System ; Switch Board Connections and Operation ; Non-multiple Common Battery System ; Multiple Common Battery System ; Universal Switch Board ; Multi-office Manual Switch Board ; Telephone Protective Devices ; Automatic System ; Vacuum Tubes ; Telephone Repeaters ; Influence of Resistance, Inductance and Capacitance on Speech Transmission ; Cross Talk and its elimination ; Line Loading ; Phantom Circuits ; Morse Characters ; Relays ; Keys ; Sounders and other Apparatus ; Single Current and Double Current Systems ; Simplex and Duplex Telegraph ; Telegraph Repeaters ; High-Speed Telegraph System.

E. E. 15. Telegraphy and Telephony II :

E.E. 4th Year ; 2 hrs. a week ; Lecture.
Properties of High Frequency Alternating Currents ; Properties of Iron-core Coils ; Incremental Permeability ; Inductance of Iron-core Coils with Direct and Alternating Current Superimposed ; Condensers ; Resonance ; Coupled Circuits ; Vacuum and Gas Tubes Thermionics ; Potential Distribution in Tubes ; Valve Capacities ; Multiple Grid Valves ; Rectifying Valves and Power Supplies ; Valve Detectors ; Valve Oscillators ; Types of Oscillation Circuits ; Conditions of Maintenance of Oscillation ; Frequency Control and Stabilisation ; Radio Frequency Amplifiers ; Neutralisation ; Audio-Frequency Amplifiers ; Resistance-Capacity Coupling ; Transformer Coupling ; Amplification and its Measurement ; Power Amplifier ; General Theory of Wireless Transmission and Reception ; Reflection, Refraction, Defraction and Polarisation ; Field Strength and Radiated Power of Aerial and its Radiation Resistance ; Modulation ;

Carrier Waves and Side Bands ; Long Distance Telegraphy and Telephony.

E. E. 16. A. C. Machines and Power Distribution:

M.E. 3rd
Year; 3 hrs.
a week;
Lecture.

Elementary Principles of Alternating Current ; Poly-phase Circuits ; Construction, Operation and Simple Characteristics of Alternators ; Transformer, Induction Motors, Synchronous Motors, Rotary Convertors and other important machines ; A. C. Instruments ; Elements of Electric Power Distribution including use of Switch Gears, Insulators and Protective Devices.

E. E. 17. Electrical Engineering :

Ch. E. 2nd
Year; 3 hrs.
a week;
Lecture.

General Laws and Definitions ; Principles of Direct Current and Circuit ; Calculations. Induction of Currents ; Flemings Rule ; Lenz's Law ; Practical application of Induction ; Self and Mutual Induction. Magnetic Properties of Materials ; General Laws and Terminology ; Magnetic Circuit ; Calculations. Electrical Measurements and Measuring Instruments.

Dynamos and Motors ; Principles involved ; Different Types and their functions ; Management ; Power and Efficiency Calculations. Accumulators ; Principles involved ; Construction and maintenance.

Principles of Alternating Currents ; Circuit Calculations ; Single-phase, two-phase and three-phase current ; Vector diagrams ; Simple Alternator ; Induction and Synchronous Motor ; Elementary Theory of Transformers and their uses ; Rotary Converter and Rectifiers.

Power Transmission ; Switchboard Diagrams ; Advantages of high tension Alternating Current Transmission. Electro-deposition of Metals ; Utility of A. C. and D. C. compared with respect to the adaptability to Chemical Industry. Cost of generation and upkeep.

E. E. 17A. Electrical Engineering Laboratory :

1. Measurement of Resistance ; 2. Measurement of Internal Resistance of Storage Battery ; 3. Calibration of Ammeter and Volt-meter ; 4. Study of Energy-meters ; 5. Study of D. C. Generators (Shunt, Series and Compound) ; 6. Characteristics of an A. C. Series Circuit ; 7. Study of Alternators (Single and Poly-phase) ; 8. Measurement of three-phase Power by Two Wattmeters ; 9. Synchronising and Parallel operation of two Alternators ; 10. Study of a Poly-phase Induction Motor ; 11. Study of a Transformer ; 12. Study of a Rotary Converter ; 13. Study of an Induction Regulator.

Ch. E. 2nd
Year; 2 hrs.
a week;
Practical.

E. E. 18. Electrical Drawing :

Standard Symbols ; Armature Winding Diagrams ; Outline Drawings of Generators, Motors, Switches etc. ; Sectional Drawing of D.C. Generator or Motor and D. C. Circuit Breaker ; Standard Circuits ; Curve Tracing ; Nomography ; Problems in D. C. Machines and Circuits.

E.E. &
M.E. 4th
Year; 3 hrs.
a week;
Practical.

E. E. 19. Electrical Design and Drawing :

Design and estimating of a Factory Lighting and Power Wiring System ; Sectional Drawing of Different Types of Conductors and Cables ; Design of Electromagnets, Regulators and Heaters.

E.E. 3rd
Year; 3 hrs.
a week;
Practical.

E. E. 20. Electrical Project and Design :

Design of an Electrical Project ; Design of D. C. Machine ; Alternator, Transformer, Induction Motor and Converter.

E.E. 4th
Year; 6 hrs.
a week;
Practical.

E. E. 21. Electrical Engineering Calculations :

Calculations covering subjects E. E. 4, E. E. 6 and E. E. 8.

E.E. 3rd
Year; 2 hrs.
a week;
Computation.

E. E. 22. Electrical Engineering Laboratory I :

E.E. &
M.E. 2nd
Year; 3 hrs.
a week;
Practical.

1. To measure resistance by ammeter and voltmeter method.
2. Calibration of voltmeter and ammeter by comparison.
3. Study of a Direct Current Generator.
4. Calibration of a D. C. Ampere-hour meter.
5. Measurement of Permeability.
6. Magnetization Curve of a D. C. Generator.
7. Characteristic Curves of Shunt and Compound Generators.
8. Characteristic Curves of Series Generator.
9. Determination of Losses and Efficiency of D. C. Generator.
10. Performance Curves of a Series Motor.
11. Performance Curves of Shunt and Compound Motors.
12. Parallel Operation of Generators.
13. Characteristics of A. C. Series Circuit.
14. Characteristics of A. C. Parallel Circuits.
15. Operation tests in Storage Battery.
16. Localisation of Faults in Electric Mains by Murray's Loop Method.

E. E. 23. Electrical Engineering Laboratory II :

E.E. &
M.E. 3rd
Year; 3 hrs.
a week;
Practical.

1. Separation of losses in a D. C. Generator.
2. Efficiency Test on a Shunt Motor by Hopkinson Method.
3. Study of Rosenberg type of Train Lighting Generator and System.
4. Magnetization Curve of an Alternator and Determination of its Regulation by Synchronous-impedance Method.
5. Measurement of Power and Power-factor of a 3-phase system by two watt-meters.
6. Measurement of Slip of an Induction Motor by Sector-disc Method.
7. Regulation and Efficiency of a Transformer from losses.

8. Performance Curve of an Alternator.
9. Effect of variation of Excitation of a Synchronous motor at constant load.
10. Performance Curves of Induction Motors.
11. Characteristic Curves of a Synchronous Converter and Inverted Rotary.
12. Performance and Vector Diagram of an Induction Regulator.
13. Heat Run on a Transformer.
14. Balance on a 3-wire System with two Shunt Machines.
15. Separation of Iron Losses of a Transformer.

E. E. 24. Electrical Engineering Laboratory III :

1. Transformer Connections and Determination of Ratio of Transformation. E.E. 4th Year; 6 hrs. a week; Practical.
2. Dielectric Strength of Insulating Oil.
3. Circle Diagram of Induction Motor.
4. Calibration of A. C. three-phase watt-hour meter.
5. Commercial Test on three-phase Alternator.
6. Efficiency and other Tests on Storage Battery.
7. Photometric Test on Incandescent Lamps.
8. Performance Test on Induction Generator and Motor.
9. Test on three-phase Pole-changing Induction Motor.
10. Standardisation of Ammeters and Voltmeters.
11. Test on Repulsion Motor.
12. Test on Rosenberg Generator.
13. Testing of Rectifier Valve with Oscillographic Record of Current.
14. Characteristics of Thermionic Valves and Determination of its Constants.
15. Measurement of Capacity and Inductance.
16. Setting up of High Frequency Oscillator.
17. Setting up of a Receiving Circuit.
18. Experimental study of characteristic of detectors and vacuum tube Voltmeter.

19. Determination of value of constants by dynamic method.
20. Study of Magneto and Common Battery Telephone system.
21. Measurement of High Voltage by Sphere-gap.
22. High-voltage Tests on Line Insulators.
23. Testing of Insulation by High-voltage Direct Current.
24. Tests on Mercury Arc Rectifier.

E. E. 25. Electrical Workshop :

E.E. 4th
Year; 3 hrs.
a week;
Practical.

1. Overhauling of Electric Machines.
2. Locating Faults in Electric Mains.
3. Insulation Resistance of Electric Machines and Installations and Calculation of Leakage Current.
4. Measurement of Resistance of Earth Plate.
5. Winding of Armature, Field, etc.
6. Jointing of Overhead Electric Lines.
7. Underground Cable Joints.

E. E. 26. Abstract :

E.E. 4th
Year; 2 hrs.
a week;
Recitation.

In this course each student will be required to write an article of about 2000 words on a current engineering topic assigned by the teacher and gives concise talk on the subject for 10 minutes in the class, by rotation. The result of these assignments will be considered as that of practical work. There will be no written examination for this course.

D. E. E. 1. Electrical Engineering :

D. 2nd
Year; 2 hrs.
a week;
Lecture.

Properties of materials used in electrical work ; Electric units ; General Laws ; Specific resistance and calculation of resistance ; Effect of heat on electrical resistance ; Electrical properties of materials ; Equivalent resistance of electrical circuits in series and, or parallel.

Magnetic, thermal and chemical effects of current ; Current ; Potential and fall of potential in electric circuits, Calculation of size of cable for different electrical circuits ; Power and energy ; Relation between electrical and mechanical units of power.

Magnetic properties of materials ; Electromagnets and rules for finding polarity ; Lines of force of a magnet ; Magnetic pull on a current carrying conductor ; Magnetic circuits ; Magnetising force ; Flux, flux density and permeability ; Hysteresis effect.

Condenser ; Capacity and Energy.

D. E. E. 2. Electrical Engineering I :

Direct Current Electrical Engineering—Measuring Instruments ; Measurement of resistance, Current, Voltage, power and energy ; Ammeter, Voltmeter, Wattmeter and energy-meter. D. 3rd
Year; 2 hrs.
a week;
Lecture.

Storage Batteries :—Chief types ; installation, capacity and efficiency ; Charging and discharging ; Connection, operation, care and maintenance.

Direct current machines :—Different types of generators and motors ; Armature windings ; Operating characteristics ; Efficiency and losses ; parallel running of generators ; Speed control of motors ; Boosters and balancers ; Installation ; Operation ; Repair ; Care and maintenance.

D. E. E. 3. Electrical Engineering II :

Alternating Current Electrical Engineering—Principles of Alternating Current ; Sine waves of voltage and current ; Effective and average values ; Circuits containing resistance, inductance and capacitance ; Calculation of conductance, susceptance, admittance and impedance ; Resonance ; impedances in series, parallel and mixed circuits ; Frequency, power factor and measurement. D. 3rd
Year; 2 hrs.
a week;
Lecture.

Alternating current machines ; Synchronous generators and motors ; Transformers ; Rotary converter ; Single and poly phase induction motors ; Synchronising and parallel operation of generators ; Installation, operation, repair, care and maintenance.

D. E. E. 4. Electrical Engineering Laboratory :

D. 3rd
Year; 3 hrs.
a week;
Practical.

- To study different parts of a dynamo.
- To study M.I. and M.C. types of voltmeters and ammeters.
- Measurement of resistance by voltmeter and ammeter.
- To find resistance of armature and field coils.
- Cable joints and soldering.
- Insulation resistance of a plant while working by a voltmeter of known resistance.
- Calibration of voltmeter, ammeter and house-meter.
- No load characteristic of a D.C. generator.
- External characteristic of a shunt generator.
- Armature winding.
- To sketch out switch-board connections.
- Variation of speed of a shunt motor.
- To run a compound motor and to reverse the direction of rotation.
- To run a series motor with drum type controller.
- To study the use of a meggar.
- To test and locate faults in armature, field coils and commutator.
- Wiring, calculation of size of cable and cost.
- To charge storage battery and measurement of internal resistance.
- Study of A.C. series and parallel circuits.
- Three-phase connection in delta and star.
- Synchronising 3-phase alternators.
- To run induction motor and to reverse direction of rotation.
- To connect transformers in delta, star and open delta.
- Measurement of 3-phase power by two wattmeters.

