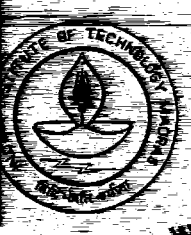

I. T. MADRAS

ANNUAL REPORT

1966-67

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INDIAN INSTITUTE OF TECHNOLOGY
MADRAS

CONTENTS

PART—I

Eighth Annual Report

1966 — 1967

PART I

1. INTRODUCTION :

The 30th of July 1959 is a red letter day in the history of this Institute, for, it was on this day, the Institute was inaugurated by Prof. Humayun Kabir, the then Union Minister for S. R. & C. A. before a large and distinguished gathering, in Guindy, Madras City. This inauguration marked the beginning of the fulfilment of a dream—happily dreamt by that great 'Master Dreamer' of India's Scientific and Technological Revolution, the late Prime Minister Shri Jawaharlal Nehru and shaped to reality by the gracious offer of technical assistance to establish a technological institute in India, made by the Government of Federal Republic of Germany to Shri Nehru during his visit to West Germany in June 1956. Since that date, out of the 633 acres of lovely wooded land, near Raj Bhavan and Deer Park, Guindy, generously gifted by the Government of Madras to the Government of India a modern technological university campus, fully residential, has been fast taking shape.

2. HIGHLIGHTS OF THE YEAR :

The following were some of the important highlights in the 8th year of the Institute :

(i) Third convocation with Dr. C. V. Raman, Nobel Laureate as the Chief Guest in July 1966.

(ii) Formation of the 'Madras Committee' in Bonn to assist in the scheme of co-operation between the I. I. T. Madras and the technical universities in Germany under the Second Indo-German Agreement.

(iii) Visit of the sub-committee of the German Parliament for Cultural Relations Abroad, in September 1966.

(iv) Visit of the members of the delegation from the Technical University, Aachen, West Germany in February 1967 and fruitful discussion with them regarding the Institute's development.

(v) Visit of distinguished professors and rectors from the universities of Stuttgart, Braunsweig, Bonn and Hamburg, in January and March 1967.

(vi) Symposium on Inorganic Chemistry organised by the Department of Chemistry of the Institute in February 1967.

(vii) Organisation and conduct of a Sequential Summer School in Mechanical Engineering for the Southern Region, in collaboration with the All India Council of Technical Education in May—June 1967.

(viii) Visit to West Germany by Prof. B. Sengupto, Director in April—May 1967 at the invitation of the Government of the Federal Republic of Germany.

(ix) Completion of Thermodynamics and Combustion Engineering Laboratory.

(x) Completion of Automobile Workshop.

(xi) Completion of Second Oxidation Pond.

(xii) R. C. C. underground sump for storing water supplied by the Corporation of Madras.

(xiii) Completion of the Institute Library Building.

(xiv) Completion of the Boy's Hostel for the Centra School.

(a) *The Institute Day* :

The Institute Day was celebrated on 15—3—1967. Sardar Ujjal Singh, Governor of Madras, presided over the function and addressed the students. Sardarni Ujjal Singh distributed the prizes for the winners of the academic distinction, literary and

cultural competitions for the year. The function came to an end with a variety entertainment and music programme by the students and staff of the Institute and children of the campus.

(b) *Third Convocation* :

The third convocation of the Institute was held on 30–7–66, when Dr. C. V. Raman, the Nobel Laureate delivered the convocation address. 203 students qualified themselves for the award of B. Tech degree, 38 for the award of M.Sc. degree and 64 for the award of M. Tech degree. Besides these, 3 qualified for the award of Ph. D. degree. The proceedings of the convocation are given in Appendix I to this Part.

(c) *Madras Committee* :

In order to co-ordinate and advise on the scheme of technical assistance under the Second Indo-German Agreement the 'Madras Committee' consisting of representatives of (1) Technische Hochschule, Aachen (2) Technische Hochschule, Braunschweig and (3) Technische Universitat, Berlin was constituted in Bonn at the end of September 1966. Other universities like Technische Hochschule, Stuttgart were also expected to join the Committee. The special tasks of the committee are to find new German Professors, German Scientific Assistants, German Planners for the new Laboratories and short-time visiting Professors and also selection of proper equipment for the teaching and research work.

(d) *Director's visit to West Germany* :

At the invitation of the Government of Federal Repuplic of Germany, Prof. B. Sengupto, Director of the Institute visited Germany from 23rd of April to 15th of May 1967 for holding discussions with the various authorities in Germany with a view to consolidate and strengthen the technical co-operation between the Institute and different universities and the Government of the Federal Republic of Germany. While in Germany, the Director had numerous discussions with the officials of the West German Government, Department of Economic Co-operation, the B. A. W., Academic Exchange Service, D. A. A. D., G. A. W. I., Members of the 'Madras Committee' and with the individual German Professors and had with them exchange of ideas and

views. As a result of these discussions a report has been drawn up by the Director and is being submitted to the Board of Governors of the Institute and the Government of India.

3. THE BOARD OF GOVERNORS :

The Board of Governors met three times during the year. The following members constituted the Board :

(i) Dr. A. L. Mudaliar, Vice-Chancellor, University of Madras (Chairman).

(ii) Prof. B. Sengupto, Director, I. I. T., Madras (ex-officio).

(iii) Prof. S. Rajaraman, Director of Technical Education, Government of Kerala.

(iv) Dr. B. L. Santhamallappa, Director of Technical Education, Government of Mysore.

(v) Shri T. Muthian, Director of Technical Education, Government of Madras.

(vi) Shri T. R. Doss, Director of Technical Education, Government of Andhra Pradesh.

(vii) Shri P. M. Reddy, General Manager (since retired), Hindustan Aeronautics Limited, Bangalore.

(viii) Dr. S. Dhawan, Director, Indian Institute of Science, Bangalore.

(ix) Dr. D. S. Reddi, Vice-Chancellor, Osmania University, Hyderabad.

(x) Dr. K. S. G. Doss, Director, Central Electro-Chemical Research Institute, Karaikudi.

(xi) Dr. W. Koch, Professor, Department of Physics, I. I. T., Madras.

(xii) Dr. P. C. Varghese, Professor, Department of Civil Engineering, I. I. T., Madras.

Shri C. V. Sethunathan, Registrar, I. I. T., Madras (Secretary).

4. STAFF :

Prof. B. Sengupto continued to be the Director of the Institute and Shri C. V. Sethunathan as the Registrar. Prof. S. Sampath, Professor of Electrical Engineering took over as Deputy Director from 12th October 1966.

Staff appointments and resignations during the year under review are given in Appendix II to this Part.

5. DISTINGUISHED VISITORS :

A list of distinguished visitors is given in Appendix III to this part.

6. EQUIPMENT :

The value of Gift Equipment received during the year amounted to Rs. 9,56,551 bringing the total of the value so far received to Rs. 1,88,47,114.

7. FACULTY ASSOCIATION :

At the general body meeting held in August 1966 the following were unanimously elected as office bearers for the year :

Vice-President	...	Dr. D. Venkateswarlu
,,	...	Dr. W. Lutz
Secretary	...	Dr. M. Venugopal
Joint Secretary	...	Mr. S. K. Jain
Treasurer	...	Miss V. Hamsaleelavaty
Auditor	...	Dr. V. Srinivasan
,,	...	Dr. D. Johnson Victor

Prof. B. Sengupto, Director, is the President of the Association. Shri G. V. N. Rayudu, Dr. B. V. A. Rao, Dr. B. V. Ramanamurty and Dr. V. Sethuraman were co-opted to the Executive Committee. The association had in all 11 meetings during the year.

Dr. S. Ramaseshan, Dr. S. D. Nigam, Prof. V. V. L. Rao, Prof. Heald from U. S. A., Shri H. V. R. Iengar and Prof. B. K. Misra were the distinguished speakers during the year on various topics of general interest, science, engineering, humanities, economics and music.

The association held receptions to the members of the 'Madras Committee' from Technical University, Aachen, Germany and to the members of the Co-ordinating Committee of the Technical Teachers Training Programme, Government of India.

8. ALUMNI ASSOCIATION :

With Prof. M. V. C. Sastri continuing as President, Dr. B. V. A. Rao as Treasurer and Mr. V. D. Muthayya as Auditor, the following office bearers were unanimously elected for the year 1966—67 from among the nominations received :

Vice-President	...	V. Ratan Babu
Secretary	...	R. Krishnaswamy
Joint Secretary	...	N. Hariharan
Member	...	T. K. Ramakrishnan
,,	...	M. Balasubramanian

From 507 in July 1966, the strength of the Association grew to 791 to-date.

The main purpose of the association to establish an everlasting relationship between the alumni themselves and between the alumni and the Alma Mater, is being achieved through the quarterly magazine "News Letter", three issues of which came out in 1966—67 and the fourth one was merged with the "Pradeep", the Alumni Journal.

The association is in touch with quite a large number of universities abroad, so as to benefit our alumni and the graduating students. The General Information Section provides valuable information to the alumni and the final year students. As regards the placement work of our alumni, it is gratifying to note

that every one of the first three batches of alumni, is well placed professionally in one form or the other. As regards the 1967 batch, some of the alumni are employed already and the placement section is doing its utmost to place the rest also in good positions. The new system of collecting the resume of each individual and keeping a complete record of the alumni with a suitable indexing system has proved to be valuable.

9. PROJECT CONSTRUCTION :

The Engineering Unit maintained its tempo of activity during the year and a number of buildings and schemes were completed and handed over for occupation.

The following major works were completed.

(i) Thermodynamics and Combustion Laboratory.

(ii) Automobile Workshops.

(iii) Students' Hostel No. 9, " Alakananda ".

(iv) Boys' Hostel for Central School.

(v) Residential quarters of different types.

'B-1' Type — 2 Nos.

'C-1' Type — 6 Nos, and

'E-1' Type — 6 Nos.

(vi) Second Oxidation Pond.

(vii) R. C. C. Under-ground sump for storing Corporation Water.

(viii) Widening and extending Madras Avenue.

The construction of the Library building which was in progress, was accelerated and the building was completed with all services and modern amenities in a relatively short time by working round-the-clock.

Works in Progress :

(i) The Administration block is in good progress. The main structural frame-work is over and the cladding work and services are in progress.

(ii) Ladies' Hostel : This building is likely to be completed by November, 1967.

(iii) Students' Hostel No. 10 : Work on one wing of the building is progressing fast.

(iv) Bank and Post Office Buildings : These two buildings to house the State Bank of India and the Post Office along with quarters for the Bank Agent and the Post-Master are coming up according to schedule.

(v) Residential Quarters : IV Phase : The fourth phase quarters consisting of 9 blocks of 'C' type quarters (18 flats) and five blocks of 'B' type (10 flats) are on hand. Out of these 5 blocks of 'C' type are in an advanced stage, while the remaining quarters have been started recently.

(vi) Sub-stations : A number of electrical sub-stations have been planned at differnt strategic points of the campus with a view to improve the efficiency of the distribution of electricity.

Besides the above, various minor works were executed and maintenance of buildings, water supply and sewage, and electrification services were attended to regularly.

The total amount spent on the construction works during the year was about Rs. 41.00 lakhs.

10. HOSTELS :

(*a*) *Ganga Hostel :*

176 students of the 5 Year and 3 Year B. Tech. Courses were housed in the Hostel. Professor R. K. Gupta, Head of the Humanities Department continued as the Warden and was assisted by Shri B. Vasudeva and Shri Y. R. Nagaraja as Assistant Wardens.

The student activity was led by Shri Thadani, the General Secretary of the Hostel. Sarvashri M. Sanyal, Bhasin and Muralidharan were outstanding during the Inter-Hostel entertainment with their music. Ganga Hostel, named the Rajendra Chola House, led by Shri M. Sanyal shared the Trophy for the Inter-Hostel Sports Tournament with Tapti Hostel. Shri Santhanaraj and Shri B. Umesh Achia were winners of prizes during the Inter-Collegiate Arts and Science Exhibition.

Due to food scarcity joint Hostel Days were conducted and the Ganga Hostel and the Saraswathi Hostel had their Hostel Day on 8—3—1967. Mr. R. W. England of the English Electric Company was the Chief Guest and Mrs. England gave away the prizes.

(*b*) *Saraswathi Hostel:*

Dr. M. Venugopal, Associate Professor, Department of Electrical Engineering was the Warden for the Hostel assisted by Shri S. K. V. K. Sobanadrachari and Shri M. Durgaprasad Rao as Assistant Wardens.

In all, 177 students of the 5 Year and 3 Year B. Tech. degree courses were housed in the Hostel. Dr. V. Anantharaman of the Humanities Department conducted the Quiz programme on 5th September '66.

The Hostel Day was celebrated in collaboration with the Ganga Hostel on the 8th of March 1967 with Mr. R. W. England, Director, The English Electric Company, as the Chief Guest. Mrs. England distributed the prizes.

(*c*) *Godavari Hostel:*

The hostel had a strength of 170 students with Dr. V. Sethuraman, Asst. Professor, Department of Civil Engineering as Warden and Shri V. T. Shadagopan and Shri S. Sukumar as Asst. Wardens. Shri C. V. Raghuraman was General Secretary of the Student Committee.

Two Quiz programmes, one by Mr. V. S. Kumar of Humanities Dept. and another by Prof. S. Ramaseshan were conducted. The hostel music team, as usual, held its position with Solomon, J. Jayaram and Cordeire as members.

Mr. Govind Swaminathan, formerly Public Prosecutor inaugurated the cultural activities of the Hostel. The Hostel won the prize in Inter-Hostel Entertainment Competition. The Hostel celebrated its Annual Day on 9-3-'67 with Prof. S. Sampath, Deputy Director, as the Chief Guest.

(*d*) *Alakananda Hostel :*

The Hostel was inaugurated on 15—7—66 by Sardarini Ujjal Singh. His Excellency Sardar Ujjal Singh, Governor of Madras graced the occasion as the Chief Guest.

166 Students of the First Year of the Five Year and 3 Year B. Tech. degree courses were lodged in it. Shri S. S. Mani, Workshop Superintendent, was the Warden with Shri A. Angamuthu and Shri N. Venkateswaran as Asst. Wardens.

The Hostel won the second prize in the Inter-Hostel Quiz competition, on 7—12—1966. Mrs. Gloria Faize of the Bahai Movement visited the hostel and gave a talk on "World Friendship". The Director, Prof. B. Sengupto presided over the function and Dr. Vairana Pillai also spoke.

The combined Hostel Day of Alakananda and Jamuna was celebrated on 5—3—1967 with Shri G. D. Naidu, a noted Industrialist of the South as the Chief Guest. Mrs. Rouve distributed the prizes.

(*e*) *Jamuna Hostel :*

Jamuna had a student population of 178 of the First Year of the Five Year B. Tech. students entirely. Dr. V. Anantharaman, Asst. Professor, Dept. of Humanities, continued to be the Warden assisted by Dr. P. Achuthan and Shri P. R. Kannan as Asst. Wardens. Shri V. Ramakrishna was the General Secretary. The inaugural function was organized to felicitate the newly elected office-bearers of the Hostel General Council formed for the first time under the constitution framed by the Council of Wardens. More than 75 parents attended the function and the Director and Smt. Shanti Sengupto addressed the gathering. At the Seniors' Welcome to Juniors organized by the Gymkhana at the Sangam, the Jamuna Students presented 5 out of the 8 entertainment items and won appreciation.

The literary activities for the year commenced with a lively debate on **'Periodicals are a Blessing in Disguise for the Students of the I. I. T., Madras'**. The Director presided over the function. The Annual Quiz for the hostel was conducted by Prof. M. C. Gupta of the Mechanical Engineering Department. Another pleasant function for the year was the re-union of the past and present Jamuna students on the lawns of Jamuna.

The Hostel Day was celebrated in combination with the Hostel Alakananda and Shri G. D. Naidu delivered the Hostel Day address with Prof. S. Sampath, Deputy Director presiding.

The Hostel won the Engineering Unit Trophy for the Inter-Hostel entertainment competition. For the first time, Jamuna won the trophy for the Inter-Hostel Garden Competition. Shri Hariharan Shankar won the individual cup for the best singer and Shri V. Chandrasekar got the first prize in the Inter-Collegiate Sketching Competition.

Mr. Vikram Chandrasekar got the first prize in photographic competition held by the Institute and Shri V. Jagadeesh won the first prize in the miscellaneous photography.

An electric grinder in the mess and a harmonium for the Hostel were the notable acquisitions during the year.

(*f*) *Narmada Hostel:*

Dr. D. K. Banerjee took over from Prof. S. Sampath as the Warden. Shri M. Krishnamurthy and Shri A. Venkatesh were the Asst. Wardens. A notable change this year was the inclusion of final year students in the hostel.

Shri Gautam Mahajan became the General Secretary. Shri Thomas Victor who was elected Sports Secretary, became the General Secretary of the Institute Gymkhana.

Shri Gopal Ramachandran returned after climbing successfully Mount Shilla along with other IITians under the leadership of Shri R. Jaikumar, formerly of Narmada.

An extempore debate was conducted with Prof. S. Sampath as Chief Guest. Hostel library was started. For the first time,

an Open Bridge Tournament was held in the Institute and Narmada provided the venue and facilities to the organisers. The tug of war was easily won by Narmada. Institute strong man Shri Mohanti was also from Narmada.

For the first time, Narmada had a combined Hostel Day with Tapti Hostel with Shri M. Nityanandam, Director, Gears India, as the Chief Guest.

(*g*) *Kaveri Hostel:*

Dr. B. V. Aswathanarayana Rao, Assistant Professor, Department of Applied Mechanics continued to be the Warden with Shri B. C. Bhattacharya and Shri B. Subramanian as Assistant Wardens. Shri B. Viswanathan was elected as General Secretary. The strength of the hostel was 186.

Independence Day was celebrated on 15-8-1966. An after Dinner talk by Dr. S. Ramaseshan, the then Head of the Department of Physics was arranged on 29-8-'66 on the eve of his relinquishing his post here and to take up his new post at National Aeronautics Laboratory, Bangalore. The inmates felicitated Prof. S. Sampath on his appointment as Deputy Director of the Institute at a function held on 6th December 1966. Dr. P. Venkata Rao, Head of the Department of Electrical Engineering and previous Warden of this hostel spoke to the inmates on 1-4-1967 about his impressions as UNESCO Professor in Uganda. Lectures from a few more noted authors and professors were also held.

This hostel won the Inter-Hostel Ball Badminton tournament. One of the inmates bagged the first prize for the I. I. T. in the Inter-Collegiate Entertainment Competition.

The Hostel Day was celebrated on 12th March, 1967, combined with the Ladies' Hostel Day function. Inmates of both the hostels took keen interest in making the function a grand success. Mr. Raghavan, Works Manager, Royal Enfield India Limited presided over the function and Prof. Alladi Ramakrishnan, Director, Institute of Mathematical Sciences, was the Chief Guest. The prizes were distributed by Mrs. Alladi Ramakrishnan to our boys and by Mrs. Sengupto to the prize winners of the Ladies' Hostel.

A photographic section with a few equipments for developing the film, to take contact prints etc., was started by the enthusiasts of the hostel. The inmates of the hostel arranged a pleasure trip to Sathanoor Dam, and on their way back visited Pondicherry also.

(*h*) *Tapti Hostel :*

Dr. B. V. Ramanamurthy, Assistant Professor, Department of Physics, continued to be the Warden with Shri K. A. Natarajan and Shri H. S. Bathla as Assistant Wardens. Shri B. S. Gilra was the General Secretary. The strength of students in the hostel was 177.

A long awaited dark room was finally set up and incidentally was housed in this hostel. A Quiz programme was conducted in the hostel in the early part of the academic session, whereas a debate was organised in the later part of the year. In the Intramural tournaments, Tapti won Championship in Kabbadi, Foot-Ball and Volley-Ball and were runners-up in Cricket and Ball Badminton and came third in Hockey, Tennis and Carroms.

The hostel could also boast of three Institute's team Captains, *viz.*, Shri Arun Swamy, Shri Santosh Nayak and Shri S. Vasudevan for Tennis, Hockey and Volley-ball respectively among its inmates.

The hostel won (with equal points) the rolling cup awarded by Mr. Kurt Schroeter for General Championship in the Intramural tournaments.

The hostel library was established and formally inaugurated by Prof. S. Sampath, Deputy Director on 27th Nov. '66. The inauguration was followed by a 'Search Talent' entertainment programme. The library opened with a humble number of 100 books bought from hostel funds but the number has since trebled.

During the Inter-Hostel Entertainment Competition, Shri Amir Ahmed of this hostel won the first prize for his portrayal of Sherlock Holmes. Shri Amir Ahmed had earlier won the first prize for the Institute Gymkhana's inauguration debate and consequently represented the Institute in the debate held at Bengal Engineering College, Howrah.

Shri J. E. T. Sargunar in addition to being a proficient guitarist and a member of popular Beat-X group had also been adjudged as one of the finest oarsman in Madras. Shri Umesh Dutta who was awarded a prize for his ingenious model in the Science Fair with Shri Sargunar had the distinction of representing Madras at the All India Regatta held at Colombo. Shri George Varghese besides being adjudged the best boxer also bagged the weight lifting and Mr. Strongman titles. Shri Alex Phillipos won a number of quizzes both in and outside the Institute and secured maximum number of points in the quiz held during Literary Week.

The Narmada-Tapti Hostel Day was celebrated on 4th March 1967 with Shri P. M. Nityanandam, Director, Gears India Private Ltd. as the Chief Guest. Mrs. Nityanandam distributed the prizes for the Hostel tournaments.

A new radio and record player was purchased by the hostel for the commonroom, with a good collection of gramophone records.

(*i*) *Krishna Hostel :*

Dr. T. Gopichand, Assistant Professor, Department of Chemical Engineering continued to be the Warden, assisted by Shri S. K. Jain and Shri G. Sambasiva Rao as Assistant Wardens. Shri Naresh Puri was the General Secretary of the Students Committee. The strength of the hostel was 184. The Independence Day was celebrated with our old student Shri Lionel Paul as the Chief Guest.

A music programme was organised in aid of the Bihar Drought Relief Fund and a sum of Rs. 900 was collected from the inmates of this hostel and members of the audience present.

In sports field, the hostel's table tennis team consisting of Messrs. Subba Rao, Rajni Mohan and Saha won the first place in the Inter-Hoste lcompetitions. Shri R. Jaikumar who volunteered for mountaineering expeditions reached great heights when he conquered the Mt. *Shilla.*

On 24th March, 1967 the hostel 'CARNIVAL' was organised and was inaugurated by Mrs. Sengupto. There was a colourful gathering. The highlight of the programme was a variety of skill games arranged on the occasion. Arrangements were also made for serving several types of refreshments to suit different tastes. On the 25th March, 1967 the Hostel Day was celebrated with great enthusiasm. Shri S. Paramanayakam, Assistant Regional Director, Regional Labour Institute, Madras was the Chief Guest on the occasion. 'Krishna Hostel Day' brochure, a regular annual feature, was released by the Chief Guest, which had more than a dozen articles written by the inmates of the hostel.

When the cyclone hit Madras in November, 1966, many were rendered homeless. Shri Kabilan and Shri V. Gopal of the hostel organised a band of volunteers to distribute food to the destitutes of the nearby Velacheri village.

(*j*) *Ladies Hostel* :

With its 16 inmates, the hostel was managed by an Assistant Warden, Miss V. Hamsaleelavathy. Miss Y. Pramila and Miss S. Janaki were the lady representatives on the Gymkhana.

The Annual Sports of the hostel and a variety entertainment competition were held on the 4th March 1967. The judges were Mrs. Sengupto, Mrs. Rouve and Mrs. Sita Subramaniam. The Hostel Day celebration was jointly held with the Kaveri Hostel on 12-3-1967 when Prof. Alladi Ramakrishnan was the Chief Guest.

11. LIBRARY :

The library remained open on all days of the year (except on seven closed holidays declared for the library) between 7-30 a.m. and 9-00 p.m. On Sundays and other closed holidays for the Institute, the library was kept open between 10-00 a.m. and 5-00 p.m. The membership of the library is extended now to outsiders at the discretion of the Director on payment of a nominal deposit of Rs. 50.

The total number of publications acquired till 30-6-'67 was 61,439 which includes 55,414 books and 6,025 pamphlets.

A total number of 1,200 titles of periodicals of which 300 were free of cost or in exchange to our publications were received. Back volumes for the last over 10 years from most of the periodicals currently subscribed are available in the library. 1595 books and 1814 periodicals were got bound.

The library received 2275 German Standards (DIN) and 110 titles of German periodicals under German Aid. Besides many valuable publications from individuals and reputed organisations were received.

The library is grateful to several Government, educational institutions and individual donors for free supply of publication.

The library borrowed and issued some publications on inter-library loan to many organisations.

A sum of Rs. 2,27,880 was spent on library activitie during the financial year 1966-67.

The new spacious library building was got ready fo occupation and it is hoped to move in July '67.

12. INSTITUTE GYMKHANA :

The Institute Gymkhana continued its work in regard to the games and sports, literary and cultural activities of the students. The Gymkhana under the presidentship of Dr. P. C. Varghese organised and conducted the sports and games cultural and other activities. This year as in the previous years the Institute entered teams in the Madras Inter-Collegiate leagues in Foot-ball, Hockey, Cricket, Tennis, Volley-ball and Basket-ball.

A Calender of the activities of the Gymkhana during the year is given in Appendix IV to this part.

13. N. C. C. ACTIVITIES :

There are four NCC Units in the Institute and are designated as follows with a strength of 200 Cadets each.

(i) 6 Madras Engineer Company NCC

(ii) 3 Madras Signal Company NCC

(iii) 6 Madras EME Unit NCC (2 Companies)

(iv) 4 Madras Air Technical Squadron NCC

The training is compulsory in the first, second and third year of five year degree course and first and second year of three year degree course.

The parades are held on every Monday and Thursday for 2 hours from 16-30 hours to 18-30 hours after which light refreshments are given to the NCC Cadets. Each unit is responsible for training the Cadets under their own arrangements. The training is conducted individually and collectively both in military subjects and technical subjects. The Military training comprises of drill with and without arms, cane drill, rifle and bayonet training, Map reading, field craft, section leading, route marches, night marches and battle procedure. The cadets are also given practice in miniature range firing and in the annual range classification.

The cadets are trained technically in the subjects and equipments pertaining to their units. They are mainly taught in the practical handling and operation of those particular equipments.

The annual training camp for 14 days is held for the cadets. During this camp, a cadet has to undergo the entire training which he has been doing during the individual training and the collective training and is given practice in man management, interior economy, guards duties and various operations of war.

The cadets have to appear in the 'B' certificate examination and finally in the 'C' certificate examination.

More attention is given for training the cadets in building up their character and in leadership and making them good citizens with a strong sense of comradeship, duty and discipline.

Promise parade has been held for cadets and the Director, I.I.T. read the promise. Ceremonial parades have been held on the occasion of Independence Day and Republic Day when the Director, I.I.T. Prof. B. Sengupto took the salute.

14. CAMPUS ACTIVITIES :

(*a*) *Central School* :

The Central School, I.I.T. is one of the 112 Higher Secondary Schools established by the Ministry of Education, Government of India. The School is affiliated to the Central Board of Secondary Education, New Delhi and prepares students for the All-India Higher Secondary Examination. The school started functioning on 20-7-1964 with classes VI to IX. Class X was added in June 1965 and Class XI the highest class, came into being in June 1966. At the end of the academic year 1966-67 the strength in the various classes was as follows : VI-65, VII-62, VIII-44, IX-36, X-19 and XI-6.

The pupils of the School participated in several competitions organised in the city and came out with flying colours.