O. E. E. 1. Elementary Electrical Engineering :

Lightning conductor—parts used in and general rules for erection ; function of the lightning conductor, earth resistance and method of measuring it. Tests.

O. 3rd
Year; 3 hrs.
a week;
Lecture.

House Wiring—Layout of simple D.C. distribution systems—working of simple switch boards. Protection devices and fault in a small power station.

DRAWING

D. 1. Drawing :

Construction of Scales ; Construction of Curves ; Orthographic and Isometric Projections ; Sections in Orthographic projections ; Conventions in Mechanical Drawing ; Dimensioning ; Working Drawing of simple machine parts such as bolts, nuts, studs, rivetted joints, keys, fly-wheel, pulleys, coupling brackets ; Tracing and Blue-printing.

Ch. E. &
Eng. 1st
Year; 6 hrs.
a week;
Practical.

D. 2. Descriptive Geometry :

Four angles of Projection in Orthographic projection ; Problems on Points, Lines, Planes, and Solids ; Sections and Developments ; Tangent lines and planes, Warped surfaces ; Interpenetration.

E.E. &
M.E. 1st
Year; 3 hrs.
a week;
Practical.

D. D. 1. Drawing :

Use of Drawing instruments ; Lettering ; Division of lines and angles ; Construction of plane geometrical figures ; Area and similar figures ; Scales (plane and diagonal) ; Construction of Ellipse, Parabola, Hyperbola, Cycloid and involute.

D. 1st
Year; 9 hrs.
a week;
Practical.

Plan, elevation and section of simple solids ; singly or in combination ; Sections of standard screw threads, projection of threads ; Standard bolts and nuts.

D. D. 2. Drawing :

D. 2nd
Year; 6 hrs.
a week;
Practical.

Isometric scales and isometric projection of joints used in carpentry work; Plan, elevation and end view of simple machine parts, such as rivetted joints, screws, bolts, nuts, keys, shaft, shaft-coupling, pulleys, bearings, etc.

Sketching and preparing drawings from sketches of simple machines such as Polishing Lathe, Press-machine, Screw Jacks, etc.

D. D. 3. Drawing :

D. 3rd
Year; 9 hrs.
a week;
Practical.

Working drawing of machine parts; Engine details; Tracing; Blue-printing; Machine sketching; Making of assembly and working drawings from sketches; Reading and checking of drawings.

ENGINEERING MECHANICS**E. M. 1. Engineering Mechanics I :**

Ch. E. &
Engg. 1st
Year; 3 hrs.
a week;
Lecture.

Displacement; Velocity; Acceleration; Graphical representation of displacement, velocity and acceleration; Vector Quantities; Velocities, Accelerations etc. considered as Vectors; Composition and Resolution of Velocities; Relative velocity; Composition and Resolution of acceleration; Angular velocity and acceleration.

Motion under gravity; Motion on inclined planes; Projectiles; Inertia, Laws of Motion; Weight, Momentum, Units of force; Motion of connected bodies, Attwood's Machine.

Work, graphical representation of Work; Power, Energy, Principle of Work; Conservation of energy.

Circular motion, Centrifugal and centripetal force, Motion in a curved track, Conical pendulum, Simple harmonic motion, Forces in simple harmonic motion, Alternating Vectors, Simple pendulum.

Concurrent forces, Composition and resolution of forces; Triangle of forces; Polygon of forces;

Analytical and graphical methods; Physical independence of forces; Moment of a force; Work done by torque; Sliding friction; Angle of friction; Action of Brakes; Friction and Efficiency of screw.

Statics of rigid bodies; Parallel forces; Moments; Principle of moments; Couples; Conditions of equilibrium; Analytical methods; Methods of sections.

E. M. 2. Engineering Mechanics II :

Centre of parallel forces; Centre of mass; Centre of gravity; Different states of equilibrium; Theorem of Guldinus or Pappus; Moment of Inertia; Radius of Gyration; Changes of energy and speed; Laws of rotation of a rigid body; Kinetic energy of rotation; Compound pendulum; Torsional and compound harmonic motion; Kinetic energy of rolling bodies.

Graphical statics; Bow's notation; Funicular polygon; Bending Moment and Shearing Force Diagrams; jointed structures; Stress Diagrams; Roof Frame and Girder; Loaded strings and chains.

Machines, Effort and Resistance, Mechanical advantage, Velocity ratio and Efficiency of machine, Rolling friction; Journal friction; Friction of Flat and V-band on pulleys; Brakes.

E. M. 3. Engineering Mechanics :

Centre of parallel forces; Centre of mass; Centre of gravity; Different states of equilibrium; Theorem of Guldinus or Pappus; Moment of Inertia; Radius of Gyration; Laws of rotation of rigid body; Kinetic energy of rotation; Kinetic energy of a rolling body.

Graphical statics; Bow's rotation; funicular polygon; Bending moment and Shearing force diagrams; jointed structures; Stress Diagrams; Roof frame and Girder; Loaded strings and chains.

Law of machines; Velocity ratio; Mechanical advantage and efficiency of simple machines as Jack screw, Pulley blocks, wheel and axle, worm and wheel.

E.E. &
M.E. 2nd
Year; 3 hrs.
a week;
Lecture.

Ch. E. 2nd
Year; 3 hrs.
a week;
Lecture.

Friction in Bearing ; Belt friction ; Transmission of Motion by Belts, Ropes and Chains, Friction gearing, spur gearing, wheel train, Rack and Pinion ; Crank and connecting rod mechanism, quick return motion, cams, ratchets.

E. M. 4. Strength of Materials and Theory of Structures :

M.E. 3rd Year ; 4 hrs. a week ; Lecture.

Strength and resistance of Materials—Strain and stress, Elasticity, Rigidity, Stress Strain diagram, Resilience and Shock, Thin Cylindrical Shell subjected to internal pressure, Torsion, Angle of twist of a shaft, Moment and resistance of a shaft to torsion, Helical springs, Bending moment and Shearing force diagrams, Bending of beams under various loads, Bending and shearing due to travelling loads, Bending and shearing forces in different planes, Stress introduced due to bending and shearing, Moment of resistance to bending, Bending beyond elastic limit and rupture. Deflection of beams, Deflections from bending moment diagrams, Deflection of beams having fixed ends, Propped up beams, Continuous beams and theorems of three moments, Resilience of Beams, Compound strain and stresses, Principal stresses due to combined bending and twisting, equivalent bending and twisting, Ellipse of stress, eccentric loading, bending combined with torsion and compression, Strength of a Ring, Poisson's ratio, Thick hollow cylinder subject to internal pressure, Column and struts, Euler's Theory of long columns, Rankine-Gordon Formulae for struts, Stress diagram for wind pressure, Roof-trusses, Beams and Girders.

Masonry structures, Retaining walls and Gravity Dams ; Reinforced Beams, Framed structures and foundation for Buildings.

E. M. 5. Strength of Materials :

E. E. & Ch. E. 3rd Year ; 3 hrs. a week ; Lecture.

Materials of Construction ; Physical and Mechanical properties, Characteristics and uses of Cast Iron, Steel, Non-ferrous Metals and alloys, such as, bear-

ing metals, stellite, etc. ; Concrete, Wood, Fire-clay, Fire Brick, Cement, etc.

Preservation of materials from natural decay—corrosion of metals and its prevention.

Simple stress and strain ; Elasticity, Rigidity, Hook's Law, Stress-strain diagrams ; Resilience and Shock.

Ultimate strength of materials, Working stress, Factor of safety, Thin cylindrical shell subjected to internal pressure, Rivetted joints.

Bending moment and Shearing Force diagram by analytical method for (a) Cantilevers and beams with single and multiple concentrated loads, and (b) Cantilevers and beams with uniformly distributed loads.

Torsional stress and Moment of Resistance of shaft to torsion.

Stress induced by Bending ; Moment of Resistance to Bending ; Neutral axis ; Section Modulus ; Deflection of beams in simple cases.

Compound stress and strain ; Principal stresses due to combined Bending and Twisting ; Bending with Tension and Compression ; Eccentric Loading.

Poisson's Ratio ; Thick Cylinder subjected to pressure ; Euler's Theory of columns and struts ; Rankine Gordon formula for struts.

Application of the foregoing in the design of simple machine elements such as cylindrical vessels subjected to internal and external pressure, Rivetted joints, Bolts and nuts, screws, cotters, keys, couplings, Belts, Pulleys, Spur wheels, Shafts, Journals and Bearings, Worm and Wheel.

E. M. 6. Technical Dynamics :

M.E. 4th Year ; 1 hr. a week ; Lecture.

Dynamics of Machinery, Effort, Acceleration and velocity diagram, Angular velocity diagrams, Piston or Slider and connecting rod velocity diagram, Piston Effort diagram, Crank Effort diagram, Forces in the Reciprocating parts, Fluctuation of Energy in Steam and Internal Combustion Engines, Fly-Wheel,

Governor, Loaded Governors, Effect of Friction on Governors, Power, Effort and Sensitiveness of Governor and Balancing of Engine ; Vibration problems ; Damped vibration ; Torsional vibration.

E. M. 7. Mechanics Laboratory :

E.E. &
M.E. 2nd
Year ; 2 hrs.
a week ;
Practical
(Half-year).

Determination of coefficient of sliding friction ; Angle of friction ; belt friction ; bearing friction ; bearing friction losses ; moment of inertia of fly-wheel by method of rotation and oscillation ; Mechanical advantage and efficiency of various mechanisms such as pulley blocks, Jack screw, wheel and axle, differential wheel and axle, crabs and winches etc. ; determination of law of machines.

E. M. 8. Engineering Computation I :

E.E. &
M.E. 1st
Year ; 1 hr.
a week ;
Lecture.

Approximation. Interpolation. Uses of the Slide Rule. Investigation of the Units. Mensuration. Methods of computing areas of irregular curved figures. Uses of Planimeter in measuring areas. Finding areas by (a) Method of averaging boundaries ; (b) Method of counting squares ; (c) the Computing Rule ; (d) the Trapezoidal Rule ; (e) Mid-ordinate Rule ; (f) Simpson's Rule ; (g) Graphical Method of Summation. Calculation of Volumes.

Application of the method of determinants in solving equations. Vector Algebra.

E. M. 9. Engineering Computation II :

M. E. &
E.E. 2nd
Year ; 2 hrs.
a week ;
Lecture.

Sketching of curves of different types, including Parabola, Hyperbola, Curves representing Exponential Functions, Catenary, Sine Curves and Simple Harmonic Motion, Compound Periodic Curves, Summation, Subtraction, Multiplication and Division of Curves. Graphical Solution of Simple Equations. Determination of Laws for Curves.

Practical ideas of differentiation. Graphical differentiation. Meaning of Integration ; Graphical Integration. Planimeter and its theory. Applications

of Integration. Determination of First and Second Moment of Section by means of Graphical Construction. Nomography.

D. E. M. 1. Mechanics and Mechanism :

Measurement of Forces, Addition of Forces by Vectors, Triangle and Polygon of Forces, Resultant and Component of Forces, Moments, Couples, Crank and Levers, Centre of Gravity. D. 2nd
Year ; 3 hrs.
a week ;
Lecture.

Laws of Motion, Velocity, Acceleration, Momentum, Impulsive Force, Work, Energy, Power, Measurement of Power, Brakes.

Circular motions and Simple Vibrations, Simple Frames, Principle of Work applied to Machinery, Friction and Lubrication, Inclined planes, Screws, Work lost in friction, Ball and Roller Bearings.

Simple Machines, Velocity ratio, Mechanical advantage and efficiency of Machines, Jack Screw, Pulley Blocks, Wheel and Axle, Lifting Machines.

Transmission of Motion and Power, Belt drive, Speed cones, Driving by chains and ropes, Friction gearing, Spur gearing, Rack and Pinion, Worm and Wheel.

Simple Mechanism, Crank and Connecting rod, Quick-return motion, Ratchets, Cams, etc.

D. E. M. 2. Applied Mechanics :

Moment of Inertia, Strength and Stiffness of Materials, Stress and Strain, Laws of Elasticity, Springs, Bending, Shearing and Twisting, Resistance to Bending, Shearing and Twisting, Jointed Structures, Stress Diagram, Roof-frame and Girder, Riveted Joints and Pressure Vessels. D. 3rd
Year ; 3 hrs.
a week ;
Lecture.

HYDRAULICS—Press, jack, accumulators, lifts, cranes, head, pressure, buoyancy, density.

RECIPROCATING PUMPS—Suction, Single and double acting force pumps.

WATER IN MOTION—Orifices, head, energy, flow, water wheels, turbines.

Venturimeter, Pitot tube, Current meters, etc.