The first batch of pupils from the school appeared for the All-India Higher Secondary examination 1967. Out of five, four came out successful, two in first class and two in second class, one of whom has joined the Indian Institute of Technology, Madras and the remaining three have joined the other engineering colleges.

The School Day Celebration for the year took place on 6-5-1967 with Prof. S. Sampath, Deputy Director, I. I. T., Madras presiding and giving away the prizes for the pupils who had distinguished themselves in sports and literary competitions.

The affairs of the school are managed by a local committee consisting of :

(i) Prof. B. Sengupto, Director of the Institute (Chairman).

(ii) Prof. R. K. Gupta, Professor of Industrial Management and Head of the Department of Humanities in the Institute.

(iii) Prof. R. G. Narayanamurthi, Head of the Department of Mechanical Engineering in the Institute.

(iv) Rev. Father L. D. Murphy, S. J., Loyola College, Madras.

(v) The Collector of Madras, Madras.

(vi) The Divisional Inspector of Schools, Madras Division, Madras-6.

(vii) The Accountant-General, Madras-18.

(viii) Shri M. K. Natarajan, Principal of the School (Secretary)

(ix) Shri R. Rama, Post-Graduate Teacher in History, Central School.

(*b*) *Vanavani Primary School :*

The strength of the school continues to be at its maximum of 300. Many applicants had to be refused admission for want of space. Unfortunately the school can take only 2 sections of 30 in each class.

The Advisory Board which meets every term consists of :

(i) Prof. Fr. L. D. Murphy (Chairman).

(ii) Prof. S. Sampath, Deputy Director of the Institute.

(iii) Prof. D. Venkateswarlu, Head of the Department of Chemical Engineering of the Institute.

(iv) Mr. M. K. Natarajan, Principal, Central School, I.I.T. Madras.

(v) Mrs. J. Peter, Headmistress of the School (Secretary).

The usual annual function (Convocation) when the children of V Class take their diplomas earned by examination at the end of the school, was held under the presidentship of the Director, Prof. B. Sengupto. The children gave a delightful performance of acting both in English and in Hindi and display of Indian Dance.

The staff consists of 17 members (trained graduates 6 and secondary grade trained 11).

(*c*) *Staff Club :*

The following members of the Club were unanimously elected as Office Bearers for the year 1966-67 at the meeting of the General Body held on 2—9—1966.

Prof. S. Sampath	...	*President*
Dr. V. Anantharaman	...	*Vice-President*
Shri V. Seshagiri Rao	...	*General Secretary*
Shri P. Sankaran	...	*Treasurer*
Shri S. K. Jain	...	*Sports & Games Secretary*
Shri V. S. Kumar	...	*Fine Arts Secretary*
Dr. R. J. H. Bisanz Dr. A. Klein Dr. V. Sivaramakrishnan Shri U. N. Srivastava	...	*Ordinary Members*

Besides, Shri T. S. Rajagopalan, Asst. Registrar (Admn.) and Shri K. V. Ananthanarayanan, Asst. Estate Officer, were co-opted.

The activities of the Club for the year 1966-67 were inaugurated on 27—9—66 by Dr. K. S. G. Doss, Director, Central Electro-Chemical Research Institute, Karaikudi. Main activities included indoor games like table tennis, carroms, chess and cards

and outdoor games like tennis, shuttle-cock, ball badminton, volley ball, etc. Annual tournaments were conducted in which more than 100 members took an active part. The club became the Member of the South India Bridge Association. Reading room continued to get a number of dailies and magazines. About 25 films in different languages were screened and two Plays were enacted by the members of the club. One magic show performance and one mono-acting were arranged. A competition was conducted in light and classical music. Membership cards were introduced. A cafeteria was opened in the Ladies Club Hall. A radio was purchased by the Staff Club. A picnic was arranged by the club to Sathanur Dam. Garden lights were provided in the club premises. A talk on 'Family Planning' was arranged. The Annual Day of the club was celebrated on 8—4—1967 and the Hon'ble Shri M. Ananthanarayanan, I. C. S Chief Justice, Madras High Court, presided.

(*d*) *Ladies Club :*

The first activity of the Ladies Club for the year 1966-67 was a subscription dinner arranged on the eve of the Independence Day. At the General Body Meeting held on 15th September 1966, the following office-bearers were elected.

(i)	*President*	...	Mrs. Shanti Sengupto
(ii)	*Vice President*	...	Mrs. Koch
	,,	...	,, Bisanz
	,,	...	,, Rouve
	,,	...	,, Y. S. Ramaswamy,
	,,	...	,, Varghese
(iii)	*Treasurer*	...	Mrs. R. G. Narayanamurthy
(iv)	*Secretary*	...	Mrs. H. C. Radhakrishnan
	,,	...	,, Raghavendra
	,,	...	,, Sankaran
(v)	*Committee Member*	...	Mrs. A. Klein
	,,	...	,, Chitra Rao
	,,	...	,, Vanaja Venugopal

Miss Lakshmi Subramanian
Mrs. Saraswathi Kumar
„ Janaki Kalyanasundaram
„ Shanta Das
„ Narasimhan
„ Padiyar
„ Rajan
„ Kuriacose
„ Geetha Reddy
„ Venkateswarlu
„ V. G. K. Murthy
„ Sampath
„ E. G. Ramachandran
„ Lakshmi Shastri
Miss Rukmini

The first meeting was held on 26th September 1966 to welcome the new members and gave a send-off party to Mrs. Gopal the ex-secretary. On the sa day, after the meeting Mrs. Bisanz showed some slides. On the 27th September, Mrs. Rouve gave a talk about her country.

First Aid Classes were started from 29th September 1966 in which 12 persons were given training. On 12th October 1966 the members of the class visited the Canning Centre in T. Nagar. On the Children's Day, drawing and painting competition was arranged. More than 150 children participated. 30 children got the prizes. Her Excellency Sardarini Ujjal Singh distributed the sweets to the children. Games were arranged for ladies on the 8th November '66. Prizes were given to the winners. On the 20th November '66, Club Day was celebrated when Her Excellency Sardarini Ujjal Singh presided. The high-light of the entertainment programme was a dance-drama directed by Mrs. Sengupto, on 13th February 1967, Mrs. Sarojini Varadappan visited the club and addressed the members. Tailoring classes were again started

from 1st March, 1967. In February 1967, a dance performance was arranged by the club in aid of the temple in the campus.

In addition to these activities, cooking classes were conducted on Mondays. The dance and music classes are running regularly.

(*e*) *Staff Co-operative Canteen :*

The I.I.T. Staff Co-operative Canteen which commenced functioning in the campus with effect from January 1964 completed three years of useful service to the staff of the Institute. Shri T. S. Rajagopalan, Assistant Registrar (Administration) and Shri A. V. K. Nambiar, Accounts Officer continued to hold the offices of the President and Vice-president respectively. Shri J. Rajasekharan, U. D. C. and Shri K. S. Narasimhan U. D. C. were elected as Secretary and Treasurer respectively.

The various measures of improvement in the service initiated by the Board of Directors in the year yielded rich dividends and the Canteen, whose financial position was not satisfactory till last year was able to show surplus in its income without increasing the sale price of the edibles in spite of the soaring prices of pulses, oils, provisions, vegetables and milk. The canteen staff were paid bonus, a reserve fund created and dividend was declared and paid to the shareholders for the first time.

(*f*) *Staff Co-operative Building Society* :

This society which was established in 1959 and was almost inactive all these years, commenced its activities in right earnest during this year. At the meeting of its general body on 9-8-1966 the following were elected to the Board of Directors :

Shri T. S. Rajagopalan, Asst. Registrar (Admn). Secretary.

Shri V. Ramachandran, Cashier (Treasurer).

Shri C. M. Gopal, Executive Engineer.

Dr. V. Sethuraman, Asst. Professor, Civil Engg.

Shri B. Ramanathan, Lecturer, Civil Engg.

Shri T. A. Ramalinga Bhat, Lecturer, Electrical Engg.

Shri V. Subramanian, Lecturer, Electrical Engg.

Shri R. M. Dubey, Stenographer, Administration.

The society was able to acquire on the Velachery Road, land measuring 11·06 acres at a total cost about Rs. 1,34,500/- providing for 134½ developed grounds for allotment as housing sites to its members. The year ended with further prospect of acquiring an additional area adjoining the present site, to meet the pressing demands from more of its members.

APPENDIX I

Proceedings of the Third Convocation of the Institute held on the 30th July 1966.

The Third Convocation of the Institute was held at 5-30 P.M., on Saturday, the 30th July 1966, at the Open Air Theatre of the Institute. Dr. A. L. Mudaliar, Chairman, Board of Governors, presided over the Convocation. Dr. C. V. Raman, Nobel Laureate, who graciously accepted the invitation of the Institute to be the Chief Speaker, delivered the Convocation Address.

On arrival at the campus, Dr. Raman was received by Prof. B. Sengupto, Director, and Shri C. V. Sethunathan, Registrar of the Institute. A Guard of Honour was presented to Dr. Raman by the cadets of the N. C. C. After inspection of the Guard of Honour, the Chief Speaker was conducted to the robing room, where Dr. A.L. Mudaliar, Chairman, Board of Governors, received him. After putting on the academic robes, the Chief Speaker sat for a group photo with the graduates and the members of the Council, the Board of Governors and the Senate, all of them being in academic robes.

After the group photo, the Director introduced to the Chief Speaker the members of the Council, the Board of Governors and the Senate present on the occasion. Then these members and the Chief Speaker formed themselves into the academic procession in twos and proceeded to the Convocation Hall in the following order, led by the Registrar :

Shri C. V. Sethunathan

Shri V. S. Nazir Ahmad	Dr. S. Ramaseshan
Shri S. S. Mani	Dr. S. D. Nigam
Dr. B. V. Ramanamurty	Dr. E. Hohmann
Prof. T. N. Seshadri	Dr. M. V. C. Sastri
Dr. H. W. Meyer	Dr. A. Klein
Prof. R. K. Gupta	Dr. P. C. Varghese
Dr. R. J. H. Bisanz	Dr. D. Venkateswarlu
Dr. D. V. Reddy	Dr. E. G. Ramachandran

Dr. W. Lutz	Prof. R. G. Narayanamurthi
Dr. G. Stahl	Dr. H. Heitland
Dr. T. R. Doss	Prof. T. Balakrishnan Nayar
Shri T. Muthian	Prof. S. Sampath
Shri S. Rajaraman	Dr. K. S. G. Doss
Prof. G. R. Damodaran	Shri P. M. Reddy
Prof. B. Sengupto	Shri G. K. Chandiramani
Dr. C. V. Raman	Dr. A. L. Mudaliar

On the Chief Speaker first entering the Convocation Hall, six bars of the National Anthem were played by the Police Band which was in attendance. The members of the procession proceeded to the dais and took their seats.

After invocation, Dr. A. L. Mudaliar, welcomed Dr. Raman and declared the Convocation open. The speech delivered by him is given in Annexure-I to this Appendix.

The Degrees to be conferred were supplicated for by the respective Heads of Departments one by one for the passing of Grace in the following order :

1. Dr. D. Venkateswarlu
   Doctor of Philosophy in Chemical Engineering

2. Dr. S. D. Nigam
   Doctor of Philosophy in Mathematics

3. Dr. S. Ramaseshan
   Doctor of Philosophy in Physics

4. Dr. D. Venkateswarlu
   Master of Technology in Chemical Engineering

5. Dr. P. C. Varghese
   Master of Technology in Civil Engineering

6. Prof. S. Sampath
   Master of Technology in Electrical Engineering

7. Prof. R. G. Narayanamurthi
   Master of Technology in Mechanical Engineering

8. Dr. M. V. C. Sastri
   Master of Science in Chemistry

9. Dr. S. D. Nigam
   Master of Science in Mathematics

10. Dr. S. Ramaseshan
    Master of Science in Physics

11. Dr. D. Venkateswarlu
    Bachelor of Technology in Chemical Engineering

12. Dr. P. C. Varghese
    Bachelor of Technology in Civil Engineering

13. Prof. S. Sampath
    Bachelor of Technology in Electrical Engineering

14. Prof. R. G. Narayanamurthi
    Bachelor of Technology in Mechanical Engineering

15. Dr. E. G. Ramachandran
    Bachelor of Technology in Metallurgy

After the passing of Grace for each Branch of Study under each Degree, the Head of the concerned Department presented the first candidate in each branch of study of each Degree to the Director who then conferred the respective Degree on this candidate and then on the other candidates taking the Degrees in person. He also conferred the Degree *in absentia* on those candidates who could not attend the Convocation.

The M. Tech. Degree was conferred for the first time at this Convocation on those who qualified themselves for the Degree in the years 1965 and 1966.

The number of candidates on whom the Degrees were conferred in person and the number on whom the Degrees were conferred *in absentia* are as follows :

Ph. D. Degree	*In Person*	*In Absentia*	*Total*
Chemical Engineering ...	1	—	1
Mathematics ...	1	—	1
Physics ...	1	—	1
M. Tech. Degree 1963-65 Batch			
Chemical Engineering ...	3	3	6
Civil Engineering ...	7	3	10
Electrical Engineering ...	5	7	12
Mechanical Engineering ...	1	3	4
1964-66 Batch			
Chemical Engineering ...	5	4	9
Civil Engineering ...	5	4	9
Electrical Engineering ...	5	3	8
Mechanical Engineering ...	4	2	6
M. Sc. Degree :			
Chemistry ...	2	1	3
Mathematics ...	1	—	1
Physics ...	4	3	7
1964-66 Batch			
Chemistry ...	12	—	12
Mathematics ...	6	—	6
Physics ...	6	3	9

B. Tech. Degree (5 year and 3 year courses)

	5 year	3 year	5 year	3 year	5 year	3 year
Chemical Engineering ...	5	3	14	6	19	9
Civil Engineering ...	7	3	10	4	17	7
Electrical Engineering ...	19	8	17	14	36	22
Mechanical Engineering...	23	6	14	19	37	25
Metallurgy ...	7	3	17	4	24	7
Total ...	61	23	72	47	133	70

After the conferment of the Degrees, the Registrar presented the following graduates for the award of prizes to the Chief Speaker who graciously handed over the prizes to them.

PRESIDENT'S PRIZE

SHRI V. SRINIVASAN

(Mechanical Engg. Branch — 5-year B. Tech.)

(for the student of the B. Tech. Degree Course with the best academic record)

GOVERNOR'S PRIZE

SHRI LIONEL PAUL

(Mechanical Engg. Branch — 5-year B. Tech.)

(for all-round proficiency in the B. Tech. Degree Course)

INSTITUTE SPECIAL MERIT PRIZE

SHRI L. PADMANABHAN

(*Chemical Engg. Branch—3-year B. Tech.*)

(for the student of the 3-year B. Tech. Degree Course with the best acadeicm record.)

INSTITUTE MERIT PRIZES

(for the student with the best academic record in each discipline of each course)

M. Tech. Degree Course (1963-1965 Batch)

Shri S. Akshayakumar	...	Civil Engineering Branch
„ S. Pasupathy	...	Electrical Engineering Branch
„ R. Rajagopal	...	Mechanical Engineering Branch

M. Tech. Degree Course (1964-66 Batch)

Shri M. G. Srinivasan	...	Civil Engineering Branch

M. Sc. Degree Course (1963-65 Batch)

Shri T. P. Srinivasan ... Physics Branch

M. Sc. Degree Course (1964-66 Batch)

Shri S. Santhanagopalan ... Chemistry Branch
,, V. Sundaresan ... Mathematics Branch

5-year B. Tech. Degree Course

Shri N. Sekhar ... Chemical Engineering Branch
,, K. V. Natarajan ... Civil Engineering Branch
,, K. Radhakrishna Rao ... Electrical Engineering Branch
,, V. Srinivasan ... Mechanical Engineering Branch
,, C. Devadas Kamath ... Metallurgy Branch

3-year B. Tech. Degree Course

Shri L. Padmanabhan ... Chemical Engineering Branch
,, B. V. Subrahmanyam ... Civil Engineering Branch
,, P. Niranjana Reddy ... Electrical Engineering Branch
,, S. Ramaswamy ... Metallurgy Branch

SIEMENS PRIZES

(Presented by M/s. Siemens Engineering and Manufacturing Company of India Limited, Madras, to the students with the best academic records in Electrical Engineering Branch of the M. Tech. and 5-year B. Tech Degree Courses).

M. Tech Degree Course

Shri S. Pasupathy ... (1963-65 Batch)

5-year B. Tech Degree Course

Shri V. Padmanabhan ... (Electrical Engineering with Heavy Current Option)

N. B.—Prizes were also awarded to the following graduates who were conferred their respective Degrees *in absentia*.

M. Tech. Degree Course (1963-65 Batch)

Shri T. S. Sridhar ... Chemical Engineering Branch

M. Tech Degree Course (1964-66 Batch)

Shri C. P. Vijayan ... Chemical Engineering Branch

„ K. Raman Nayar ... Electrical Engineering Branch

M. Sc. Degree Course (1964-66 Batch)

Shri B. Sudheer Nanda ... Physics Branch

3-year B. Tech Degree Course

Shri A. S. Rangan ... Mechanical Engineering Branch

SIEMENS PRIZE

M. Tech. Degree Course

Shri K. Raman Nayar ... Electrical Engineering Branch

The distribution of prizes being over, the new graduates took the following pledge which was read out by Shri V. Srinivasan, winner of the President's Prize.

" We, the graduates and post-graduates of the Indian Institute of Technology, Madras, hereby pledge :

That we will, in thought and deed, ever endeavour to be scrupulously honest in the discharge of our duties as engineers, technologists and scientists :

That we shall endeavour to utilise our knowledge of science, engineering and technology for the service of our country and honour of our Institute ; and

That in all circumstances we will uphold the dignity and integrity of the profession ".

Sahanavavatu, Saha Nau Bhunaktu,
Saha Viryam Karavavahai,
Tejasvinavadhitamastu Ma Vidvishavahai
Aum Shantihi Shantihi Shantihi.

Then Dr. Raman delivered the Convocation Address on being requested to do so by the Chairman. His address is given in Annexure No. II to this Appendix.

On the conclusion of the Address, the Chairman signed the Record of Degrees conferred and declared the Convocation closed.

After the playing of the National Anthem, the members of the Academic procession descended from the dais and, re-forming themselves into a procession in the same order in which they entered the Convocation Hall, proceeded to the robing room with the Registrar leading.

ANNEXURE—I TO APPENDIX I

Speech of Sir A. L. Mudaliar, Chairman, Board of Governors

"I declare the Convocation Open.

"May I avail myself of this opportunity to extend a most hearty and cordial welcome to our most distinguished guest Sir C. V. Raman. I am not going to commit the impertinence of trying to introduce him to an Indian audience—for the matter of fact, to any audience in the world. He is so well known all over the world and has received so many marks of their appreciation of the good work that he has done, that it is not necessary for me to add to it. But, we in India and particularly from Madras are deeply sensible of the honour that he has conferred on us. As an alumnus of the University of Madras, he is the most distinguished alumnus not only of this century but I venture to say, for all time to come.

"Sir C. V. Raman is a dynamic personality. All those who have come into contact with him would certainly realise this. But even more than that, he has been one of the most fruitful of investigators, who has been able to draw in a very large number of young scientists to himself and train them in the methods of research. When to-day so much is being talked about research, I wish to recapitulate the work that Sir C. V. Raman did at a time when there were few, indeed very few, of the many equipments and facilities that people require for research to-day. A genius that he is, he did not depend on foreign imports.

"Sir C. V. Raman creates opportunities for himself and gives to the world something which the world is longing for. I could go on saying a great deal more about him. It has been my privilege to have known Sir C. V. Raman for a long time and to have had the opportunities of knowing something of the great work that he has been and is doing even now in Bangalore. He has now turned his attention to the medical field,—fortunately to the 'eye' only! So I am not jealous of him because my field in medicine is somewhat different.

"I do hope and trust that Sir C. V. Raman's lecture here will be duly appreciated, studied over and over again, recapitulated and brought to memory by many of the young scientists who are gathered here. I have great pleasure in requesting Sir C. V. Raman to deliver the Convocation Address."

ANNEXURE—II TO APPENDIX I

Text of the Address delivered by Sir C. V. Raman on the occasion of the Third Convocation

I have been at many Convocations but I have never seen an assembly that impressed me so much as the one that I am privileged to address now. I have been on a joy-ride through the Campus and was thrilled to see the wonderful, old banyan trees, the wild grass, the thorns here and there and the occasional buildings. Study, lectures, books and examinations constitute a small part in a man's or woman's education. The greatest teacher of all is Nature herself—the supreme artist who creates forms of beauty, loveliness and colour that have been unsurpassed since the beginning of time. She has been the inspiration not only of artists, painters and sculptors but men of Science as well. She should inspire the new graduates. Technology and Industry are usually associated with dust and smoke, squalor and ugliness ; this ought not to be so. Life is not merely a matter of getting food, clothes and shelter. Its finer aspects are to be found in music, flowers, colour and beauty and the aesthetic sense and satisfaction that are derived from an enjoyment of all these. I was privileged to be shaken by the hand by your prize-winners-hefty-young fellows with plenty of grip in them. This is as it should be, because physical strength and energy form the basis of all engineering activity.

It is right and proper that on this occasion I should speak of that great country, Germany. To me she is all the master-minds that have made her great-men like Hermann von Helmholtz and Albert Einstein who have written their names in an imperishable way in the records of science. Ten years ago, I attended a conference at Lindau-a lovely little place on the edge of Lake Constance. This meeting was hosted by Count Bernadotte, and the minimum qualification for the invitee was that he should have won a Nobel Prize. I went on to the ancient University of Freiburg in Breisgau and then to Bonn. Here I was enormously impressed by the Museum of Mineralogy and I marvelled at the way that a country so much devastated by the War could get together so swiftly such an amazing collection of rare and

beautiful specimens. By a coincidence, our Prime Minister, late Shri Jawaharlal Nehru, was also in Bonn at that time. We had lunch with the President of the German Republic. It was on this occasion that the German Government promised their gift of this Institute to India. And in a short span of ten years, a veritable jungle has been translated into a place of learning with its fine buildings and equipment and bright, young people from all over India, and here such a magnificent assembly has been presented to me for my delectation.

This joyous and colourful scene should be a unique occasion in your lives. Fully sixty years ago, I came out of College in this very city. I find, to my astonishment, that my experiences of those four years have left an indelible impression on my mind; and what is even more remarkable is that all that I have done in the last sixty years was determined for me with mathematical precision by what I did in those four years. I want to stress this because in these three, four or five years that you have been here, you have been subject to the influence of your teachers and also, I hope,—of the old banyan trees around, which I do not regard as unimportant.

On the foundation of what you have learnt here, you must build your future. The most wonderful possession that we all have is the human body with the marvellous, absolutely incredible power of the human faculties. The habit of independent thinking must be applied to all the problems of life. It is the achievement of doing something of permanent value that will bring real joy. Only by realizing this, when you are young and energetic, when your blood is coursing strongly through your veins, that you will meet with success and advance the glory of India. Age is usually credited with wisdom. With all deference to the people around, I beg to question that proposition. As you grow old, you will find it difficult to summon up the enthusiasm and fierce desire for achievement. It is for this reason that I regard youth as the most glorious time of all. Practically all the great discoveries of Science have been made by young people. It is not the experience or the wisdom of old age but the freshness of outlook and the indomitable desire to achieve which are characteristic of youth that make discoveries possible.

There is a deep and ineradicable defect in us that is due to the inferiority complex that makes us think that we dare not question what comes to us from abroad. Whatever is said in a text-book must be right and we bow in fear and trembling because a great man has said it. This produces mental inhibition. I do not for a moment suggest that you should all become arrogant and contemptuous of all the great men of the past. But we should remember that no one is infallible, not even Hermann von Helmholtz or Einstein. Time's new knowledge may upset what was done in the past. Fearless independence of thinking is our essential need today for our progress.

We are ruled by a Consortium of all the nations of the World except ourselves. It is bad to borrow money but much worse to borrow knowledge and to forget to think for ourselves. I consider that it is far better to work with our own imperfect, inadequate equipment than shine in borrowed feathers. And it is my firm conviction that no country can become scientifically and industrially great without a foundation of real knowledge.

Science comes first and Technology follows in its wake. Germany is great because in the nineteenth century she had a galaxy of men of Science-humble University Professors who sought knowledge for its own sake and who made their students seek knowledge. These were the springs from which knowledge gushed forth and fertilised all the industries and raised the country's prosperity. It is only when we build up our own powerful schools of thinking in various fields—electro—technology, chemistry, metallurgy and the like—that we shall have a solid basis for teaching the technologists what they should do.

The finest and most sophisticated instruments are today to be found not in technological establishments but in the research laboratories where men try to explore the hidden secrets and discover the unknown. Not only is science the fountain-head of technical knowledge, but in many instances it has set the problems which the technologist had to solve. The astronomers, for instance, have demanded instruments of the highest precision with which the heavenly bodies could be tracked. This led to the development of precision mechanics. The imposing two-hundred inch telescope at Mount Palomar, weighing hundreds of tons,

moves with the precision of a Swiss watch. The demands of Botanists and Zoologists who wished to examine subtle structures paved the way for striking progress in the Optical Industry. It was a scientist who thought of the Electron microscope, and it is in widespread use today.

What has made Science develop in the explosive, spectacular fashion that we have seen in the last sixty years ? There are three distinctive causes. The first, that at the end of the nineteenth century and at the beginning of the present century came a succession of epoch-making discoveries in fundamental knowledge the discovery by Planck of the quantum of action, the enunciation by Einstein of the corpuscular nature of light and the use of this principle by Neils Bohr and others to analyse the structure of the atom and to explore the chemical molecule. The second is the fact that Science, as we all know and recognise. has definite applications to human welfare—as evidenced by examples in agriculture, knowledge of heredity etc. An important advance is the invention of plastics. Stemming from the work of a scientist who was simply interested in studying the structure of big molecules—an instance of a pure scientific endeavour leading to the establishment of an industry on a big scale. In the field of medicine, from the era of the witch-doctor to the age of modern medicine, there has been a spectacular leap. There is a third and some what sinister way in which Science has developed in the last sixty years, its application to warfare. It is true to say that a lot of modern Science has come directly out of the needs of war. A good deal of our knowledge of the mechanism of the brain and of the body has come from a study of dead and dying men in the theatres of armed conflict. During the I World War I, scientists like Lord Ruthurford and Sir William Brragg worked on subsonic devices to combat the submarine menace, and these devices are widely used today. In the exigencies of World War II aviation reached new proportions. The II World War also brought the atom bomb into existence. It came as the consequence of the actual discovery of fission in the laboratory by Joliot Curie—I was privileged to see this experiment in Paris. The fear that the opponent may use the atom bomb has led to its wide development. Then came the hydrogen bomb and with it an atmosphere of fear, mutual hatred and recrimination. The fear complex has produced a psychological and pathological state of affairs in the

human mind. In many countries, Science has become the hand-maiden of the War Machine. Rockets are sent up and men walk in space. It is with feelings of disgust and loathing that I witness this colossal display of lunacy on the part of mankind. It is a pretence to say that exploits like these have any scientific value. This is all nothing but militarism thinly disguised. I heard you pledge that you will not use your knowledge for unworthy ends. If you were in one of these countries, you would have to use it for unworthy ends, or you would lose your job. There are sensitive consciences in those countries which revolt from this sort of misuse of science. Yet the prostitution of Science goes on. As a man of Science, my heart is wrung by this tragedy.