O. E. M. 1. Applied Mechanics I :

O. 1st
Year; 3 hrs.
a week;
Lecture.

- (1) Fundamental units.
- (2) Motion :—Velocity and speed ; Linear velocity and acceleration ; Angular velocity, Circular motion ; Composition and Resolution of velocity ; Velocity considered as Vector ; Motion with uniform acceleration, Motion under gravity, Motion down a smooth inclined plane.
- (3) Force, Inertia, Momentum, Laws of Motion ; Measurement of Force ; Concurrent and non-concurrent Forces ; Parallel Forces ; Couples ; Composition and Resolution of Forces ; Forces as Vectors ; Equilibrium of Forces ; Centre of gravity ; Determination of Centre of gravity.
- (4) Work, Power, Energy.
- (5) Application of the foregoing in Levers, Pulleys and Balances.

O. E. M. 2. Applied Mechanics II :

O. 2nd
Year; 3 hrs.
a week;
Lecture.

- (1) Graphical Statics ; Funicular Polygon ; Bending Moment and Shearing Force in Beams, Roof frames and Stress Diagrams.
- (2) Electricity, stress, strain, Hooke's Law, Stress Strain Diagram, Elastic Limit, Ultimate stress, Working stress, Factor of safety.
- (3) Bending Moment and Shearing Force Diagrams of Simple Beams and Cantilevers.
- (4) Moment of Inertia, Moment of Resistance, Section Modulus, Neutral Axis, Stiffness of Beams, Deflection Formula in Simple cases.
- (5) Rivet Joints in Frames and Structures, Columns & Struts.

MECHANICAL ENGINEERING

M. E. 1. Applied Thermodynamics :

This course embraces the Study of the Principles of Thermodynamics governing the various forms of Heat Engines and Heat Producers such as :—Steam Engine, Steam Turbine, Oil and Gas Engines, Boiler, Compressors, etc., etc. E.E. &
M.E. 2nd
Year; 3 hrs.
a week;
Lecture.

Heat units, Measuring Instruments, Laws of Thermodynamics, Mechanical Equivalent of Heat, Laws of Perfect Gases and their Characteristic Equation, Gas Constants and their Physical Significance, Specific Heats, two Specific Heats of Gases, Specific Heat of a mixture of gases, Relation between two specific heats of a gas and its constant, Internal Energy, Adiabatic, Isothermal and Polytropic expansion in general, Work done during Isothermal and Adiabatic expansion and compression of gases, Relation between Pressure, Volume and Temperature in Adiabatic and Isothermal changes, Carnot's and other Cycles, Reversible Engine, Condition of maximum efficiency and reversibility, Single and Multistage air-compressor, work required in a compressor, Air-Motors, Internal Combustion Engine Cycles. Fuels, higher and lower calorific values, other properties of fuels, combustion, coefficient of excess air, regulation of combustion from flue gas analysis, Formation of Steam, Properties of saturated and superheated steam. Internal energy, Total heat of Saturated and Superheated steam, Quality of Steam, High pressure Steam, Critical pressure, Use of Steam Tables, Entropy, Entropy chart for Water and Steam, Study of Mollier chart and its application in Steam Engines. Wire-drawing and throttling of Steam, Dryness fraction and its determination by Steam Calorimeters.

Steam Engine Cycles, Representation on P-V Diagrams and Entropy Diagrams, Flow of Steam through Nozzles and Orifices, Conversion of Pressure Energy into Kinetic Energy and *vice versa*, Pressure, Volume and Entropy diagram for expansion through Nozzles.

Other important vapours as used in Refrigerating Machine such as:— SO_2 , CO_2 , NH_3 , etc., etc., their Characteristics.

M. E. 2. Mechanism :

E.E. &
M.E. 2nd
Year; 2 hrs.
a week;
Lecture.

In this course instructions are given in the forms and motions of various mechanism independent of their strength. It is the purpose of this course to familiarise the students with the principles on which various mechanisms are designed.

Instructions in this course covers the following and are supplemented by drawing office exercises.

Revolving and Oscillating Bodies such as Cranks and Levers ; Transmission of Motion Belts, Ropes and Chains ; Transmission of Motion Bodies in pure Rolling contact ; Gears and Gear Teeth ; Gear Wheel in Trains ; Epicyclic Gear Trains ; Inclined Plane Wedge, Screw, Worm and Wheel ; Cams ; Four Bar Linkage ; Relative Velocities of Rigidly connected Points ; Link work ; Straight Line Mechanism and Parallel Motion ; Aggregate Combination ; Pulley blocks ; Intermittent Motion, etc., etc.

Application of above in actual machines.

M. E. 3. Heat Engines :

Ch. E. 2nd
Year; 2 hrs.
a week;
Lecture.

Heat, Absolute Temperature, Unit of Heat and Work, Horse-Power, Mechanical Equivalent of Heat, Transfer of Heat, two Specific Heats, Characteristic Equation of a Gas, Generation and Properties of Steam, Saturated and Superheated Steam, work done by Steam in Expansion, Back Pressure, Mean Effec-

tive Pressure, indicated and Brake Horse power, Efficiency, Limit of Expansion, Cylinder Condensation, Clearance, Compounding, Effect of superheating.

Types of Engines—Simple and Compound, Valve Gears, Lap, Lead and Angle of advance, Eccentrics, Valve-setting, Reversing Gear, Link Motion, Engine Details and Driving Mechanism, Flywheel and Governor.

Boilers and their Types, Boiler Mountings and Accessories, Economiser, Feed-water Heater, Feed pumps, etc., Chimneys, Natural, Induced and Forced Draught. Condensers and Air Pumps.

Impulse and Reaction Turbines, Single-Stage and Multi-Stage.

Gas and Oil Engines, Working Cycles, Indicated and Brake Horse Power, Mechanical and Thermal Efficiency. Care and Management of Engines and Boilers.

M. E. 4. Steam Engine and Boiler :

A brief survey of principles of Thermodynamics as applied to Steam Engines, Properties of Steam, Behaviour of Steam in the Steam Cylinder, Wire drawing, Clearance, Composition, Cushioning, Cylinder feed, Initial Condensation, Action of Steam Jacket, Advantage of high speed, super-heating, Jacketting and Compound Expansion. Theoretical Indicator Diagram, Mean Effective Pressure, Indicated Horse Power, Steam Consumption from Indicator Diagram, Effect of Clearance, Expansion and Compression on economy, Relation between Steam Consumption and power, Willians Line, Study of Indicator and Indicator Diagrams.

M.E. 3rd
Year; 4 hrs.
a week;
Lecture.

Reciprocating Steam Engine Mechanism, Types of Reciprocating Steam Engines, Simple and Compound, Condensing and Non-condensing, Uniflow Engines, Reciprocating Steam Engine details.

Performance of Reciprocating Engines, Heat balance. Brake Horse Power, Mechanical Efficiency, Available heat, Steam Consumption and Equivalent Heat, Thermal Efficiency, Efficiency Ratio, Economy due to Superheating. Binary Vapour Engines.

Valve and valve Gears, Bilgram Diagrams, Zeuner Diagrams, Slide Valves, Piston Valves. Consequences of Early and Late Cut off, Meyer Expansion Valve, Movable Eccentric Stephenson Link Motion. Gooch and Allen Link Motion, Equivalent Eccentric, Corliss Valve, Drop Valves.

Dynamics of Reciprocating parts Piston or Slider Velocity Diagrams, Piston or Slider Acceleration Diagrams, Piston Velocity and Acceleration, Piston Effort and Piston Effort Diagrams, Crank Effort and Crank Effort Diagrams, Forces due to Inertia of Reciprocating parts, Fluctuation of Energy, Fly-wheel.

Function of a Governor, Simple Conical Pendulum Governor, Loaded Governor, Effect of friction of Governors, Isochronism and Hunting, Sensitiveness of Governor, Effort and Power of Governor, Shaft Governors.

Performance of a Steam Boiler, Generation of Steam, Equivalent Evaporation, Heating Surface and Grate Area ; Boiler Horse Power, Operation and Efficiency of a Boiler, Heat losses in Boiler, Boiler lagging, Chimney Draught and Chimney Height, Artificial Draught, Force Draught, Steam-jet Draught.

Types and Classification of Boilers, Lancashire and Cornish Boilers, Locomotive Boilers, Water Tube Boilers, Boilers details, Boiler Mountings, Water Level Indicator, Pressure Gauges, Safety Valves, High and Low Water Safety Valves, Feed Check Valve, Boiler Accessories, Feed Pump, Injector, Feed Water, Heater, Gain due to Feed Water Heating, Economiser, Super-heaters, Chain Grate and Mechanical Stoking.

M. E. 5. Steam Turbine :

Principles of Thermodynamics as applied to M.E. 3rd Year; 2 hrs. Steam turbines, flow of steam through orifices and nozzles, Adiabatic flow, Polytropic flow, Critical pressure ratio and velocity ; Design of Nozzles, Use of Entropy chart in connection with Problems relating to Nozzles, Diffusor effect of Nozzles, Velocity Coefficient and Coefficient of Discharge and Efficiency of a Nozzle and the different methods of determining them, Velocity diagram and design of turbine blades. Thermodynamical Efficiency, Mechanical and thermal efficiency of a steam turbine, Types of turbines, Impulse, Reaction and combined Impulse and Reaction turbines, Simple stage and Multistage turbines, Pressure and Velocity compounding, Mechanical and Hydraulic losses in turbines, Testing of steam turbines, Commercial types of turbines such as De Laval, Terry, Curtis, Zoelly, Westinghouse, Parson, Thysen-Röder, Allis-Chalmers, Kerr, Ljungstrom, etc., etc., Marine turbines, Principle of Governing and types of Governors, Exhaust turbines, Bleeder turbines, Back-pressure turbines. Turbine Details, Leakage in Turbines, Labyrinth Packing.

M. E. 6. Internal Combustion Engine :

Principles of Thermodynamics as applied to M.E. 3rd Year; 2 hrs. Internal Combustion Engines ; Otto, Diesel and other Cycles, Two Stroke and Four Stroke Cycle Engines, their different efficiencies, Comparative Study of these Cycles, Scavenging, super-charging.

Fuels in Internal Combustion Engines, Producer Gas Plant and Gas Generation.

Valves and Valve Mechanism, Ignition Devices, Injection systems, Reciprocating Parts, Bush, Bearings, Cylinder liner, frame, crankshaft, cylinder-head, base, etc., etc. Timing, Methods of Governing, Balancing, Cooling, Lubrication, Arrangements for Starting and Stopping, Types of Engines, Perfor-

mance and Testing. Gas Turbines Theory & Performance. Theory of Jet Propulsion, Rockets.

M. E. 7. Prime Movers :

E.E. 3rd
Year; 3 hrs.
a week;
Lecture.

Steam Engine, Fly wheel and Governor, Indicator, Dynamometer, Testing of Steam Engine, Performance and Efficiency, Application of the Laws of Thermodynamics to gases, vapours and gaseous mixtures, Internal combustion gas, oil and Diesel Engines. Flow of steam through nozzles, Impulse, Reaction turbines, Theory performance.

M. E. 8. Hydraulics :

E.E. &
M.E. 3rd
Year; 2 hrs.
a week;
Lecture.

Properties of Fluids ; Hydraulic Press ; Static Pressure of Fluids ; Pressure Heads ; Centre of Pressure ; Fluids in Motion ; Total Energy Bernoulli's Theorem, Radiating Current, Free Circular and Spiral Vortex, Whirling Liquids, Torricelli's Theorem, Flow of water through orifices, Flow of water over Notches and Weirs, Loss of Head due to sudden enlargement, contraction or obstruction in pipes, Flow through mouthpieces, Fluid Friction, Flow of water through open channels and pipes, Usual and Critical Velocities, Friction and other losses in pipe line, Hydraulic Gradient, Flow of water through Nozzles, Power transmitted in a pipe.

Venturimeter, Pitot tube. Impact of a jet on fixed and moving Cups and Vanes, Reaction of a jet, Action of a jet on revolving Vanes.

Working and governing of Pelton-wheels, water-turbines, Single and Multistage Centrifugal pumps ; Piston, Bucket and Plunger pumps, etc.

M. E. 9. Theory of Machine Design :

M.E. 3rd
Year; 2 hrs.
a week;
Lecture.

This Course covers Physical Properties of Metals ; Strength of Materials ; Study of the Statical and Dynamical Forces acting in various parts of Machines ; Theory of Design of Machine Parts such as Rivetted Joints, Cotters, Keys, Bolts, Nuts, Screws, Couplings

Belts, Ropes, Chains, Pulleys, Axles and Shafts, Journals, Bearings, Gearing, etc. and Engine Parts such as Eccentric, Crank, Connecting Rod, Connecting Rod Ends, Cross-Head, Piston, Stuffing Box, etc., etc. Helical and other Springs, Thick Cylindrical Shell, Thin Cylindrical Shell subjected to Internal and External pressure, etc., etc.