We in this country have no future unless we learn to rely on ourselves for all that we need. It is far better to go back to the Gandhian age and ride an ox-cart and throw away Radio, Television and all the rest of it than to cling, as we now do, to the coat-tails of European Civilization. If we cannot by our own efforts make the things that we require, let us do without them. Why should we buy our Cars from abroad? Or, even import parts? I have tried to find out if there is any place in India where the most important component part of all lamps and Radio Valves—the metallic filament—is made. This is the starting point of the whole industry and we do not make this basic ingredient. Let us wait till we make it before we buy a single electronic valve from outside. Then we would learn how to make it. We will learn the lesson of self-reliance and until we learn it there is no future for us.

APPENDIX II

STAFF APPOINTMENTS, RESIGNATIONS, ETC.
(during the year).

APPOINTMENTS

Deputy Director :
Prof. S. Sampath

Professors :
Dr. D. V. Reddy
Dr. B. S. Murthy
Prof. N. K. Datta
Prof. A. L. Krishnan

Associate Professor :
Dr. M. Venugopal

Assistant Professor :
Dr. D. Johnson Victor
,, B. Ramaswamy
Shri S. Ramani

Lecturers :
Shri A. Prabhakhara Rao
Dr. Ch. Durgaprasada Rao
Shri G. Subramanian
,, P. Kalyanasundaram
,, N. Rajagopalan
,, D. S. Subramanian
,, R. Nagarajan
,, C. Sivaprasada Rao
,, T. N. Govindarajan
,, T. Narayanan
,, R. M. Siddaveere Gowda
,, K. N. Gopalan
,, K. J. Lakshminarayana Iyer
,, A. Baradarajan
Shri R. Subramanian
,, K. Thulasiraman
,, T. K. Varadan
,, V. Ramamurthi
,, M. Adithan
,, R. Parthasarathi
Dr. (Miss) Vasantasree
Shri V. Krishnamurthy
,, C. Narayana Reddy
,, E. G. Thulapurkara
,, P. Satyanarayana Rao
Dr. V. Mahadeva Ayyar
Shri K. Narayanan
,, J. Rajaram
,, M. Ramakrishna Udupa

Associate Lecturers :
Shri K. R. Rajagopalan
,, S. G. Asthana
,, R. Vedaraman
,, K. Ramamurthy
,, B. K. Sudhaman
Shri M. G. Srinivasan
,, S. Selvaraj
,, Purna Chandra Majhee
,, V. S. Kumar
,, M. Anthony Reddy
,, B. H. Lakshmana Gowda
,, P. S. Aswathanarayana
,, P. A. K Murthy
,, S. B. Dias

Senior Technical Assistants :
Shri A. Angamuthu
,, C. Srikumara Menon
Kum. B. Bagyalakshmi
Shri A. S. Satheesan
,, V. Kannan
,, S. Radhakrishnan
,, Sheo Prakash
,, V. Dakshinamurthy
,, C. M. Srinath
,, T. C. Gopalakrishnan
,, A. Thiruvangadam Chetty
,, S. S. Natarajan
,, A. Ganesh
,, D. V. Seetharamamurthi
,, Jagabandhu Majhi
,, P. S. Kalyanasundaram
Kum. T. M. Vimala
Shri G. Govardhanagiri Rao
,, G. Venkata Rao
,, S. Haranath
,, V. Subramaniamurthy

Junior Technical Assistants :
Shri B. Sankaran
,, M. R. Venkataraman
,, T. Subramaniam
,, K. Subramanian
,, C. Ramachandran

Senior Physical Training Instructor :
Shri A. N. Lamech

Accounts Officers :
Shri A. V. Karunakaran Nambiar
,, G. Sundaram (Special Assignment)

Superintending Engineer :
Shri S. Nagarajan

Executive Engineer :
Shri C. S. Subramanian

Assistant Engineer :
Shri S. G. D ' Rosario

Lady Medical Officer :
Dr. (Mrs.) K. Shantha

Accountant :
Shri R. Kannan
,, S. Ananthan

Assistant Accountant :
Shri V. Ramachandran
,, K. Chidambaram.

Junior Superintendent :
Shri A. Chandrasekharan

Cashier :
Shri T. K. Ramanarayanan

Foremen :
Shri K. S. Veeraraghavalu
,, M. S. Ananthamurthy
,, U. D. Venkatarangiah

Mechanic 'A' :
Shri R. Jayapalan
,, S. V. Sankaran
,, V. Sivaraman
,, Joseph Angelos
,, C. E. Ranganathan
,, K. Kandaswamy
,, K. M. Kanagasundaram.

Mechanic 'B':
Shri S. Subramaniam
„ V. Avanasiappan
„ P. Sundaram
„ K. Ethirajan
„ M. Muthirulappan
„ B. Ganapathia Pillai
„ K. K. Bhalgunan
„ S. Anguvelu

Mechanic 'C':
Shri P. V. Subramania Achary
„ K. M. Sundaramurthy
„ N. Ramalingam
„ D. Viswanathan Nair
„ V. Balasubramanian
„ G. Nallaperumal Pillai
„ C. S. Subramanian
„ S. Antonidass
„ Joseph Antony
„ S. Chelliah
„ S. Sankaranainar
„ K. P. Yohannan
„ M. Sebastien
„ A. M. Deenadayalan
„ R. Appadurai
„ R. R. Rajkumar
„ W. Ibrahim
„ K. Natarajan
„ Y. V. Ramanamurthy
„ S. Jothiramalingam
„ A. Chandraguptan
„ N. Srinivasan
„ R. Jagadeesan
„ E. Balakrishnan
„ A. Sadasivam

Draughtsmen:
Shri K. Seetharaman
Shri K. Suryaprakasam
„ D. James
„ V. Sankarapandian

Workshop Supervisors:
Shri A. Toner
„ T. Ramachandran
„ K. K. Narayana Menon

Steward (Senior):
Shri T. Sambandam

Stewards (Junior):
Shri P. L. Narasimha Rao
„ K. Gopalakrishnamurthy
„ J. S. Narasimhalu

Upper Division Clerks:
Shri T. Narayanan
„ R. Suryanarayanan
Kum. A. Lakshmi
Shri K. Gopalan
„ K. V. Kasturirangan
„ N. Sethuraman

Stenotypists:
Shri V. Veeraraghavan
„ K. Krishnan
„ C. Syed Azam
„ T. Narayanan

Lower Division Clerks:
Shri K. V. Venkateswaran
„ A. Ranganathan
„ T. N. Thirumalai
„ N. K. Sundararaman
„ P. Balachandran
„ K. Sankaran Nair

Lower Division Clerks—(contd).
Shri N. Ramachandran
„ V. Venkatanarayanan
„ V. R. Ganesan
„ V. Srinivasan
„ K. Raghunathan
„ R. Raghunathan
„ S. Sampathkumaran
Kum. L. Rajamma
Shri M. Venkataraman
„ N. Narayanan
„ M. Jayakumar

Laboratory Attendants :
Shri V. Velu
„ G. Srinivasan
„ T. Mohandoss
„ P. Hendry Daniel
„ R. Ganapathi Subramaniam
„ B. Sathyanarayana Rao
„ U. K. Parasuraman
„ S. Sambasivam
„ K. Ramachandran
„ M. Janni

Store Attendant :
Shri P. V. Rathakrishnan

Library Attendant Grade II :
Shri L. Thomas

Health Inspector :
Shri K. Ramaswamy

Gestetnor Operator Grade II :
Shri N. Chakrapani
„ V. J. Meagher
„ C. Subramanian

Daftry :
Shri A. Mariadoss
„ S. K. A. Shakul Hameed

Ayah :
Mrs. G. Thirupuram

Dresser :
Shri G. Gopalakrishnan

Photo Assistant-cum-Projector Operator :
Shri R. Kubendran

Section Officers :
Shri K. Srikantiah
„ P. Venkataraman
„ M. Subbi Reddy.

RESIGNATIONS, RELIEF, ETC.

Hon. Professor :
Prof. R. Krishnamurthy

Professor :
Dr. S. Ramaseshan

Lecturers :
Shri C. S. N. Raju
„ G. K. Narasimhamurthy
„ C. Rajasekaramurthy

Associate Lecturers :
Shri Prem Bhatia
„ E. V. James
„ K. Jayaraman
„ K. Palaniswamy
„ C. S. Krishnan
„ A. S. Venkatesamurthy
„ S. Ramaswamy
„ K. Jayasimhulu
„ V. Rajagopalan
„ R. Subramanian
„ P. Satyanarayana Rao
„ N. M. Anil Kumar
„ N. Jothi Shankar

Senior Technical Assistants :
Shri P. P. Kunhikrishnan
Dr. B. Bhaskara Rao
Shri K. S. Raghavan
„ P. Kotiveeraiah
„ B. Gopala Rao
„ K. J. Sethuraman
„ J. Inder Rao
„ S. S. Natarajan
„ A. Thiruvengadam Chetty
Shri C. M. Srinath
„ P. R. Kannan
„ Sheo Prakash

Junior Technical Assistants :
Shri J. R. Jain
„ R. Chandrasekaran
„ K. N. Reddy
„ Kulwant Singh Bhatia
„ K. Vasudevan
„ R. Raghavan
„ V. Kannan

Medical Officer :
Dr. C. B. Mohandas

Superintending Engineer :
Shri Y. S. Ramaswamy

Executive Engineer :
Shri C. M. Gopal

Assistant Engineers :
Shri N. J. Chandrasekaran
„ T. S. Shanmugam

Accounts Officers :
Shri S. G. Chandrasekaran (Works)
„ G. Sundaram (Special Assignment)
„ G. T. Sundararajan

Asst. Accountant :
Shri V. Jayaraman

Junior Superintendent :
Shri S. Narasimhan

Assistant :
Shri K. V. Natarajan

Mechanic 'B' :
Shri M. Muthirulappan
Shri P. B. Ragupathy

Mechanic 'C' :
Shri M. Unnikrishnan
,, M. S. Elumalai
,, V. Avanasiappan

Supervisors :
Shri B. Sankaran
,, S. Srinivasan
,, C. S. Krishnan
,, N. D. Logasundaram
,, K. S. Krishnaswamy

Store-keeper :
Shri N. P. Narayanan

Steward (Junior) :
Shri M. D. Devarajan

Upper Division Clerks :
Shri T. Edmund
,, T. S. Sethuraman
,, Y. Rajagopala Rao

Steno-typist :
Shri T. Narayanan

Telephone Opertor :
Miss. Joan Garrett

Lower Division Clerks :
Shri V. Raghunandan
Shri V. Veeraraghavan
,, K. Krishnan
,, C. Syed Azam
,, A. Ranganathan
,, T. S. Sivaramakrishnan
Kum. P. Usha Kumari
Shri T. K. Ramanarayanan

Drivers :
Shri E. Murugesan
,, R. Benjamin
,, K. S. Vasudevan Nair

Store Attendent :
Shri H. Sharif

Library Attendent :
Shri G. Krishnaswamy

Gestetner Operators :
Shri D. A. Thomas
,, T. R. Chellappa

Peon :
Shri M. Ganesan

Cook :
Shri C. Murugesan

Lascar :
Shri E. Kannian

Chowkidars :
Shri H. Bhairath
,, Sebastian Manuel
,, Ram Singh
,, M. K. Yakub Hassan
,, V. Achuthan Nair

APPENDIX III

DISTINGUISHED VISITORS TO I. I. T. MADRAS

9-7-66 Group Capt. D. Rajagopal, Deputy Director, Electronics R & D Organisation, New Delhi.

11-7-66 Group Capt. H. D. Mehra, Commandant, A. F. Tech. College, Bangalore.

15-7-66 His Excellency Sardar Ujjal Singh, Governor of Madras and Sardarini Ujjal Singh.

30-7-66 Dr. C. V. Raman, Nobel Laureate.

1-8-66 Dr. I. Von Ruckteschell, First Secretary (Commercial) Embassy of the Federal Republic of Germany, New Delhi

29-9-66 Sub-Committee of the German Parliament (Bundestag) for Cultural Relations abroad consisting of :-

Dr. Martin, Chairman, Mr. Kahn-Ackermann, Dy. Chairman, Dr. Huys. Mr. Raffert, Mr. Saam, Dr. Schramm, Secretary, Foreign Relations Committee and Dr. Citron, Second Secretary (Cultural Affairs)

2-12-66 Mr. Hermann Ziock, Head of the Information Dept. Ministry of Economic Co-operation, Bonn.

Mr, Heinz Ockhardt, Head of the Photographic Dept., Inter-Nationes, Bonn and

Mr. Rolf Seelmann-Eggebert, Editor, North German Radio, Hannover.

14-12-66 Maj. General Virendra Singh, Director-General, NCC

3-1-67 Prof. Dr. Med. K. H. Schafer, Director, Universitats-Kinderklinik, Hamburg.

Prof. Dr. Wilhelm Groth, Rector, Rheinischen Fredrick Wilhelms-Universitat, Bonn.

Prof. Dr. Wolfgong Mechelein, Rector, Technical University, Stuttgart.

4-1-67 His Excellency Mr. G. Dove-Edwin, High Commissioner for the Federal Republic of Nigeria, New Delhi.

6-1-67 His Excellency Baron von Mirbach, Ambassador of the Federal Republic of Germany, New Delhi.

18-1-67 Dr. Linus Pauling, Nobel Laureate and Mrs. Pauling.

28th Jan. to 6th Feb. '67 Prof. Dr. Ing-Hans A. Havemann, Director of the Institute for International Technical Collaboration, Technical University, Aachen.

Prof. Dr. Phil. Martin Schmeisser, Pro-Rector and Prof. Graf Stenbock Fermor, Chancellor of the Technical University, Aachen.

8-2-67 Mr. R. Staiger, Senior Engineer GAWI, Frankfurt.

24-2-67 Dr. Gieselher Wirsing Chief Editor, "Christ und Welt," West Germany.

26-2-67 Prof. Dr. Ing. Herbert Doring. Institute of High Frequency Technology, Technical University, Aachen,

7-3-67 Dr. Wilson, Council Science Officer, British Council New Delhi.

10-3-67 Prof. Dr. U. Senger, Director Institute for Warme mungsmaschinen und Dampfanlagen, Technical University, Stuttgart (W. Germany).

12-3-67 Mr. John G. Steeves, Advisor, Workshops, I.I.T. Kanpur.

20-3-67 Prof. Dr. Ing. H. Petermann, Director, Institute fur Stromungsmaschinen, Technical University, Braunschweig (West Germany).

28-3-67 Brigadier B. P. Wadhera, Commandant, College of Military Engineering, Poona.

25-4-67 Mr. Oskar W. Reschke, India-Correspondent, German News Agency D. P. A.

2-5-67 Dr. G. F. Werner, Minister-Counsellor, Embassy of the Federal Republic of Germany, New Delhi.

APPENDIX IV

INSTITUTE GYMKHANA ACTIVITIES 1966-67.

5-8-66 Get together function.

13-8-66 Gymkhana Class representative Election.

24-8-66 Fresher's Debate.

31-8-66 Annual Quiz.

2-9-66 Participation in Inter Collegiate quiz conducted by Saturday evening Club—Participation in Tournament.

7-9-66 Recorded Music programme of KISS ME KATE. Annual Essay Writing Competition.

12-9-66 Bharathi Day.

14-9-66 Inauguration of Institute Gymkhana-Annual Debate.

21-9-66 Brains Trust Programme.

24-9-66 Dr. T. M. A. Pai's Lecture.

28-9-66 General Knowledge Test.

5-10-66 Annual Group Discussion and German Students' Visit.

8-10-66 Participation in Inter Collegiate League tournament. Variety Entertainment Programme at Open Air Theatre for Seva Samajam.

10-10-66 Exhibition Basketball Match at Open Air Theatre.

12-10-66 Lecture by Prof. T. E. Shanmugam, under 'Psychology study Circle".

17-10-66 Magic Show by Mr. Bhattacharya.

16-11-66 Participation in Inter Collegiate Debate conducted by College of Engineering, Guindy.

17-11-66 Participation in Inter Collegiate Quiz conducted by College of Engineering, Guindy.

25-11-66 Concert by German Radio Dance Orchestra.

29-11-66 Participation in the All India Inter Collegiate Debate conducted by Bengal Engineering College, Sibpur.

13-12-66 / 14-1-67 } Inter Hostel Entertainment competition.

24-1-67 Participation in Entertainment competition at MIT.

25-1-67 Participation in Inter Collegiate Debate conducted by Madras Institute of Technology.

26-1-67 Participation in Student Times Knock-out Tournament (Entertainment Competition.)

2-2-67 Inter Hostel Quiz.

3-2-67 Delegation from the Technical University of Aachen meet with the Students.

6-2-67 All India Inter Collegiate Debate.

7-2-67 Inter Collegiate German Recitation.

8-2-67 Inter Collegiate Group Discussion.

9-2-67 Inter Collegiate Quiz—Inter Collegiate Photographic competition.

10-2-67 Inter Collegiate Entertainment Competition.

11-2-67 Prize Distribution Day. Inter Collegiate Entertainment competition.

18-2-67 All India Amateur Musical Meet—Entertainment Competition.

21-2-67 Pantomime Programme by Rolf Scharre.

27-2-67 / 28-2-67 } Participation in Inter Collegiate Atheletic Meet at YMCA College.

2-3-67 Finals of the Inter Departmental Tournament of Toshniwal Trophy.

11-3-67 Annual Sports Day.

15-3-67 Institute Day.

PART II

AN ACCOUNT OF THE ACADEMIC WORK OF THE INSTITUTE INCLUDING RESEARCH, INVESTIGATION FOR INDUSTRY AND ALLIED WORK DONE BY THE VARIOUS DEPARTMENTS

CONTENTS

PART II—A

RESEARCH WORK DONE BY DEPARTMENTS

DEPARTMENT OF MATHEMATICS

Research Work

Research work is being done by the staff-members and research scholars of the Department in the following fields :

Hydrodynamics

Boundary Layer Theory

Magnetohydrodynamics

Stratified Fluid Flows

Rotating Fluids

Hydrodynamic Stability

Relativistic Fluid Mechanics

Storage Theory and Operations Research

Theory of Cosmic Ray Showers

Stochastic Point Processes

Plasma Physics

Stochastic Problems in Continuum Mechanics

Fundamental Particles and their interactions

Differential-Difference Equations

Stability of Motion

Non-linear Oscillations

Elasticity

Piezo-electricity

Graph Theory

Operations Research

Work is also being done in "Kinetic Theory of Fluids" and "Study of Response to Nervous Systems" By Dr. S. K. Srinivasan in collaboration with Dr. R. Vasudevan (MATSCIENCE).

Doctoral Work :

Research work leading to Ph. D. in the following topics has been completed :

Studies in the Pionic and Photoproduction of Mesons-P. Achuthan

The Study of Thermal Stresses Due to a Nucleus of Thermo-Elastic Strain in Elastic Bodies-K. Kishan Rao

Studies in Stochastic Processes and their applications—N. V. Koteswara Rao

Problems on Fracture and on Non-Homogeneity in Elastic-Plastic Solids—V. P. Muthuswamy.

PAPERS PUBLISHED

1. 'On Slow motion of a Sphere In a Viscous Liquid'—S. D. Nigam and V. Subba Rao, Proc. Ind. Acad. Sci., 64 (4). 249-253, 1966.

2. 'Magnetohydrodynamic Duct Flow Problems'—L. V. K. V. Sarma and R. Seetharamaswamy, A.I.A.A.JI., May, 1967.

3. 'Sequent Correlations in Stochastic Point Processes'—II—S. K. Srinivasan, R. Vasudevan and N. V. Koteswara Rao, Nuovo Cimento, 44, 1818-21, 1966.

4. 'Novel Approach to Kinetic Theory and Turbulence'—S. K. Srinivasan, Zeit fur Phy., 197, 435-439, 1966.

5. 'Scattering Phase Shifts in Stochastic Fields'—S. K. Srinivasan, R. Vasudevan and A. Ramakrishnan, Zeit fur Phy., 196, 112-122, 1966.

6. 'Fluctuation of Photo-Electrons and Intensity Correlations of Light Beams'—S. K. Srinivasan and R. Vasudevan, Nuovo Cimento, 47, 185-193, 1967.

7. 'Vibrations of Circular Cylindrical Shells of Piezoelectric Silver Iodide Crystals'—H. S. Paul, Jl. Acoust. Soc. Am., 40 (5), 1077—1080, 1966.

8. 'On an aeolotropic solid with spherical inclusion'—S. C. Das and R. Subramanian, Ind. Jl. of Mech. & Maths., 4 (4), 19-25, 1966.

9. 'On a spherically isotropic composite truncated cone'—S. C. Das and R. Subramanian, Bull. Acad. Polon. Sci. Ser. Tech., 14 (9), 545-552, 1966.

10. 'Charge Dependent Corrections in Photo-production of Positive Pions'—S. K. Srinivasan, V. Ramabhadran and P. Achuthan, Nuovo Cimento, 42 (X), 997-999, 1966.

11. 'Photo-production of Vector Mesons-II'—S. K. Srinivasan and P. Achuthan, Nucl. Phys., 87, 605-617, 1967.

12. 'On the Pionic Production of Eta Meson'—S. K. Srinivasan and P. Achuthan, Nuovo Cimento, 48, 1124-1139, 1967.

DEPARTMENT OF PHYSICS

Research Work

I—SOLID STATE PHYSICS

1. *Colour Centres* :—Dr. C. Ramasastry, Dr. S. B. S. Sastry, Dr. Y. V. G. S. Murthy, Dr. J. Sobhanadri, N. Harihara Iyer, Miss. C. Janaki Lakshmi and V. Subramanya Murthy.

2. *Electrical conduction in ionic crystals* :—Dr. C. Ramasastry, Dr. S. B. S. Sastry, Dr. Y. V. G. S. Murthy, V. Subramanya Murthy, Miss. C. Janaki Lakshmi.

3. *Electron spin resonance* :—Dr. C. Ramasastry, Dr. S. B. S. Sastry, Dr. Y. V. G. S. Murthy, V. Subramanya Murthy, Dr. J. Sobhanadri, N. Harihara Iyer and Miss. C. Janaki Lakshmi.

4. *Dielectric properties of solids* :—Dr. C. Ramasastry and C. V. Ramaiah.

5. *Photoelasticity* :—Dr. W. Koch, Dr. R. Srinivasan, K. Srinivasan and Mrs. K. Kamala Balaraman.

6. *Lattice Dynamics* :—Dr. R. Srinivasan.

II—TRANSISTOR PHYSICS

1. *Surface States' studies* :—Dr. C. Ramasastry and Jagabandu Majhi.

2. *Breakdown of devices under reverse bias* :—Dr. W. Koch, Dr. C. Ramasastry and B. S. V. Gopalam.

3. *Intermetallic semiconductors* :—Dr. W. Koch, Dr. C. Ramasastry and K. Viswanatha Reddy.

III—X-RAY CRYSTALLOGRAPHY AND CRYSTAL STRUCTURE ANALYSIS

1. *Structure Determination of organic crystals :*—Dr. B. V. Ramanamurthy, Dr. S. Swaminathan, S. Srinivasan, G. Srinivasa Murthy, K. Sarangapani, G. D. Nigam, S. Natarajan and Veerabhadra Rao.

DOCTORAL WORK

Two theses were completed in 1966-67 for Ph. D. in the field of Solid State Physics.

(1) 'Colour Centres Studies in Sodium Chlorate' by S. Bhimasankara Sastry.

(2) 'Nature of Point Defects in Sodium Nitrate' by Y. V. G. S. Murthy.

PAPERS PUBLISHED

1. 'Optical Bleaching of Radiation Induced absorption in NaC103 and KC103 crystals' } C. Ramasastry, S. Bhimasankara Sastry.
   Indian Journal of Pure and Applied Physics, 30,404, 1965.

2. 'Paramagnetism of colour centres in Sodium chlorate crystals' C. Ramasastry, S. Bhimasankara Sastry—Journal of Physical Society of Japan, 20,2303, 1965.

3. 'Electron Spin Resonance of Coloured Sodium chlorate'—C. Ramasastry, S. Bhimashankara Sastry—Solid State Communications 1967.

4. 'Dielectric constant of sodium chlorate crystals at microwave frequencies'—C. Ramasastry and C. V. Ramaiah—Physica Status Solidii 19,K15, 1967.

5. 'Colour centres in alkali halides'—Y. V. G. S. Murthy and C. Ramasastri—Presented at the "Solid State Session" of the Symposium on Inorganic Chemitsry, I. I. T. Madras-'67.

6. 'Effects of Radiation damage in NaC103 and KC103 crystals'—S. B. S. Sastry and C. Ramasastry—Presented at the "Solid State Session" of the Symposium on Inorganic Chemistry, I. I. T. Madras, '67.

7. 'Radiation damage in chlorates and Bromates'—Y. V. G. S. Murthy and S. B. S. Sastry—Presented at the "Solid State Session" of the Symposium on Inorganic Chemistry, I.I.T. Madras, '67.

8. 'Surface states' relaxation times in N-type germanium'—C. Ramasastry and J. Majhi—Indian Journal of Pure and Applied Physics 1967.

9. 'Recombination in 'N' Germanium'—B. S. V. Gopalam and K. Viswanatha Reddy—Viswakarma, Vol. VII No. 5, 1966.

10. 'Reversed biased barrier layers'—B. S. V. Gopalam and K. Viswanatha Reddy—Viswakarma, Vol. VII No. 2,33, 1966.

11. 'Spare charge effects in P-n junctions—1'—B. S. V. Gopalam and K. Viswanatha Reddy—Viswakarma Vol. VII No. 9,26, 1967.

12. 'Space charge effects in P-n junctions-2'—B. S. V. Gopalam and J. Majhi—Viswakarma Vol. VII No. 8, 14, 1967.

13. 'Conductivity, Hall effect and magnate resistance ia semiconductors'—B. S.V. Gopalam and K. Viswanatha Reddy—Viswakarma Vol. VII No. 6, 22, 1966.

14. 'Semiconductor rectifiers at high reverse currents'—B. S. V. Gopalam and K. Viswanatha Reddy—Viswakarma Vol. VII No. 11, 18-34.

15. 'Crystal and molecular structure of phenyl hydrazine.'—S. Swaminathan and S. Srinivasan—Current Science, 5th July, 1967, Vol. 36, No. 13, P. 336.

16. 'Electronic spectra of P_2, As_2 and Sb_2 molecules.'—C. Santaram—J. Optical Soc. of the America 57, 522-530, 1967.

17. 'Double electron Molecular spectra'—C. Santaram—Abstract, International Conference on Spectroscopy, Bombay, 1967.

PAPERS COMMUNICATED IN PRESS

1. 'Optical absorption in irradiated sodium sulphate—N. Hariharan and J. Sobhanadri—Ind. Jour. of Pure and Applied Physics.

2. 'Electron spin resonance in X-irradiated sodium sulphate'—N. Hariharan and J. Sobhanadri—'Nature'.

3. 'X-ray study of mono-thiourea Cd-sulphate dihyrate'—S. Natarajan,—Acta Crystallographica (Accepted for publication).

4. 'Effect of large number of heavy atoms in intensity distribution of centro symmetric and non centro symmetric crystals'—G. D. Nigam—Indian Journal of Pure and Applied Physics.

5. 'Crystal structure of 1 : 4 dihydroxy anthra quinone'—S. Swaminathan and G. D. Nigam—Current Science.

6. 'Crystal structure of Bis-thiourea Cd-nitrate'—S. Swaminathan and S. Natarajan—Current Science.

7. 'Semiconductor Rectifiers'— B. S. V. Gopalam and K. Viswanatha Reddy—Presented at the symposium on 'Semiconductor Electronics' at the Birla Institute of Technology, Pilani (1967).