M. E. 9A. Machine Drawing and Design (Elementary Course) :

In this Course the students are acquainted with the applications of Theory of Machine Design studied in Course M. E. 9, by means of suitable Problems on Design of Machine Parts such as Keys, Cotters, Bolts, Nuts, Screws, Helical and other Springs, Belts, Pulleys, Gears, Couplings, Axles and Shafts, Bearings, Journals, Hangers, Eccentrics, Stuffing Boxes, Connecting Rods, two ends of the Connecting Rod, Overhead Crank, Forged Crank, Rivetted Joints, Pressure Vessels, etc., etc.

The second part of the Course is devoted in Structural Design and each student is required to design at least one Roof-truss or one Bridge Girder, and one complete Hoisting Machine such as Travelling Cranes, Derricks, etc., etc.

M. E. 9B. Machine Drawing and Design :

This is an abridged course of M. E. 9A.

E.E. 3rd
Year; 5 hrs.
a week;
Practical.

M. E. 9C. Machine Drawing and Design :

Design of Machine parts such as keys, Cotters, Bolts, Nuts, Screws, Helical and other Springs, Belts, Pulleys, Gears, Couplings, Shafts, Stuffing boxes, Rivetted joints, Pressure Vessels, Roof trusses, etc.

Ch. E. 3rd
Year; 3 hrs.
a week;
Practical.

M. E. 10. Hydraulic Machines and Water Power Engineering :

In this course theory and design of water turbines, Centrifugal pumps and utilisation of water power will

M.E. 4th
Year; 2 hrs.
a week;
Lecture
(Elective).

be taken up. It will also embrace study of other water motors and hydraulic pressure machines used for commercial purposes.

Theory and principle of Impulse and reaction turbines, Types of turbines, Peltonwheel, Francis turbine, Propellor turbines with special reference to Kaplan turbine, Specific speed, Classification of turbine according to the direction of flow, General comparison of impulse and reaction turbines, General theory of turbine design, General case of radial, axial and mixed-flow turbine, Velocity diagram, Vane thickness and curvature of vanes, Losses, Efficiency and variation of efficiency with specific speed, Measurement of Head in turbine test, Characteristic curves for turbines, Model test, Governing, Surge tanks and the effect of governor action on surge.

Centrifugal pumps, Types and construction, General theory of centrifugal pumps, General equation and characteristic, axial thrust balancing of axial thrust on impeller shaft.

Other hydraulic motors such as overshot and undershot wheels etc., etc.

Piston, Bucket and Plunger pumps, Design of valves, theory of air vessels, Efficiency. Rotary pumps and other liquid-raising appliances.

Other hydraulic machines used for commercial purposes such as hydraulic Rams, Presses, Accumulators, Intensifiers, Elevators, Riveters, etc., etc.

M. E. 11. Power Plant Engineering :

This course deals with Design, Operation and Economics of Power Plants, Cost of production and distribution of Power and determination of Rates.

Location of plants ; Study of Power Plants and Buildings ; General Lay-out, Erection, Initial cost, Operating Expenses and maintenance. Study of performance of Power Plants by recording Apparatus and Gauges.

M.E. 4th
Year; 2 hrs.
a week;
Lecture.

Theory of Heat transmission and its application to the design of heating surface or cooling surface in Boilers, Evaporators, Condensers, Furnaces, Coolers, etc.

Steam Power Plant :—Supply, handling & storing of fuels, preparation of fuels, mechanical stoker, natural and artificial draft, Chimneys, influence of draft on evaporation, Boiler specification, heating surface, grate area, Boiler mountings, Boiler accessories, Flue chamber, Damper, Steam pipes, Water pipes, Pipe fitting, lagging, feed water heater, Economiser, Water softening, Superheater, Boiler losses, Boiler performance, Boiler regulation.

Selection of Prime movers, their performance, composition of prime movers.

Condensers and Air Pumps :—Types of Condensers, Parallel Flow and Counter Current Jet Condensers, Surface Condensers, Amount of Water for Condensation of Steam, Condenser Efficiency, Sources of Air in condenser, Function and Types of Air Pumps, Combined Wet and Dry Air Pump, Vacuum Augmenter, Air Pump Capacity, Rotary Air Pump, Steam Air Injector, Cooling Towers.

Cooling arrangements for generators.

Diesel Power Plant :—Equipment of Diesel Plants, suitability of Diesel Equipment of Diesel plants, cost of operation, cooling systems, re-cooling arrangements, starting device, performance of Diesel Engine, care of Diesel plants.

Hydroelectric Plant :—Selection of suitable site, advantages and disadvantages and capacity of Hydrostation ; factors on which the capacity depends, Prime movers, their characteristics and performances, hydroelectric survey, flow, fall, catchment, reservoir, rainfall, run-off etc.

M. E. 12. Motor-car Engineering :

Gasoline Engines and Cycles, Valves and Valve operating Mechanism, Horsepower of Engines, Types of modern Auto-Engines. Fuels, Principles of Carbu.

M.E. 4th
Year; 2 hrs.
a week;
Lecture
(Elective).

retting, Types of Carburetors, Governing. Engine Lubrication and Cooling Systems, Radiators. Producer-gas engines.

Ignition Systems, Magnetos, Types of Magnetos, Spark Plugs, Care and Maintenance of Magneto and Battery Ignition System. Automobile Storage Battery, Charging and Discharging, Starting and Lighting System, Head Lamps and Reflectors.

Automobile Chassis, Frames, Springs and Spring Suspension, Front Axle, Steering Mechanism, Brakes, Clutches, Change Gear Sets, Universal Coupling and Transmission, Types of Rear Axles, The Differential Wheels, Rims and Tyres. Automobile Troubles and Remedies. Preparation of Starting Operation and Care. Efficiency Test. Design of Engine Parts, Frames and Chassis.

M. E. 13. Machine Tools :

M.E. 4th
Year; 2 hrs.
a week;
Lecture.

The importance and development of Machine Tools, Examination of the finished article, Measuring system of Machine shop, Setting up of Machine Tools, Method of work, Feed, Cutting speed, Power required, the Driving System, Changing of Speed, Principles and Design of Rotary Machine Tools such as :—Simple and Screw-cutting Lathes, Turret Lathes, Semi-Automatic and full Automatic Lathes, Drilling Machines Single Multispindle, Horizontal Boring Mills, Vertical Boring and Turning Mills, Cylinder Boring Machine, Milling Machine, Plane and Universal, Vertical Milling Machines, Different types of Gear Cutting Machines, Grinding Machines and methods, Special Screw Cutting Machines, etc., etc.

Reciprocating Machine Tools such as :—Shaping Machines, Planing Machines, Slotting Machines, Bevel Gear and Spur Gear Shaping Machines, Key-seating Machines, Plating edge Shaping Machines, etc., etc.

Machine Saws such as :—Circular Saws, Band Saws, etc., etc., Shearing Machines, Punching Machines and Presses.

Testing of Machine Tools. Economical Utilisation of Machine Tools.

M. E. 14. Materials of Construction :

This course includes the study of the general nature of deformation and stress in materials used in Construction, Machines and Appliances and also their Characteristics, Physical and Mechanical Properties, Uses, Testing, etc., etc.

M.E. 4th
Year; 1 hr.
a week;
Lecture.

Physical and Mechanical Properties, Characteristics, and Uses of Iron, Steel, Wood, Preservation of Timber, Physical and Mechanical Properties of Building Stones, Structural Clay Product, Refractory Materials such as Fire Bricks, Fire Clay, etc., Portland Cement, Hydraulic and other Cements, Mortar, Concrete ; Effects of Temperature.

Physical properties and Uses of Important Non-Ferrous Metals and their Alloys such as Copper, Zinc, Aluminium, Lead, Tin, Nickel, Brass, Bronze, Gun-metal, White-metal, Babbitmetal, Monelmetal, Stellite, etc. Important metals used for Thermocouples.

Effect of Temperature on the physical properties of Metals, Fatigue of Metals. Corrosion and its prevention, Paints, Varnishes, etc.

Study of Materials used in Belt, Rope and Cord Manufacture, Packing Materials :—Asbestos Fibres, Asbestos Cord, Leather, Rubber, Guttapercha, etc., etc. Lubricating materials, Lubricants, their suitability and uses.

M. E. 15. Mechanical Handling of Materials :

Different types of Elevators and Lowerers for handling material in bulk and for large objects. Their speed and tightening gears ; Worm, Push Plate, Push-trough and Band Conveyors. Picking Belts ; Reciprocating Conveyors ; Gravity Shoots ; Roller Run-

M.E. 4th
Year; 2 hrs.
a week;
Lecture.

ways ; Humper ; Stacker and Gadget ; Automatic feeding Devices ; Pneumatic Handling of Materials ; Endless Rope and Chain Haulage ; Aerial Ropeways ; Cable Cranes ; Mono-rails and Telfers ; Blast Furnace Hoists ; Unloading of Railway Wagons ; Skips, Grabs ; Lifting Magnets ; Hand and Electric Cranes ; Locomotives Cranes ; Wharf Cranes and Transporters.

M. E. 16. Factory Organisation and Management:

M.E. 4th
Year; 2 hrs.
a week;
Lecture.

Factory Location, Influence of Sale Market, Raw Materials, Labour and Transport, Planning of Factory, Internal Transport, Possibilities of Expansion, Equipments, Staff and Departmental Organisation, Functional organisation, Control, Departmental Report, Central Office, Location of various departments and their relations, Division of work, Advertisement and Sale, Designing and Drafting, Research and Testing Laboratories, Estimating, Purchase, Stores, Production, Planning and Production, Tools, Measuring instruments, tolerance, standardizations, Jigs and Fixtures, Inspection and Checking, Assembling and Testing.

Cost accounting, material and labour costs, overhead charges, costs, accounting, Factory costs and Inventory.

Labour and labour problem, management of labour, wage systems, Strike, Welfare methods, apprenticeship system, Factories and Engineering Institutions.

Factory Laws, Industrial Finance.

M. E. 17. Refrigeration :

M.E. 4th
Year; 2 hrs.
a week;
Lecture
(Elective).

Refrigeration Methods ; Systems of Mechanical Refrigeration ; Air System, Compression System, Absorption System, adsorption system. Refrigerants and their Properties—pressure and boiling point, latent heat of evaporation, inflammability, effect on metals, effect on lubricants ; Testing for leaks ;

Refrigeration unit ; Capacity of a refrigeration system.

Household refrigerators and their characteristics ; Refrigerator details and accessories—liquid receivers, expansion valve, evaporator, condenser, absorber, rectifier etc.; Compressors of refrigerating plants.

Operation of refrigerating system—Starting and shutting down of compressor ; Charging refrigerant in the system ; Testing of leakage ; Operating practice for absorption system.

Insulation, Insulating materials, Heat transmission through walls, Refrigeration load.

Thermodynamics of refrigerating system ; Work of Compression, P-V diagram T- ϕ diagram ; Effect of superheating and undercooling ; wet compression ; Power required for Compression. Co-efficient of performance. Refrigeration Cost and Plant testing.

Ice-making—Can system and plate system ; Raw water ; Removal of core water from ice ; Defects of ice ; Refrigeration per ton of ice.

Eutectic ice, Sodium Chloride and Calcium-chloride brine.

Cold Storage—Construction, Insulation ; Insulating materials and their properties ; Heat transfer through composite walls ; Calculation of refrigeration required.

Air circulation and ventilation in cold storage ; Natural and forced circular ; Cold storage of foods.

M. E. 18. Air Conditioning :

Atmosphere, its nature, air and water vapour mixture ; Law of partial pressures.

Psychrometry ; Dry and Wet bulb temperatures, Dew-point, Relative humidity, Psychrometers, Psychrometric Chart.

Requirements for comfort ; functions of Air Conditioning ; Ventilation requirements, Comfort Charts.

M.E. 4th
Year; 2 hrs.
a week;
Lecture
(Elective).

Air-conditioning systems, component parts ; Winter Air Conditioning, Summer Air Conditioning ; Year-round Air Conditioning equipment ; Central air-conditioning system.

Winter Air-conditioning load ; Air infiltration heat loss, Heat transmission loss ; Total heating and humidifying load.

Heaters ; Warm Air heating system, Hot Water heating system, Steam heating system, Radiators, Unit Heaters.

Humidifiers, Air filters ; Application of Winter Air-conditioning Equipment.

Mechanical Refrigeration system.

Summer Air-conditioning load ; Air infiltration heat and humidity gain. Heat transmission and sunlight heat gain ; Heat and humidity gain from human occupants, Heat gain from electric lights, motors, etc.

Dehumidifier, Absorbers, Application of Summer Air-conditioning equipment.

Temperature and Humidity control ; Thermostats, Humidistats ; Zone controls.

M. E. 19. Machine Drawing :

Ch. E. &
Engg. 2nd
Year ; 6 hrs.
a week ;
Practical.

Machine Sketching (Orthographic and Isometric) ; Making of Assembly and Working Drawings from Sketches ; Preparing Detailed Working Drawings from Assembly and Assembly Drawings from Details ; Reading and Checking of Drawings ; Empirical Design of Standard Machine Parts.

M. E. 20. Machine Design :

M.E.
4th Year ;
10 hrs.
a week ;
Practical.

In this course complete design of two machines will be required of each student. The student will be given option to select any two from the following of which at least one must be a Prime-Mover : (1) Design of reciprocating Steam Engine, (2) Design of Internal Combustion Engine, (3) Design of Steam Turbine, (4) Design of Water Turbine, (5) Design of

Steam Boiler, (6) Design of Pumps or Compressors, (7) Design of Machine Tools.

M. E. 21A. Mechanical Engineering Laboratory :

This course is meant for the Third and Fourth Year students of the Mechanical Engineering course and is intended to familiarise them with the practical application of the theories taught in lecture courses in Applied Thermodynamics, Steam Engines, Steam Boilers, Steam Turbines, Gas Engines, Oil Engine, Gas Producer, Hydraulics, Hydraulic Machinery (Pumps and Water Wheels etc.), Mechanism, Applied Mechanics (Strength and Resistance of Materials), by suitably arranged series of graded experiments and to acquaint them with methods of commercial testing of Prime Movers, Boilers, Gas Producers, Pumping Machinery and Engineering Materials.

M.E. 3rd &
4th Year ;
3 hrs.
a week ;
Practical.

Work in this course includes the following :—

Calibration, Adjustment and use of Instruments and Meters, such as Planimeters, Thermometers, Pyrometers, Water-meters, Gas-meters, Pressure and Vacuum Gauges, etc., used in Mechanical Engineering work ; Determination of Calorific value of Fuels (Solid, Liquid and Gas). Testing of different types of machines for lifting. Determination of Bearing Friction etc., Moment of inertia of fly wheel.

Taking of Indicator Diagrams, Valve Setting ; Location and Correction of Defects in Steam, Oil and Gas-Engines, etc., etc. Running and management of Engines, Boilers and Pumps, etc. ; Determination of Indicated and Brake Horse Power, Fuel and Steam Consumption of Engines and Turbines ; Economy and Efficiency Tests of Engines, Turbines and Boilers ; Heat Balance, Complete Testing of Steam Power Plant.

Calibration of Tank, Measurement of Flow of Water ; Determination of Critical Velocity ; Efficiency Test of Centrifugal and Reciprocating Pumps.

Tension, Compression, Bending, Shearing, Hardness and other tests of Cast iron, Wrought iron, Steel, etc., Testing of Wires and Ropes under Tension, Testing of Helical and Laminated Springs, etc.; Testing of Cement and other Engineering Materials.

In this course a report is required of each student on every experiment.

E.E. 3rd
Year; 3 hrs.
a week;
Practical.

M. E. 21B. Mechanical Engineering Laboratory :

This is an abridged course of M. E. 21A.

M. E. 22. Abstract.

M.E. 4th
Year; 2 hrs.
a week;
Recitation.

For Mechanical Engineering Fourth Year Class
In this course each student will be required to write an article of about 2000 words on a current engineering topic assigned by the teacher and give a concise talk on the subject for 10 minutes in the class, by rotation. The result of these assignments will be considered as that of practical work. There will be no written examination for this course.

M. E. 23. Railway Engineering Mechanical :

M.E. 4th
Year; 2 hrs.
a week;
Lecture
(Elective).

Conditions governing the performance of Locomotive Engine, Climate. Civil Engineers Specification, Traffic Managers requirements.

Boiler Power, Boiler Horse Power, Estimation of Radiant Heat in the fire Box of a locomotive by Stefan Boltzman Law. Determination of the temperature of Furnace.

Tractive force formula for two cylinder Engine. Definition of Mechanical Efficiency of two cylinder Engine. Indicated Horse Power to be calculated from tractive force and speed. Resistance to be overcome by the Engine & train.

Adhesion. Factor of Adhesion, Draw Bar Horse Power. Rail Horse Power, Cause of Wheel slipping and its prevention. Determination of the number of coupled axles when tractive force and weight of Rail

per yard is given. Cylinders and valves. Principles of Stephenson's Link motion. Walschaert Valve gear. Cam operated Lentz and Caprotti Gear.

Locomotive Boiler with fittings and Accessories. Smoke Box, Blast Pipe Principles of Injector. Pulverised fuel firing.

Railway wheels and axles and fixing tyres by method of shrinkage, Frame axle Box and Spring, Vacuum Brake and Brake Gearing, Lubrication of parts by sight feed and Mechanical Lubricator.

Rail Friction and steam sanding gear, Garatt system of Heavier type Locomotive.

Turbine Locomotives and Diesel Locos, Construction of carriages and waggons. Laminated Bearing Spring, Semi elliptical type. Sanders formula for deflection per ton and safe working load.

Books followed :

Locomotive management—Hodgson & Lake.
Locomotive of today—Locomotive Publishing Co.,
Locomotive Engineers Pocket Book—Locomotive Publishing Co.
Locomotive Design Data and Formula—Philipson.
Railway Carriage & Wagon Hand Book—Locomotive Publishing Co.
Heat Engine—D. A. Low.
Lubrication of Loco—by Bhrous.

M. E. 24. Boiler and Power Plant

Heat transmission in Boiler furnace. Steam Boilers. Various Types. High Pressure Steam Generation. Boiler Mountings and accessories Feed Pumps. Chimney Draught. Boiler Performance. Boiler house equipments. Different types of grates

E.E. 4th
Year; 2 hrs.
a week;
Lecture.

and stokers. CO₂ recorder and other measuring instruments. Feed heating. Water softening Plant. Superheater. Economiser. Fuel handling Plant. Circulating Water.

Economics of Steam Plant condensers, cooling power Air pump. Oil Engine Plant and Hydro Electric Plant Economics. Fundamentals of Station Design. Works Buildings. Pipe work. Station costs and organisation Load Division. Incremental Rate Curves.

D. M. E. 1. Heat Engines, Boilers, Pumps and Auxiliary Machine :

D. 3rd
Year; 4 hrs.
a week;
Lecture.

Heat, Absolute temperature ; Units of heat and work ; Horse power ; Mechanical equivalent of heat ; Transfer of heat ; Two specific heats ; Characteristics of a gas ; Expansion of gases ; Generation and properties of steam ; Saturated and superheated steam ; Work done by steam ; Back pressure ; Mean effective pressure ; Indicated and brake horse power ; Efficiency ; Limit of expansion ; Cylinder condensation ; Clearance ; Compounding ; Effect of super-heating.

Types of Engines ; Simple and compound ; valve gears ; lap, lead and angle of advance ; Eccentrics ; Valve setting ; Reversing gear ; Link motion ; Engine details and driving mechanism ; Flywheel and governor.

Boilers and their Types ; Boiler mountings and accessories ; Economiser ; Feed water heater ; Feed pumps ; Chimneys and natural, induced and forced draught. Auxiliary machines ; Condenser ; Wet and dry air pump ; Circulating pump, etc.

Impulse and reaction turbines of single and multi-stage. Gas and Oil engines ; Working cycles ; Indicated and brake horse power ; Mechanical and thermal efficiency.

Erection, care, operation and management of engines, turbines and boilers.

Piston and centrifugal pumps and compressors, their care, maintenance and operation.

Text-book :—Heat Engines—Ripper.

D. M. E. 2. Power House Practice :

Taking indicator diagram ; Valve setting ; Location and correction of defects in steam, oil and gas engines ; Starting ; Running ; Care and maintenance of Engines, Boilers, and Pump including centrifugal pumps. D. 3rd Year; 3 hrs. a week; Practical.

Attending Power-house and switch-board and recording of Logsheets.

O. M. E. 1. Elementary Mechanical Engineering :

Fastenings—Boilers—Common types and their description and uses—Erection and inspection—Arrangement and lagging heat engines—Description of the simple types—foundations and erection. O. 3rd Year; 3 hrs. a week; Lecture.

Internal combustion engines—description of petrol, oil and gas engines—foundations—location and running faults.

Hydraulic machinery—common type of reciprocating and centrifugal pumps—Turbines.

Power transmission—by belts, gearing, ropes, chain and friction drives.

WORKSHOP PRACTICE

In workshop courses, instruction and training are given through assigned readings, lectures, demonstrations and carefully planned and graded practical exercises in different shops.

W. 1. Carpentry, Foundry and Moulding :

E.E. &
M.E. 1st
Year; 6 hrs.
a week;
Practical.

Use of Carpenter's and Joiner's tools, Sawing, Planning, Making of Joints, Wood turning, Chiseling, Boring, Laying out of work, Jig, Band and Circular Sawing.

The use of various Moulder's tools, Cutting over, tempering and mixing foundry sand and loam, making two and three parts green sand mould from pattern supplied; sweep moulding and pipe moulding; making, backing and testing Core; preparing and charging Cupolas and casting.

Study of large Flood and Sweep moulding, Steel casting, Foundry appliances and modern methods of foundry production, etc., etc.

W. 2. Pattern-making and Forging :

E.E. &
M.E. 2nd
Year; 6 hrs.
a week;
Practical.

Pattern making consists of designing wood pattern from working drawing and pattern construction. The course includes patterns of pipe fittings, Pulleys, Hangers, Gears, Valves and Machine parts, etc., etc. It also includes the study and construction of spirit and loose piece of patterns; large, complete, part, skeleton, patterns for floor, loan and sweep work, metal pattern, etc., and making of core boxes. The use of handling of blacksmith's tools; Laying and managing fires, heating, drawing, bending, forming, twisting, upsetting, bending while upsetting, upsetting of square corners; bolt making, punching, chamfering, construction of hooks and ring bolts; tempering, spring and tool making, study of the use

of power hammer, study of the physical properties of iron, steel and other metals, heat treatment of steel, tool making, etc., etc.

W. 3. Fittings and Machine Shop :

Laying out work; chipping, filing and fitting, angles of cutting tools, chipping of key-ways, grinding, drilling, production of plane surfaces by hand methods, fitting parallel parts together, lining and making off, tapping, stud fitting; fixing pulleys in position, etc., etc.

M.E. 3rd
Year; 6 hrs.
a week.
E.E. 3rd &
4th Year;
3 hrs.
a week;
Practical.

Turning and boring steel, wrought iron and cast iron from working drawings, face plate and chuck work, outside and inside screw cutting, use of various tools, study of cutting angles, speed and different feeds suitable for each tool, machine and material, centering, squaring, taper turning, reaming, finishing, polishing, drilling, tapping, mandrel making, grinding, lapping plane, flat, and V-surfaces, the use of Milling machines, gear cutting, tool-making, making of taps, drills, reamers, Milling cutters and gauges, etc., etc.

In this course every student is required to work on modern standard machine tools such as lathes of different types, planing machines, grinding machines, slotting machines, drilling and milling machines, shaping machines, etc., etc.

The students are required to study and use different measuring tools and devices with their advantages and limits of accuracy.

Instruction is also given whenever necessary in the mechanism of the standard machines found in modern factories and the attention of the student is drawn to the various possible adjustments for different works.

W. 4. Advanced Workshop Practice :

In this course the students will be taught to apply the principles studied in other workshop

M.E. 4th
Year; 6 hrs.
a week;
Practical.

courses in Commercial production of finished articles from crude materials. Each class will be required to manufacture some useful articles and at least one complete machine or a standard machine tool from the drawing supplied.

D. W. 1. Carpentry :

D. 1st
Year; 6 hrs.
a week;
Practical.

Use of Carpenter's and Joiner's tools ; Sawings ; Planing and making of joints of various kinds ; Wood turning ; Chiselling ; Boring, Laying out of work ; Jig, band and circular sawing.

Foundry Work and Moulding :

6 hrs.
a week;
Practical.

The use various moulder's tools ; Making two and three parts green sand mould from pattern supplied ; Sweep moulding, pipe moulding ; Making, packing and testing core ; Preparing and charging cupolas and casting.

D. W. 2. Forging :

D. 2nd
Year; 6 hrs.
a week;
Practical.

The use and handling of Blacksmith's tools ; Laying and managing fires ; Heating ; Drawing ; Bending ; Forming ; Twisting ; Upsetting ; Bolt making ; Punching ; Chamfering ; Construction of hooks and ring bolts ; Tempering and tool making ; Use of Power-hammer ; Different methods of welding ; etc.

Pattern Shop :

6 hrs.
a week;
Practical.

Making of wood patterns from drawings ; The course includes patterns of pipe fittings, pulleys, hangers, gears, valves and machineparts ; Core box and Core fitting, etc.