8. 'Thompson coefficient and thermal conductivity of semi conductor crystals carrying large currents'— B. S. V. Gopalam and J. Majhi—Presented at the symposium on Semiconductor Electronics' at the Birla Institute of Technology, Pilani (1967).

9. 'On the compensation for excess average intensity in the rotation and rotation inversion symmetrics for X-ray reflections and N(Z) functions'—G. D. Nigam—Presented at the symposium on crystal growth and crystal structure organised by the Defence Science Laboratories, Kanpur.

10. 'X-ray study of mono-thiourea Cd-sulphate dihyride'—S. Natarajan—Presented at the symposium on crystal growth and crystal structure organised by the Defence Science Laboratories. Kanpur.

DEPARTMENT OF CHEMISTRY

RESEARCH WORK

I—PHYSICAL CHEMISTRY

1. Determination of pore sizes of solid catalysts and their distribution pattern in terms of surface area (B. Viswanathan, V. Srinivasan and M. V. C. Sastri).

   A method for determination of pore size distribution has been evaluated and its applicability tested with adsorption measurements of Nitrogen and porus solids at low temperatures.

2. Adsorption studies at low pressures and evaluation of the thermodynamic parameters of adsorption (B. Viswanathan and M. V. C. Sastri).

   A unit for this measurement has been completed and studies in adsorption of N_2 and Co at low temperatures on supported metals are being caried out.

3. Physico-Chemical studies on solid Oxide Catalysts (B. Viswanathan, V. Srinivasan and M. V. C. Sastri).

   The effect of structure and electronic factors on a chemical reaction is under investigation. Units for measurement of reaction rates and changes in conductivity during reaction have been completed. Preliminary studies on the rates of decomposition of iso-propyl alcohol on a $Zno - Al_2O_8$ have been completed.

4. Adsorption studies on reduced iron using nitrogen and hydrogen (N. Chandrasekaran, V. Srinivasan and M. V. C. Sastri).

   Studies on the heterogeniety of pure iron catalyst surface employing the desorption—readsorption technique of

Taylor and Liang, using nitrogen and hydrogen gas as adsorbates have been carried out. Further work is in progress to interpret the results.

5. The Kinetics and Mechanism of Bromination of p-Bromophenol (J. Rajaram and J. C. Kuriacose).

This investigation has been carried out in carbon tetrachloride and acetic acid media with and without the presence of catalysts like iodinebromide and anhydrous aluminium chloride. A general mechanism has been postulated.

6. The Decomposition of Acids, and Alcohols on Chromia (R. Swaminathan and J. C. Kuriacose).

The nature of different kinds of sites on a dual function chromia catalyst is being investigated by studying, the decomposition of alcohols. Partial pressure studies at a constant temperature and at a constant contact time are being conducted with isopropanol, cyclohexanol, acetic acids etc., to gain an insight into the mechanism of a ketonization of acetic acid.

7. A study of the Dual Behaviour of Chromia-Alumina Catalysts (C. Daniel and J. C. Kuriacose).

The dehydration and dehydrogenation reactions on chromia-alumina catalysts are being studied using isopropanol as the reactant. The kinetics is investigated at varying temperature, contact time and partial pressure to arrive at an understanding of the mechanism of catalytic action.

8. Mechanistic Study of Reactions by Electrochemical Techniques (R. Ramaswamy and J. C. Kuriacose).

The polarographic technique is used for the kinetic study of some fast reactions in solution. Preliminary results have been obtained for the rate constants for the dissociation of weak acids.

9. Inhibition of Electrode-reactions (S. R. Rajagopalan and M. V. C. Sastri).

A numerical analysis method has been worked out for obtaining charge density data from electrocapillary measurements. From theoretical grounds it is expected that the rate of inhibited anodic reaction can be estimated by studying the rate of its conjugate cathodic reaction. Experiments are under progress to verify the above conclusion.

10. Studies on Interfacial Electrochemistry (C. S. Venkatachalam and M. V. C. Sastri).

A critical comparison of the three methods suggested by Koryta, Tanaka and Tamamushi and Hale and Parsons for evaluating $E^{\circ}f$ from a pure cathodic or anodic wave was made. A theoretical and experimental procedure was adopted to find out the magnitude of the standard rate constant, ks within which each method is useful.

11. Studies on acidity function in basic systems (N. Chattanathan and C. Kalidas).

Establishment of H scale in glycolic media using nitrodiphenylamine and nitroanilins as indicators, the effect of solvent on H and equilibrium constant measurements in these systems are in progress.

12. Validity of Bunnet criterion in mixed aqueous solvent (K. V. Raman and C. Kalidas).

Extension of Bunnet hypothesis to glycerol water mixtures by a study of iodination of acetone and hydrolysis of methylal in these media.

13. Studies on Photosensitised Oxidation (M. Santhanam and V. Ramakrishnan).

A study of the photosensitised oxidation of amines with a view to understand the mechanism of the reaction and the nature of the active states involved.

14. Theoretical Study of the electronic structure, spectra and energetics and donor-acceptor complexes (K. Vasudevan and V. Ramakrishnan).

Calculations have been made with a view to locate energy levels in tetracyanoethylene complexes.

II—ORGANIC CHEMISTRY

1. Dehydration of Alcohols on Oxide Catalysts. (K. Narayanan and **C. N.** Pillai).

A study of the dehydration of alcohols over alumina and thoria with a view to understand the stereochemistry and mechanism of these reactions, is in progress.

2. Study of Ether and Ester Formation on Oxide Catalysts (S. V. Kannan and **C.** N. Pillai)

This is a mechanistic study using alumina, thoria and other oxide catalysts. Ether formation has been established to proceed with inversion of configuration. An alkyl cleavage Mechanism is indicated for esterification over alumina.

3. Isomerisation of Paraffins (D. V Ramana and C. **N.** Pillai).

A mechanistic study of the isomerisation of saturated hydrocarbons in the presence of acidic catalysts is in progress.

4. Modification of Alumina by Acid and Base treatment (S. Santhanagopalan and C. N. Pillai).

Alumina can be modified by the addition of suitable reagents including alkali metal irons. The effect of such treatment on the catalytic activity and selectivity is being investigated.

5. Synthesis of 6-Oxa-B-norequilenin (1) and 7-methyl-6-oxaocstrone (2). (J. Radhakrishnan and S. R. Ramadas).

With a view to synthesising (1), 6-methoxycoumaranone-3 was prepared and subjected to Reformatsky reaction with methyl γ bromocrotonate to furnish a mixture of methyl γ - (6 - methoxybenzofuran) crotonate (3) and methyl γ-(6-methoxy-3-coumarrlidene) crotonate (4) as expected along with a by-product (5). Conversion of (3) into the known γ - (6 - methoxybenzofuran)—butyric acid is in progress.

III—INORGANIC CHEMISTRY

1. Studies on thiourea complexes of zinc, cadmium, mercury, cobalt and nickel (M. R. Udupa and G. Aravamudan).

   Infrared spectra and X-ray powder photographs of the thiourea complexes of the nitrates and sulphates of Zn, Cd, Hg, Co and Ni were taken in order to characterise the compounds and to ascertain the stereo-chemistry.

2. Coordination complexes of morpholine (D. Venkappayya and G. Aravamudan).

   Complexes of morpholine and morpholinium ion with various cadmium, mercury, copper and nickel salts have been isolated and their structural characteristics examined.

3. Chloramine—T titrimetry (V. R. S. Rao and G. Arava mudan).

   The stability of aqueous chloramine—T solutions under different conditions was studied in detail. The nature of products obtaining during the reaction of chloramine—T with ammonia and with thiourea in aqueous media was investigated.

4. Chemistry of uranium, vanadium and chromium (S. Sampath and G. Aravamudan).

   Work is in progress regarding the isolation of compounds of U (VI), U (IV), V (V), V (IV) V (III) and Cr (III) with organic acids and the study of their characteristics.

PUBLICATIONS

Papers Published :

1. A Kinetic Study of the Bromination of p-Bromophenol in Carbon tetrachloride.
   J. Rajaram and J. C. Kuriacose, Curr. Sci., *35* 306 (1966)
2. Estimation of Benzidine by Non-aqueous Titration.
   C. Kalidas, Z. Anal. Chem. *4* 260 (1966)
3. Investigations on the Synthesis of Oestrone.
   D. K. Banerjee, S. R. Ramads and G. Ramani, Tetrahedron letters No. 43, 5311 (1966)
4. Thermal Decomposition of Aluminium Alkoxides.
   K. Narayanan, C. N. Pillai and Ellen Haug, Current Science *35*, 566 (1966)
5. Oxidimetric Determination of Sulphides. M. R. Udupa, V. R. S. Rao and C. Aravamudan, Talanta *13*, 1466-7 (1966).

Papers Communicated/in Press :

1. Computation of Pore-size Distribution in terms of Surface Area. B. Viswanathan and M. V. C. Sastri. Journal of Catalysis.
2. Catalytic Maxima in the Bromination of p-Sromophenol. J. Rajaram and J. C. Kuriacose, Current Science.
3. On the determination of $E^{\circ}f$ from polarographic data. C. S. Venkatachalam and S. R. Rajagopalan, presented at the Symposium on " Electro Chemistry " at C. E. C. R. I., Karaikudi 1966.
4. Photosensitised Oxidation of Aniline. M. Santhanam and V. Ramakrishnan, Indian Journal of Chemistry.
5. Stability of aqueous Chloramine-T solutions. D. Venkappayya, V. R. S, Rao and G. Aravamudan, Zeitschrift fur analytische Chemie.
6. Determination of Dimethylsulphoxide using chloramine-T. D. Venkappayya and G. Aravamudan, Zeitschrift fur analytische Chemie.
7. Determination of iodide using chloramine-T. D. Venkappayya and G. Aravamudan, Zeitschrift fur analytische Chemie.

DEPARTMENT OF CIVIL ENGINEERING

Research Work

1. Moment—curvature relationships of R. C. Members subjected to moment and axial force—a contribution to the study of problem of buckling in R. C. Columns (Sri G. S. Rao and Dr. P. Srinivasa Rao).

   The results show that the moment curvature relationship under short time loading can be calculated theoretically with sufficient accuracy.

2. Influence of Span and the mode of application of load on the rotation capacity of plastic hinges in reinforced concrete beam (Sri P. R. Kannan and Dr. P. S. Rao).

   Three different modes of application load (as described below) were studied.

   (i) over a steel plate
   (ii) over a column steel and
   (iii) by means of transverse.

   A distinct dependence of the rotation capacity on the mode of loading was clearly established.

3. Relative economies in the design of R. C. structures by the elastic method and the ultimate load method (Dr. P. S. Rao and Sri C. S. Krishnamurthy).

   Investigation is complete. The results will be published shortly as a paper.

4. Ultimate load analysis of Hyperbolic Paraboloid Shells (R. Radhakrishnan and Dr. P. C. Varghese)—The studies seek to evolve an ultimate load analysis of shell in rectangular Hyperbolic Paraboloid shells. Tests on micro

concrete specimens with different span rise ratio and with varying percentage of reinforcement are to be conducted. At the first instance 4′ — 0″ (plan dimension) shells are cast and the test is under progress in the new loading framed set up for this purpose.

5. A study of R. C. C. Vierendeel girders (Sri T. P. Ganesan and Dr. P. C. Varghese).

   The strength and behaviour of RCC vierendeel girders under different types of nodal loadings have been studied. The influence of depth/span ratio and the type of loading has been investigated. The work is in progress.

6. An economic system of composite construction for floors and roofs of buildings (Dr. P. C. Varghese, T. P. Ganesan and H. Achyutha).

   A New type of composite construction using precast RCC joists and stock bricks have been evolved and their behaviour and strength has been studied through tests on prototype models.

7. Investigations on open web steel girders (Dr. P. C. Varghese, T. P. Ganesan and Jayagopal).

   A method has been evolved for predicting the actual deflection of open web girders. The buckling strength of certain type of girders has also been investigated.

8. Bending analysis of Conoidal shells (Sri C. Ganapathy Chettiar).

   Conoidal shell with a simply supported boundary conditions are solved by transfer matrices using digital computer. The project is in progress and the method will be applied to other boundary conditions.

9. Design of slab bridge by computer (Dr. D. J. Victor and C. Ganapathy Chettiar).

Computer program is prepared for the design of slab bridges decks by IRC class AA and A loadings for multi-lanes. It is proposed to give equivalent simplified loadings for the standard IRC loadings.

10. Development of design for precast frames (V. Paramasivam) Designs for precast R. C. and Prestressed concrete frames of 25′ and 30′ span have been evolved. It is proposed to do experimentation on prototypes to verify their strengths and to study the behaviour of joints.

11. Investigation of Geometry and Geodesic domes (V. Paramasivam) A study of the geometrical development of geodesic domes was made. An article describing the various methods of subdivision of the basic icosahedion has been prepared. A few models were also constructed to aid in the study.

12. Bond and Horizontal sheer Resistance of Encased Beams (V. Paramasivam and Dr. P. C. Varghese).

For increasing the bond resistance of encased steel beams, a new type of fin connectors welded to the web of the joist was investigated and has been found to be promising.

13. A study of cracking of Encased steel beams (V. Paramasivam and Dr. P. C. Varghese).

The spacing and width of cracks in encased beams under two point loading has been studied on ten beams. Based on experimental results, formulae have been proposed to predict crack spacing and crack width at working loads.

14. Strength and behaviour of deep reinforced concrete beams (Dr. P. C. Varghese and C. S. Krishnamurthy).

An experimental investigation is carried out to study the strength and behaviour of moderately deep reinforced concrete beams. The flexural and shear strength of these beams are studied.

15. Analysis of Balcony slabs (C. S. Krishnamurthy and C. Ganapathy Chettiar).

Slabs with two adjacent edges fixed and other two edges free are used in balcony slab construction. The analysis of these slabs is done using the finite-difference method. A set of design charts is prepared.