D. W. 3. Fitting Shop :

D. 3rd
Year; 6 hrs.
a week;
Practical.

Chipping ; Filing and fitting ; Angles of cutting tool ; Chipping of key-ways ; Grinding ; Drilling ; Production of plane surface by hand methods ; Fitting

parallel parts together ; Stud fitting ; Fixing pulleys in a position, etc.

Machine Shop :

Turning and boring steel, wrought iron and cast iron from working drawings ; Face plate and chuck work ; Outside and inside screw cutting ; Use of various tools ; Study of cutting angles ; Speed and different feeds suitable for each tool-machine and material ; Centering ; Squaring ; Tapering ; Reaming ; Finishing ; Polishing ; Drilling ; Grinding, etc. ; The use of Milling machines ; Gear cutting, etc.

O. W. 1. Workshop :

Smithy and Carpentry as in W. 1 and W. 2.

O. 3rd
Year; 6 hrs.
a week;
Practical.

Ag. W. 1. Workshop :

First term—Wood work, selection, use and care of tools, selection of wood for definite purposes, preservation against termites and decay, use of drawings as guide to construction, making of simple objects. The major part of the work is definitely related to agricultural work.

Agri. 1st
Year; 6 hrs.
a week;
Practical.

Second term—Metal work, selection, use and care of tools, study of metals used in machinery, characteristics of each, pipe work, simple forging, hardening and tempering, soldering and brazing, rope splicing, belt lacing and general repair principles.

GENERAL STUDIES

Ch. E. &
Engg. 1st
Year; 1 hr.
a week;
Lecture.

G. 1. English Composition :

G. 2. Modern World I :

Ch. E. &
Engg. 1st
Year; 1 hr.
a week;
Lecture.

History of the modern world from 1789 to 1939 *i.e.*, from the French Revolution to the outbreak of the World War II. Students will be expected to have only an *outline knowledge* of the history of the Modern World, with special reference to the following topics :—

1. French Revolution.
2. Career of Napoleon Bonaparte.
3. Vienna Settlement and the history of Europe from 1815 to 1850.
4. Crimean War.
5. Unification of Italy.
6. Unification of Germany.
7. Scramble for overseas empires.
8. Period of Armed Peace.
9. World War I (1914-18).
10. Peace settlements and Post-War Europe.
11. History of the Socialist movement.
12. Russian Revolution and the rapid development of the U.S.S.R.
13. Rise of a new Turkey under Kemal Pasha.
14. History of Egypt from the first British occupation to the Anglo-Egyptian Treaty of 1936.
15. History of the Arab World in the Post-War period (Syria, Lebanon, Palestine, Trans-jordan, Saudi-Arabia and Iraq).
16. India : (a) Growth of the Nationalist movement.
(b) Constitutional development.
17. China and Japan—(from about the middle of the 19th century to the present day).

18. The U.S.A. : (a) A rapid survey of the development of the Federation.
(b) Policy of Expansion.

G. 3. Modern World II :

- (a) Fundamental Principles of Politics and Out-lines of the Constitutions of the important countries.
- (b) Indian Economics.

Ch. E. &
Engg. 2nd
Year; 1 hr.
a week;
Lecture.

Under (a) will be included—

General Theories about State, Government, Functions of Government, Organs of Government, Types of Government, Different kinds of Constitution, Public Opinion, Party System, Local Government, Public Services, International co-operation.

Indian Constitution and Government.

Broad Outlines of the Constitution of Great Britain, the U.S.A. and the U.S.S.R.

Under (b) will be included—

Trade Union Movement, Labour Legislation, Banking and Currency, Foreign Trade, Government Policy regarding Industrial Development and Tariff with respect to protection of infant national industries, Public Finance including the effect of the existing taxation policy on the Development of Industries.

G. 4. Engineering Economics :

Wealth, Capital, Income, Economic Law, Increasing and diminishing Returns, Cartels, Trusts, Desire and utility, Law of diminishing Utility, Law of demand, Elasticity of demand market prices, market speculation, short period long period monopoly. The theory of money, functions of money, Gresham's law,

Engg.
4th Year;
2 hrs.
a week;
Lecture.

inflation and deflation. The Doctrine of comparative costs, the relations of imports to exports, Foreign exchanges, Rent, Quasi-Rent, Profits; Interest and wages.

Interest and annuity, certain accumulation at compound interest, nominal and effective rates, present values, discount, sinking fund, amounts, and present values of annuities certain. Loans payable by terminable annuities, Book-keeping and accounting, Recording transaction in Cash-book, Invoice-book, Sales Day-book, Purchase returns, Sales returns, Journal and posting them into Ledgers, preparation of trial balance, trading account, profit and loss account, and balance sheet, cost accounting and costing method, methods of labour remuneration, various piece work systems and premium Bonus schemes, overhead classification, fixed and variable expenses, form of expense analysis of a factory, administration, selling and distribution expenses, Departmental overhead allocation to product, distribution of cost or overhead expenses and their computation, job or terminal costing, process costing, unit or single out-put cost, study of fatigue, work and rest periods, study of movements, Elimination of unnecessary movements.

G. 5. General Geology and Dynamical Geology :

Study of the general principles of geological phenomena, study of minerals and specially the rock-forming minerals. Volcanoes and igneous actions, Igneous rocks, sedimentary rocks and metamorphic rocks. Movements of the earth and the earth structure. Structural geology—definitions of different structural features and geometrical problems, folding and faulting. Elementary stratigraphy and elementary palaeontology. Geological maps and sections.

Laboratory work—map reading, drawing of sections, identification of common rocks, minerals and fossils.

M.E. &
E.E. 4th
Year; 2 hrs.
a week;
Lecture.

G. 6. Engineering Geology :

Choice of materials for engineering operations,—sands, clays, pebbles, building materials like sand-stones, limestones, laterite etc. Preservation of building stones, road metals like basalt, dolerite etc. Elementary notion about quarrying, tunnelling and mining operations. Drilling of different types of rocks, study of different parts of the machinery and engine required for running various types of drilling machines.

Geology applied to hydro-electric projects—construction of dams on different types of rocks. Earth dams, concrete dams, flood dams etc. Geological materials used in building dams. Revetments, quay walls, protecting walls, erosion walls, breakwater, earthquake considerations affecting the site of dam construction. Study of the geological considerations regarding the proposed dams in different parts of India.

Water prospecting and tube-well problems. Quality of water, surface water and underground water, boiler-feed water, water for sanitary purpose, drinking water, etc.

Industrial minerals and rocks, Origin, occurrence of metallic and non-metallic minerals of economic importance. Study of coal-fields of India and geology and mineralogy of coal substance. Gasification of coal—underground and surface. Petroleum geology—chemical and physical properties of petroleum, origin and accumulation of petroleum and natural gas, reservoir rocks, petroliferous provinces of India and other parts of the world.

D. G. 1. English :

D. G. 2. Business English :

O. G. 1. Accountancy :

(Available from 1948-49).

M.E. 4th
Year; 2 hrs.
a week;
Lecture
(Elective).

D. 1st
Year; 1 hr.
a week;
Lecture.
D. 2nd
Year; 2 hrs.
a week;
Lecture.
O. 3rd
Year; 2 hrs.
a week;
Lecture.

OVERSEER COURSE

O. S. 1. Surveying 1:

O. S.
1st Year;
2 hrs.
a week;
Lecture.

Definitions, Principle of surveying, History, Instruments and their constructions (chain, Compass, Levels, Optical squares, Cross staff).

Chain Surveying:—Testing of chain, Hand sketch, Selection and marking of station points; Ranging lines, Method of chaining. Methods of surveying. Obstacles and sources of error and how to avoid them. Plotting, Useful problems.

Compass Survey:—Method of surveying. Field book, variation, sources of error and how to avoid them, where recommended, Different methods of plotting, Closing error, Graphite adjustment and by calculation, Working in magnetic areas. Traverse along road, river, etc.

Plane Table Survey:—Equipments, Mounting paper, Method of surveying, Interior fillings, sources of error, Advantages and disadvantages, Finding one's place, Relaying a missing station.

Cadastral Survey:—Basis, method of surveying, Duty of traverse party, Surveyors' and Amins' duty to fill the Interior fillings.

Levellings:—Y. Reversible and Dumpy levels, Temporary and permanent adjustments, Objects of levelling, Different classes, Method of running a line of levels, Sources of errors, Difficulties and how to avoid them. Use of staves, care of instruments, stadia reading, Curvature and refraction, Field book of rise and fall system, and collimation system, Checks, Bench marks, Datum, Level surface, Limit of errors.

O. S. 2. Surveying II :

O. S.
2nd Year;
2 hrs.
a week;
Lecture.

Advanced study of the First Year Course

(a) *Levelling*:—Compound and continued series, Cross-section Levelling and contouring.

(b) *Theodolite Survey*:—Descriptions, Care of instruments, Method of traversing, Gales traverse-field-book, Plotting limit of error, How to apply correction, Laying out curves by chord and offset method and by theodolite. Use of sextant, Trigonometrical Survey.

Knowledge of all surveys in India from C. T. S. onwards, Useful problems.

O. S. 2A. Principles of Survey Instruments :

Instruments for linear measurements:—Pegs, flags; offset rods; tapes; chain and arrows. O. S.
2nd Year;
2 hrs.
a week;
Lecture.

Instruments for determining directions:—Official square; cross staff; prismatic compassing; surveying compasses; compass attached to levels; plane table—alidade and rectangular compasses; theodolite; sextants, mining dials.

Levels:—Abney levels; Road tracer (Ceylon pattern); Road perambulator; Surveying Aneroid Barometer; Clinometer.

Instruments for office work:—Acre-comb; Planimeter; Pentagraph; Proportional compass; Drawing and ferro-printing accessories.

O. S. 3. Surveying III :

Engineering Surveying:—Surveying requirements when taking a project for a building, bridge, road, canal and railway. O. S.
3rd Year;
3 hrs.
a week;
Lecture.

Curves and alignments:—Setting out by theodolite and chain and by means of chord and offsets—Compound Curve, Diversion, Vertical, Spiral or Transition Curves—Area of Cross-Section.

Topographical Maps:—Approximate discharge of streams and rivers. Preliminary survey and final contour survey.

Astronomy:—The earth as an astronomical body. The celestial sphere, Apparent path of the Sun among the stars. Definitions—Astronomical system of Co-

ordinates—Measurement of time—Relation between time and longitude—Correction to observation.

O. S. 4. Civil Engineering I :

O. S.
1st Year;
4 hrs.
a week;
Lecture.

Building materials :—Stone—selection, characteristics—classification and varieties—quarrying, blasting, dressing, implements.

Bricks and Tiles—classes and qualities, moulding, drying and stacking, burning, types of kilns—manufacture.

Lime, Cement, Mortar and Concrete—uses, varieties—plaster and white wash.

Iron and Steel—uses, characteristics, painting.

Timber—growth—felling—classification and properties—suited for particular purposes—preservation.

Construction :—Stone masonry—dressing, bond, Ashlar and Rubble masonry, Racking back, corbel, lintel, jamb, Reveal, Sill coping, Lewis, Dowel, Joggle, Cramp, Template. Precaution against moisture and settlement.

Brick Masonry :—Types and their uses, bond, closer, Racking back, Coping, cornice parapet—corbel, lintel, jamb, Reveal sill, drip course. Hollow masonry—Reinforce brick work—Precaution against moisture and settlement.

Types of doors and windows and their fittings—Damp proof courses.

O. S. 5. Civil Engineering II :

O. S.
2nd Year;
4 hrs.
a week;
Lecture.

Sites, Foundations—description of different types and calculations. Pile driving—Construction and sinking of masonry wells, walls, struting, buttresses, pilasters, scaffolding, shoring, under pinning, plastering, pointing. Retaining walls—depth of foundation—counterforts and buttresses, Revetments. Simple masonry dams, Floors and roofs. Ceilings. Arches, columns, stanchions with details of design—staircases with details of design.

Culverts, beams, girders, and simple bridges.

R. C. Concrete Construction, Calculations with details of simple slabs, T. beams and columns.

O. S. 6. Civil Engineering III :

Bridges—selection of site—Types—foundations—piers and abutments—Bricks—steel and concrete bridges—Pile and Pile driving.

Foundations—Safe pressure, columns—Cantiliver and grillage, well and pile foundations.

Roofs—Steel and timber—consideration of materials. Determination of stresses in various methods—Design of roof trusses, roof coverings, collar beam and beams.

Columns and Struts—Use of Euler's, Gordon's Rankings and Fidler's and Straight line formula—Bucking factor—Comparative strength. Choice of sizes of sections—Finish of steel work. Joints—and End bearings. Method of fixing and supporting ends specifications.

Fire proof constructions.

Reinforced concrete, elementary theory of construction—advantages and disadvantages. Theory and design—simple beams, T. beams, slabs, sheer—bend Location of reinforcement. Doubly reinforced beams—foundations—Columns. Simple Cantiliver and retaining walls.

O. S. 7. Highways and Irrigation :

Roads—types—construction and maintenance, types of bridges and culverts.

Railways—Land required, earth work—Road crossings, Grades and Ruling gradients. Permanent way—Ballasting materials used and function of permanent way. Maintenance Points and crossings—plate laying. Super elevation. Station Requirements. Tunneling. Light and Mountain Railways.

Irrigation—Well irrigation—Canal irrigation—Method of raising water from wells—Channels—

O. S.
2nd Year;
2 hrs.
a week;
Lecture.

design of channels—critical velocity—spoil banks. High embankments—outlets, discharges.

Headwork—Description—Main weirs—foundations—function of dropping shutters—under sheices—System of lifting sluices—canal head regulators—works—regulators—falls and their design—Rapids, Bed bars, Silt tanks—escapes. Dead water—Method of influencing current.

O. S. 8. Estimates and Specification I :

Rules for taking off quantities in earth work, masonry, wood work, steel work, and plumber work. Rates and their analysis. Calculation of quantities of materials required for the completion of work. Contracts preparation and laws.

O. S. 9. Estimates and Specification II :

Advanced estimates
Agreement, Contracts
Accountancy.

O. S. 10. Sanitary Engineering :

Drainage—sewers and drains—separate and combined system. Sewage—disposal and purification—Systems—design and lay out—Advanced hydraulic machines.

House fittings:—Water closets, urinals, sinks, baths, house drain connections with sewers and drains. Materials used in construction, flushing—Calculation of sizes and gradients.

Water Supply :—Storage, reservoir, tanks (sources of water supply): filtration, simple and mechanical filters; sterilization and chlorination. Pumping arrangements. Distribution—Lay out of simple mains, water supply fittings—Calculation of hydraulic mean gradient and mean depth. Losses of head.

System of collection and removal of refuse. State of sanitation in India.

O. S.
3rd Year;
4 hrs.
a week;
Lecture.

O. S. 11. Drawing I :

Use of instruments—Lettering—Construction of Scales—Construction of curves. Geometrical drawings—Orthographic and isometric projections—sections—Developments.

O. S.
1st Year;
12 hrs.
a week;
Practical.

Simple working drawing of buildings.

Bolts, nuts, and Rivetted joints.

Details of doors and windows—Arches—Mouldings—Pillars—Details of roof trusses.

O. S. 12. Drawing II :

Building construction details. Design of Brick masonry buildings. Drawing of culverts, railway, road, structural building plans from measurement and specifications. Architectural Drawings.

O. S.
2nd Year;
12 hrs.
a week;
Practical.

Fastenings—Pulleus—Gearings—Preparing drawing from sketches of simple machines such as Polish-ing lathe, Press-machine, Screw jack etc.

O. S. 13. Drawing and Design :

Design and Drawing of buildings—Culverts and simple bridges. Architectural drawings—sketching and drawing of machine parts.

O. S.
3rd Year;
12 hrs.
a week;
Practical.

O. S. 14. Office Work I :

Preparing a chart of conventional signs, plotting from field-book, From plan to prepare a field book and replotting, Reducing and enlarging maps by pentagraph and proportional divider, Tracing, Colouring and ferro-printing, How to keep drawings and records, Area calculation by acre-comb and tale square.

O. S.
1st Year;
6 hrs.
a week;
Practical.

Preparing maps of practical survey work during the session.

O. S. 15. Office Work II :

Tracing, Colouring, Ferro-printing, Keeping records, Preparing survey plates, Preparing compara-

O. S.
2nd Year;
6 hrs.
a week;
Practical.

tive maps and case maps, Partition of lands, Plotting by rectangular co-ordinates, Co-ordinates, Computing area, Preparation of charts.

O. S.
1st Year;
4-6 weeks;
Practical.

O. S. 16. Practical Survey I :

Chain, Compass, Plane-table, Levelling.

O. S. 17. Practical Survey II :

Lavelling, Traversing with theodolite, Curve tracing, Trigonometrical survey.

O. S.
2nd Year;
4-6 weeks;
Practical.

O. S. 18. Practical Survey III :

Road project: Curve Tracing: Astronomical observations and determination of Azimuth Problems.

O. S.
3rd Year;
4-6 weeks;
Practical.

O. S. P. 1. Elementary Physics :

O. S.
1st Year;
4 hrs.
a week;
Lectures.

General Measurement:—Fundamental units in C. G. S. and F. P. S. systems. Mass, density and specific gravity. Air pressure, Barometer, Centre of gravity. Boyle's law, Syphon, Pressure gauges and Water pumps.

Heat:—Thermometry—Expansion of Solids, liquids and gases—Charles' law, specific heat, Fusion, evaporation and boring. Latent heat. Radiation—conduction. Heat and Work. Calorific value of coal.

Light:—Transmission of light. Illumination and photometry. Reflection and Refraction, mirror and lenses. Principles of the telescope.

Magnetism:—General properties of magnets. Magnetic Induction, magnetic lines of force. Terrestrial magnetism with reference to dip, variation.

Electricity:—Electricity, charge, potential, cells, electric current, E.M.F., Resistance, Ohm's law.

Sound:—Elementary knowledge only.

Physical Laboratory :

1. Use of Scales, Dividers, Vernier Scale, Screw gauge. O. S. 1st Year; 3 hrs. a week; Practical.
2. Use of Balance.
3. Determination of Centre of gravity.
4. Determination of density of Solids
 - (a) by Hydrostatic balance.
 - (b) by Specific gravity Bottle.
5. Reading of Barometer.
6. Determination of fixed points of thermometers.
7. Determination of specific heats of solids.
8. Verification of laws of reflection and refraction.
9. Photometry.
10. Measurement of Dip.

O. S. M. 1. Trigonometry and Mensuration :

Trigonometry—Theory of scales—natural scales, logarithmic scale, verniers. Trigonometrical ratios—measurement of angles, Logarithmic series, Cosines etc. Use of logarithmic tables, Solution of triangles. Problems of heights and distances. O. S. 1st Year; 4 hrs. a week; Lectures

Mensuration—Solution of triangles—area of plane figures field-book—surface and volume of solids and frustoum of solids—Duodecimals.

O. S. E. M. 1. Applied Mechanics I :

- (1) Fundamental units.
- (2) *Motion*:—Velocity and speed; Linear velocity and acceleration; Angular velocity, Circular motion; Composition and Resolution of velocity; Velocity considered as Vector; Motion with uniform acceleration; Motion under gravity; Motion down a smooth inclined plane. O. S. 1st Year; 3 hrs. a week; Lecture.
- (3) Force, Inertia, Momentum, Laws of Motion; Measurement of Force; Concurrent and Non-concurrent Forces; Parallel Forces; Couples; Composition of Resolution of Forces; Forces as

Vectors ; Equilibrium of Forces ; Centre of gravity ; Determination of Centre of gravity.

- (4) Work, Power, Energy.
- (5) Application of the foregoing in Levers, Pulleys and Balances.

O. S. E. M. 2. Applied Mechanics II :

- (1) Graphical Statics ; Funicular Polygon ; Bending Moment and Shearing Force in Beams, Roof frames and Stress Diagrams.
- (2) Elasticity, stress, strain, Hooke's Law, Stress Strain Diagram, Elastic Limit, Ultimate stress, Working Stress, Factor of safety.
- (3) Bending Moment and Shearing Force Diagrams of Simple Beams and Cantilevers.
- (4) Moment of Inertia, Moment of Resistance, Section Modulus, Neutral Axis, Stiffness of Beams, Deflection Formula in Simple cases. Momentum—angular momentum, Rotational inertia.
- (5) Shafts—solid and hollow—torsion—springs—fly wheels and Governors—whirling of shafts.
- (6) Rivet joints in Frames and structures, columns and struts.
- (7) Transmission of motion by belts, ropes, chain and wheel.
- (8) Hydraulics—Hydraulic pressure and transmission—Flow through orifices, weirs and pipes—Losses. Simple hydraulic machines.

O. S. M. E. 1: Elementary Mechanical Engineering :

Boilers—Common types and their description and uses—Erection and inspection—Arrangement and lagging—Steam Engines—description of the simple types—foundations and erection.

Internal combustion engines—description of petrol, oil and gas engines—erection—running—location of faults.

O. S.
2nd Year ;
3 hrs.
a week ;
Lectures.

O. S.
3rd Year ;
3 hrs.
a week ;
Lecture.

Hydraulic machinery—Common type of reciprocating and centrifugal pumps—Turbines.

Power Transmission—by belts, gearing, screws, ropes, chain and friction drives.

Fastenings—Bolt & nuts, keys, cotters.

O. S. W. 1. Mechanical Laboratory :

Use of Instruments and Metres, such as Planimeters, Thermometers, Water-meters, Gas-meters, Pressure and vacuum gauges. Determination of calorific value of Fuels.

Location and correction of defects in steam, oil and gas engines. Running and management of Engines, Boilers, and Pumps.

Tensile test of Steel.

Bending test of Steel and Wood.

Compression test of Brick, Cement etc.

O. S. E. E. 1. Elementary Electrical Engineering:

Lightning conductor—parts used in and general rules for erection ; function of the lightning conductor, earth resistance and method of measuring it. Tests.

House wiring—Layout of simple D.C. distribution system—working of simple switch boards. Protection-devices and fault location in a small power station.

Street lighting—Cable laying.

Elementary Principles of working D.C. & A.C. machines.

Elementary Electricity. Ohm's Law—Volt, Ampere, Watts, Board of Trade Unit of Electric Energy.

O. S. E. E. 2. Electrical Engineering Laboratory :

1. To study different parts of a dynamo.
2. To study M.I. and M.C. type of Voltmeters and Ammeters.

O. S.
3rd Year ;
3 hrs.
a week ;
Practical.

3. To study Watt Low meter.
4. Cable joints and soldering.
5. To sketch out switch-board connections, variation of speed of a shunt motor. To run a compound motor and to reverse the direction of rotation. To run a series motor with drum type controller.
6. To study the use of a meggar ; To test and locate fault in armature, field coils, and commutator.
7. Wiring calculation of size of cable and cost.
8. To charge storage battery.

AGRICULTURE

Agri. 1. Agricultural Botany :

General description of a plant, kind of plants—annual, biennial, perennial. Parts of a Plant—root, stem, leaf, flower, fruit. Germination ; essential of germination. The function of the parts of a plant—(1) seed, (2) root, (3) stem, (4) leaf, (5) flower, (6) fruit. Composition of plants—(1) water, (2) dry matter—combustible, incombustible or ash, essential ingredients, non-essential ingredients. Plant food—(a) Soil, air and rain ; water and sunshine, (b) how plants take food and develop, (c) most important elements of plant food, (d) Nitrification.

Agri. 1st
Year ; 2 hrs.
a week ;
Lecture.
4 hrs.
a week ;
Practical.

Agri. 2. Farm Crops I :

Vegetable Gardening—each student will be given a plot on which to grow vegetables. This practice is accompanied by lectures on varieties and principles of culture. Garden Crops of the Bengal Presidency and their requirements will receive special attention.

Agri. 1st
Year ; 2 hrs.
a week ;
Lecture.
16 hrs.
a week ;
Practical
(½ year).

Agri. 3. Farm Crops II :

Field Crops and their productions—(a) choice of crops and variety as determined by climate, soil, seasons, special requirements of crops and market. Importance of leguminous crops, rotations, principles underlying rotation, fallows and mixtures.

Agri. 1st
Year ; 2 hrs.
a week ;
Lecture.
(Second
½ year).
2nd Year ;
2 hrs.

(b) Production, selection and care of seed, steeping and fumigation. Sowing methods (i) by hand, (ii) by drill.

a week ;
Lecture.
10 hrs.
a week ;
Practical
(First
½ year).

(c) Rotation—(i) advantages, (ii) reasons for, (iii) rules for, (iv) examples of.

(d) Improvement of crops by selection of seed and other methods.

(e) Weeds, fungus and insectpests and their preventions.

(f) Harvesting, Threshing, Winnowing, Storing and Marketing.

(g) Growing of particular crops—

A. Paddy (a) Aus, aman, boro; (b) preparation of land; (c) Seed and selection thereof; (d)—(1) Sowing time, (2) quantity of seed to grow, (3) manure, (4) after cultivation, (5) harvesting, (6) yields.

B. Jute—yields; Sugarcane—yields; Wheat, Barley, Oats—yields; Pulses and leguminous crops—yields; Maize—yields; Millets—yields; Oil seeds—yields; Fodder crops—yields.

Agri. 4. Animal Husbandry I :

Agri. 1st
Year; 2 hrs.
a week;
Lecture
(First
½ year).

(Types and breeds of farm animals)—Types of cows, horses, sheep, buffalo, goats and hogs. Feeds and feeding; breeding and management of livestock, housing and care. Treatment of young animals and pregnant ones. Disposal of animal dung and other refuse. Cattle foods available in Bengal and their relative value. Forage crops and their production. Silos and ensilage. Treatment of diseases.

Agri. 5. Animal Husbandry II :

Agri. 1st
Year; 2 hrs.
a week;
Lecture
(Second
½ year).

Dairy Husbandry—Breeds of cattle, feeding, milking, handling of milk, making of butter, ghee, cheese, curd etc.; milk testing, principles of a profitable dairy business.

Agri. 6. Animal Husbandry III :

Agri. 2nd
Year; 2 hrs.
a week;
Lecture
(First
½ year).
6 hrs.
a week;
Practical.

Poultry Husbandry—Breeds, Indian and foreign; their characteristics and advantages, housing, management and care. Feedings and handling of poultry, making of rations, natural and artificial incubation, use of incubators, testing of eggs.

Agri. 7. Soils and Fertilisers :

General description of soil and sub-soil. **Forma-** **Agri. 1st**
tion of soils (a) weathering of the earth's crust, Year; 2 hrs.
(b) action of changes of temperature, (c) action of a week;
vegetation, (d) action of water, (e) action of frost, Lecture
(f) action of animal and insect life. Composition (First
of soils, classification of soils (1) indigenous and ½ year).

Brief and simple account of the soils of Bengal. Preparation and improvement of the soil—by tillage, plough, harrow, roller, spades, hoe. Eastern and Western implements, irrigation, drainage, manures and manuring.

Manures and Manuring—(a) classification of general and special manures; natural and artificial manures, (b) Composition and values, (c) Great importance of conserving farm yard manure in India—pitting with urine and protecting from sun, (d) application, (e) Green manuring, (f) Line and lining.

Agri. 9. Farm Machinery :

Study of farm machines adapted to Indian con- **Agri. 2nd**
dition, principles, selection, construction, operation, Year; 2 hrs.
care and repair of common tools and machines used a week;
on the farm. Sources of power on the farm; principles Lecture.
of oil, and petrol engines and tractors; selection, (First
operation and care of engines, and practice in the ½ year).

Agri. 10. Horticulture and Floriculture :

Principles of propagation including budding, **Agri. 2nd**
grafting, transplanting, pruning, insect and disease Year; 2 hrs.
control; harvesting and marketing; methods of cul- a week;
ture, study of the principal fruit trees with reference Lecture.
to their morphology, anatomy, physiology, varieties 4 hrs.
of diseases and cultivation. The principles and prac- a week;
tical. (First Practical.
½ year).

tice of artistic garden planning. The chief ornamental plants available in the Bengal Presidency, their varieties and culture.

Agri. 11. Agricultural Zoology :

Agri. 2nd
Year; 2 hrs.
a week;
Lecture.
4 hrs.
a week;
Practical.
(First
½ year).

The anatomy of vertebrate animal is studied because of its bearings upon animal husbandry; the characteristics and habits of rodents, birds and other animals injurious to crops; a study of insects with special reference to those injurious or useful to the agriculturists; the insects which carry disease; the control of insects. Insects attacking stored products and their control. Identification of insect pests in the field by the nature of damage to crops. Recognition of insects of agricultural importance.

Agri. 12. Irrigation and Drainage :

Agri. 2nd
Year; 2 hrs.
a week;
Lecture.
(First
½ year).

Necessity of irrigation. Sources of water. Methods of raising water from wells, tanks, rivers, including hand power, bullock power, and power machinery and its distribution. Water requirements of crops. Advantages of different systems of irrigation. Relation of irrigation to drainage. Necessity, advantages and methods of drainage. Control of soil moisture.

Agri. 13. Agricultural Economics :

Agri. 2nd
Year; 2 hrs.
a week;
Lecture.
(First
½ year).

The financial problems of the farmer including the cost of production, marketing, credit and co-operative societies are thoroughly dealt with. Production; Land; Various systems of tenure; Tenures in India; Systems adopted in the Bengal Presidency; Relations between landlord and tenant; Distribution and nature of land. Capital—fixed and circulating; Labour; Systems of payment in kind or money. Connection between prices and wages. Consumption—Demand, markets and marketing, prices. Management of Farms; Farm account; Farm Book-keeping; Cost of Cultivation and Profits; Factors which determine wages.

AUTOMOBILE ENGINEERING SECTION

The Institute of Engineering Technology Incorporating The F.M.C. School of Motoring with its staff and equipments has since been amalgamated with the College of Engineering & Technology, Jadavpur.

INTRODUCTION

The Motor Industry in India is growing rapidly year by year. Therefore, good theoretical and practical training in Motor Engineering will qualify students for a trade in which they will afterwards find work and in which there are always many possibilities of advancement.

At present there is a growing demand for skilled mechanics well versed in mechanical and electrical technique, so far as it relates to modern automobiles.

The training given in this College is the best that can be obtained. The Department is thoroughly equipped and supervised by qualified instructors.

There are working models of modern internal combustion engines, electrical apparatus, dual control training cars and other equipments for practical demonstration work.

The life of a car is governed by the degree of skill with which it is driven and cared for. To the owner, this means a lot. An incompetent driver endangers his car, himself and passengers.

A well-trained driver is an investment because :—

- (1) Mechanics' wages are high and therefore repairs are expensive.
- (2) Good driving means a big saving in Tyres, Petrol and reduces wear of Engine, Brakes and transmission.
- (3) A well-cared Car will always command the best price in the second-hand market.

The object of the Department is to provide comprehensive tuition in Motor Car Driving and Maintenance to those who desire to become professional Drivers or Mechanics.

Driving Tuition is given on cars fitted with our own System of Safety Dual Control enabling the beginners to drive in traffic with confidence and safety.

Owners of cars residing in the Mofussil, away from good Repair Depots, will readily appreciate the benefit of having 'a well trained driver-mechanic available, in case of mechanical breakdown. They will be well advised to have their men trained in this College ensuring thereby the best possible training for them in India.

Each student on completion of the course is awarded a Diploma of Merit according to his results in the final examination and can enter the profession of a mechanic or electrician with the backing of a sound practical training such as would not be possible to acquire as an ordinary apprentice in any workshop.

Inspection of our lecture rooms, workshops and cars is cordially invited.

THE INSTITUTION IS RECOGNISED BY THE GOVERNMENT OF INDIA, DEPARTMENT OF LABOUR AS A SUITABLE INSTITUTION FOR EDUCATION AND FOR TRAINING I. C. ENGINE DRIVERS AND IN AUTOMOBILE ENGINEERING.

THE DIRECTOR OF INDUSTRIES, BENGAL Inspection Report described it as "a *bona fide* and big institution with up-to-date appliances, teaching motor mechanism and driving in a thorough manner by a combination of theoretical lessons and practical work."

It was also officially recognised by the ADJUTANT-GENERAL IN INDIA, ARMY HEAD QUARTERS, as the only School in India, approved by the Military Authorities for VOCATIONAL TRAINING OF BRITISH SOLDIERS in Motor mechanism and in light and heavy car driving, until that scheme was discontinued.

COURSES OF STUDIES

- | | | |
|---------------------------------|-----|-----------------------------|
| 1. Motor Mechanics with Driving | ... | One year Course. |
| 2. Motor Mechanics | ... | One year Course. |
| 3. Driving | ... | Sixty working days minimum. |

FEES & DEPOSITS

At the time of admission to the College, the following fees are payable by new entrants:

	Tuition Fees	Magazine Fee	Contingency Fee	Students' Union Fee	Sporting Fee	Students' Aid Fee	Caution money Deposit	Total
1. Motor Machines with Driving ..	275/-	1/8/-	2/-	1/-	5/-	-/8/-	15/-	300/-
2. Motor Machines ..	175/-	1/8/-	2/-	1/-	5/-	-/8/-	15/-	200/-
3. Driving Course ..	125/-	...	...	...	...	...	...	125/-

The above fees are payable fully in advance. Caution money deposit for working in the laboratories and workshops and other practical classes is refundable at the end of the College career after deduction for breakage or dues, if any.

N.B.—Fees for the ex-students or advanced students of this College for the Driving Course is Rs. 100/- only.

EXTRA CHARGES FOR POLICE LICENSE.

Doctor's Fee	...	...	Rs. 4/-
Police License Fee	...	...	Rs. 5/-
4 copies of Photograph	...	...	Rs. 3/-
Learner's License Fee	...	...	Rs. 2/-
Test Fee	...	...	Rs. 2/-

EMPLOYMENT

The Institute does not guarantee to obtain employment for students on completion of the course, but it does guarantee that students will be quite capable of taking charge of any car and of carrying out repairs, adjustments, etc.

The Principal is always willing to answer enquiries which a prospective employer may make regarding any student, feeling confident that those who have taken the course will prove satisfactory.

DETAILED SYLLABUS

1. MOTOR CAR AND ITS MECHANISM :—

Working principles of Petrol engine and cycle of operations, Engine parts as cylinders, valves, pistons, piston rings, Gudgeon pin, Cranks, bearing etc. Carburettor and its principle of action. Fuel and different methods of feeding. Valves and valve setting cams, valve gears, Ignition and ignition systems, Spark Plugs, Cooling systems, Pump and Thermo Siphon, Radiators, Lubrication of Engine. Starting, running and Maintenance of Engine.

Transmission :—Clutch, various types, Gear Box, Propellor Shaft, Universal Joints, Differential, Rear axle, 4-wheel drive.

Wheels & Brakes :—Different types of Brakes, Types of wheel rims, Tyres, Inflation.

Chassis :—Steering mechanism, Springs, Different types of suspension.

2. AUTO ELECTRIC APPLIANCES :—

Meaning of volt, Ampere, High and Low tension, Electromagnets, Condensor, Magneto, Dynamo, Motor, Battery, Electric Lamps and Horns.

3. FITTINGS :—

Filing, Chipping, Use of Callipers, Scales and Micrometer. Use of other general fitters' tools, Drill machine, Dies and Taps, Soldering.

4. MAINTENANCE AND GENERAL REPAIR :—

Decarbonising, Valve grinding, Adjustment of Valves, Changing Piston rings, Adjustment of Bearing, Testing of Spark Plugs, Location and rectification of Engine defects.

5. MAINTENANCE OF AUTO ELECTRIC SYSTEM :—

Care of Storage Batteries, Charging of Batteries, Electric wiring of cars, Adjustment of Self-Starter, Ignition systems, etc.

6. MACHINE SHOP PRACTICE :—

Turning and Screw cutting on lathe, Reboring cylinders, Making of new Bearings, Turning of brake drum, etc.

7. VULCANISING :—

Repair of tubes and tyres.

8. DRIVING :—

Instruction is given on Special Cars fitted with our own System of Safety Dual Control Pedals which enables the beginner to drive in traffic with confidence and safety. The tuition embraces the complete management of Starting a Car, Gear-changing, Hill-climbing, Driving in Traffic and Reversing.

9. PHYSICAL TRAINING :—

One hour per week.

Examinations will be held twice in a year at the end of each semester. At the end of the session each student shall have to appear in the following examination :—

1. Motor Car and its Mechanism :—

Paper I one written paper	...	100	marks.
Paper II one oral paper	...	100	marks.

2. Auto Electrical Appliances :—

Paper I one written paper	...	100	marks.
Paper II one oral paper	...	100	marks.

3. Practical Test on the mechanical side of a car

... 100 marks.

4. Practical Test on the Electric Appliances of a car

... 100 marks.

Minimum Pass mark is 50%. Students securing 75% or more in the aggregate will be declared to have passed with Distinction. In order to qualify for appearing at the annual examination a student must be present at least 80% of all the classes and must secure at least 75% of the marks in the practical classes.

The working days for the course will be the same as in the workshop and only those holidays granted to workshop will be observed as holidays.

WORKING HOURS :—

10-30 A.M. to 4-30 P.M. on week days.

10-30 A.M. to 2-00 P.M. on Saturdays.

Examination fee will be Rs. 2/- per paper.

Any student failing to pass in any paper will be required to sit in the next examination for that paper only. If any student, after completing the course fails to succeed in the first chance he will not be required to pay further fees for the course but he shall have to pay the other annual fees and examination fees of the college.

At the successful completion of the course Diploma will be awarded.

Students are to abide by the general discipline of the college and to abide by any order of the Authorities.

Further, students absenting themselves frequently or attending at irregular hours without plausible reasons are liable to dismissal without any claim for the fees paid.

Whilst every precaution is taken for preventing of accidents and to ensure the safety of the students, it must be clearly understood and agreed that the college cannot be held responsible for any accident which may occur during the training.

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