16. Analysis of Structures by the method of initial conditions. (H. Achyutha).

A general method to analyse beams, bean-columns, etc. in terms of the initial parameters like deflection, slope etc. has been obtained. Further work is being carried out presently.

17. Study on underwater concrete (Dr. P. C. Varghese & V. Kannan).

The factors affecting the strength and density of the concrete made under water is studied. For a specific cement content, the optimum flow required for the maximum strength and maximum density of concrete consistent with compaction without vibration or rodding under water is determined. The suitable relation between these factors will be worked out. The study is in progress.

18. Thermal characteristics of water-proof roof (Dr. P. C. Varghese and V. Kannan).

Plain concrete slabs topped with different water-proof roof (9 Nos.) are subjected to hot and cold conditions of natural weather and observation of variation in temperature is made in all the seasons. The observation has been made for more than one year and results are analysed. The observation is continued.

19. Time Dependent Deflections of Reinforced Concrete Beams (Dr. P. C. Varghese and K. N. Ramamurthy).

Investigations on time-dependent deflections of reinforced concrete beams subjected to sustained loads have been made. Tests were conducted on eight beams for short time deflections and on fifteen beams for long time deflections. By

considering the behaviour of an equivalent rheological model for beam and the test results, equations are suggested for computing final creep and shrinkage deflections and the time dependent deflections of reinforced concrete beams subjected to sustained loading.

20. Experimental work on effect of line loads on the behaviour of rectangular R. C. Slabs for M. Tech Projects work (Y. R. Nagaraja).

21. Analysis of curvilinear gravity flows in a two-dimensional transition from a conduit to free surface flow (M. H. Abdul Khadar and Dr. Ing. Gerhard Rouve).

A solution of the problem of efflux of an invicid fluid in a gravity field from a two-dimensional conduit outlet is found through the use of complex variable theory and conformal mapping technique. Computations and experiments are in progress.

22. Studies on flow through orifice in a pipe wall (T. Babu Rao and Dr. V. Sethuraman).

Detailed pressure measurements were for a single and multiple orifices in a pipe wall. The work has been completed.

23. Studies on sediment movement in branch channels (H. Suresh Rao and Dr. Ing. Gerhard Rouve).

Experimental investigations are made on movement of sediment in branch channels, without and with an obstruction in the main channel, to study the effects of secondary flow on sediment entry into the branch. The work has been completed.

24. Studies on Spatial Hydraulies Jump (W. Rohrbach and Dr. G. Rouve).

Studies on the characteristics of hydraulic jump in a three dimensional expansion is carried out. This is an extension of the work done last year by Mr. Padmanabhan for his M. Tech Thesis.

25. Studies on Sudden Impulse on Laminar flow in a pipe (F. G. Rohde).

Investigation on the experimental set-up to verify theoretical solutions under progress.

26. Two-dimensional flow in a channel bay with entrance vane (F. G. Rohde).

Theoretical investigations are under progrees.

27. Study of Clay Mineralogy of Creamy Shales from Sriperumbudur in the Chingleput District, Madras State carried out during 1966-67 (V. D. Muthayya).

The dominant clay mineral of creamy shales has been found to be illite.

28. Split Tensile Test in Soils (B. Ramanathan and V. Raman) The use of split tensile test of soils in evaluating the shear strength parameters of soils have been studied. The project is in progress.

29. Studies on the Strength and performance of Hyperbolic Parapoloid Shell footings (P. K. Ninan and Dr. P. C. Varghese).

The aim of the study is to present a bending analysis and evolve an ultimate strength design for individual and combined footings made up of hyperbolic paraboloidal shell quadrants, transmitting concentrated column loads on sand.

The first phase of the work which is under progress is the study of the behaviour of individual shell footings having varying rise to span ratio, against the performance of ordinary flat footings having the same plan area. A bigger model in aluminium alloy will be tested for strain measurements. The results will be compared with some prototype test already carried out.

30. Experimental studies on the stability of deep foundation (K. Muthukrishniah).

The aim of the study is (1) to observe the plan of failure in the foundation soil when the foundation is subjected to inclined loads, (2) to trace the point of rotation and estimate the amount of translation and (3) to determine the forces on the foundation due to the surrounding soil.

Apart from locating the pattern of failure and tracing the point of rotation a probable force system acting on the foundation has been suggested on the strength of the results from the experiments.

It is proposed to analyse the forces along the surface of failure in foundation soil.

31. Swelling Characteristics of Black cotton soils of India (V. Raman).

In this investigation the swelling characteristics of typical black cotton soils of India were studied in the following lines as below ;

(i) To identify and classify the soils from simple classification test according to the potential expansiveness rating.

(ii) To determine the free swell and swelling pressures of soil under different over burden pressures.

(iii) To corelate the results of swelling with the classification test data.

32. Geotechnical properties of marine clays around Madras Region (V. Raman).

A detailed study on marine clays around Madras regions is proposed and literature survey is being compiled.

PAPERS PUBLISHED

1. Recent Earth Tremors in South Madras (R. Radhakrishnan)—Indian Engineer, February 1967.

2. Ultimate load analysis of structures—(R. Radhakrishnan) Notes published for use of staff and students in the department.

3. An indegeneous device for measuring compressive loads—(T. P. Ganesan)—Cement and Concrete—July, September 1966.

4. Flexural strength of encased beams (Dr. P. C. Varghese, R. Radhakrishnan and V. Paramasivam)—accepted for publication in the Indian Concrete Journal.

5. Grid Analysis by the Rotation Contribution Method (V. Paramasivam)—Accepted for Publication in the Indian Concrete Journal.

6. A method of initial conditions for the analysis of beams subject to combined axial and lateral loads—H. Achyutha) —Indian Concrete Journal—December 1966.

7. Ultimate strength design of reinforced concrete beams in accordance with IS 456-1964 (C. S. Krishnamurthy)—Indian Concrete Journal—Vol-40, November 1966.

8. Ultimate resisting moment of Rectangular beams with compression reinforcement — (H. Achyutha) — Indian Concrete Journal.

9. Composite floors and roofs with precast RCC joists and brick infilling (Dr. P. C. Varghese, T. P. Ganesan and H. Achyutha) to be presented at the symposium on construction costs at New Delhi.

10. Some observations on flow through flip buckets (Dr. Ing. Gerhard Rouve)—presented at the 6th symposium of Civil and Hydraulie Engineering on 'High velocity flow' at the Indian Institute of Science, Bangalore.

11. Boundary layer control on spillways (Dr. V. Sethuraman and A. C. Radhakrishnan)—presented at the 6th symposium of Civil and Hydraulic Engineering on ' High velocity flow ' at the Indian Institute of Sclence, Bangalore.

12. Studies on spatial hydraulic jump (Dr. V. Sethuraman and M. Padmanabhan)—presented at the 6th symposium on Civil and Hydraulic Engineering on ' High velocity flow ' at the Indian Institute of Science, Bangalore.

13. Boundary layer on a hermisphere embeded on an infinite plane (M. H. Abdul Khader)—presented at the 11th Congress on Theoretical and Applied Mechanics (ISTAM) December 1966 at the Coimbatore Institute of Technology, Coimbatore.

14. Study on Clay mineralogy of creamy shales from Sriperumbudur in thc Chingleput District, Madras State (V. D. Muthayya) Journal of Indian Society of Engineering Geology, Calcutta—Accepted for publication.

15. Stress distribution in sandy soils—(B. Ramanathan)—The Indiaa Engineer—January 1967.

16. The Design of Reciprocating Engine foundation with special reference to vibration. (M. S. Subramaniam)—Indian Engineer, June 1966.

17. Consolidation of soils—The Indian Engineer, July 1966.

18. Evaluation of the one point liquid limits of soils—(V. Raman)—Viswakarma—May 1966.

19. Identification of expensive soils from the plasticity index and the shrinkage index data (V. Raman)—The Indian Engineer—January 1967.

DEPARTMENT OF MECHANICAL ENGINEERING

RESERCH WORK

I—MACHINE DESIGN

1. Interaction of Fatigue and Creep—V. M. Radhakrishnan.

Materials subjected to fatigue with mean and alternating components of stresses at high temperature will have the effect of creep also. As a result the rupture time is accelerated in certain materials. A theoretical analysis has been made to find the effect of creep on fatigue based on dislocation machanisms. Experimental set-up is under fabrication to test the validity of the theoritical results.

II—STEAM

1. Heat transfer accompanied by a ehange of phase.

An endeavour to exrlain the mechanism of boiling in the different regimes, (the nucleate bliling regime in particular) is being made both analytically and experimentally. The factors such as surface roughness, superheat, pressure, etc., have got a pronounced effect on the boiling heat transfer co-efficient. An experimental set-up is being made to study the effect of these parameters on the boiling heat transfer rate. Staff-member-in-Charges: V. N. Rajan, Lecturer in Mech. Eng.

2. Effect of Longitudinal pulsations on heat transfer in pipes :

The experiment is being carried out in a double shell heat exchanger with the steam condensing on a pipe carrying water. The pulsations are created by a solenoid valve which is made to open and close with the help of a motor to the shaft of which is fixed a wooden disc carrying a metal strip The frequency of operation is varied from 0.5

to 2.5 cps by varying the motor speed. The nusselt No. In pulsated flow is being compared with that of steady flow at various Reynolds number and frequencies of pulsations.

Staff member-in-charge : G. Sama Rao, Associate Lecturer.

3. Heat transfer in separated flows :

Experiments are being carried out to study the effect of separation on heat transfer. Separation of flow is effected by the introduction of orifices. A large increase in local heat transfer coefficient in the vicinity of the orifice (12 times that of steady flow) was observed. The experiments are carried out with different orifice diameters and with two orifices in series.

Staff-member-in-charge : M. N. Viswanathan, Associate Lecturer.

4. Investigation of heat transfer coefficients in nucleate and film boiling regimes :

In the rational design of boiler circulating system, the primary requisite is that nucleate boiling is maintained for all anticipated operating conditions which ensures the continuous wetting of the inside surface of the tubes. The conversion of this nucleate boiling into film boiling at certain regions results in a sharp rise of the tube wall temperature thereby causing the tube getting overheated, It is our aim to investigate the methods for maintaining the nucleate boiling throughout the riser section. Research work is being carried out in the steam loboratory to obtain the heat transfer correlation equations on boiling heat transfer in different regimes.

Staff member-in-Charge ; P. Suryanarayana Chetty, Associate Lecturer.

5. Performance characteristics of labyrynth glands :

An experimental set-up is made to tetermine experimentally the optimum conditions for sealing steam flow in high pressure turbines. Different types of labyrynth seals with

adjustable spacings is being tried out to keep the leakage area and the pressure drop a minimum.

Staff member-in-Charge K. V. Chalapathy Rao, Teacher Trainee.

6. Prediction of performance of flooded type evaporators to study the effect of vapour bubbles on heat transfer surfaces.

The eonditions inside an evaporator of refrigeration system were simulated by bubbling superheated steam through water in a tank, inside which a heat exchanger was placed submerged in water. The heat transfer rate increased with increasing steam flow rate. An attempt was made to separate out the heat transfer due to condensation and convection, by bubbling compressed air instead of steam.

M. John Kurian, Subhash Kumar and Kalakar Murthy.

III—INSTRUMENTATION

1. Friction in sintered bearings for instruments :

The object of the investigation is to provide a theoretical basis for the frictional characteristics in sintered bearings of diameters less than 3 mm used in instruments and allied apparatus. Based on the long bearing theory and applying D ' Arcy's law of flow within the porus body, the theory has been put forward to take into account the features typical to bearings of these dimensions. The effect of the surface features of the sintered bearing caused by manufacturing process has also been included. A pendulum dynamometer has been built to test the bearings under different loads and speeds. The experimental results show good correlation with the theory.

Based on the verification the frictional characteristics of the sintered bearings has been presented in the form of logarithmic strip diagram similar to that proposed by Prof. Vegelpohl. A simple procedure to arrive at the dimensions of the bearings to ensure its operation with minimum friction has been proposed.

Staff-member :—S. Padmanabhan

IV—THERMODYNAMICS

1. Effect of sound on Flames :

   The effect of audio-frequency sound on Burshane-air flames is studied. A loud-speaker of 3-watt capacity and a beat-frequency oscillator are used. The flames are photographed by the shadowgraph technique, using stroboscopic light.

   Staff-member :—K. S. Padiyar

2. Ignition-Delay Measurement by the Shock-Tube Technique :

   A shock tube, suitably instrumented is set-up. Nitrogen and Hydrogen are used as the driving gases. Ignition delay of Burshane-air mixtures is currently under investigation.

   Staff-member :—K. A. Bhaskaran

3. Flame Quenching :

   Flame Quenching is a major contributing factor for the presence of unburned hydrocarbons in the products of combustion. Combustion in closed vessels, which are suitably instrumented, is being currently investigated.

   Staff-member :—M. C. Gupta

4. Studies on Pulsating Combustion :

   Pulsating flow of Burshane-air mixture is set-up with the aid of an aerodynamic valve. Effect of the fuel-air ratio of the mixture on frequency, amplitude and heat release is being studied.

   Staff-member :—V. Sriramulu

5. Utilisation of Solar Energy .

   To utilise the energy in thermal radiation from the Sun, which is diffuse and at a low potential, flatplate collectors and parabolic concentrators are devised and their effectiveness is being studied. Their successful application to water heating, space heating, drying, refrigeration, desalination etc. will be investigated.

   Staff-member :—A. Venkatesh

The students of the graduating year of the B. Tech., class, undertook some research projects as part of the requirements for the award of the Bachelors' Degree. They were guided by the faculty members of the Laboratory and the projects are listed below :

1. Stabilisation of Turbulent Premixed Flames.
2. Vortex tube.
3. Optical pyrometer.
4. Rocket Test Stand.
5. Hartmann Burner.
6. Studies on Ejector.

V—PRODUCTION ENGINEERING

1. Diffusion wear of H. S. S. tools—study of white layer formation—V. C. Venkatesh.
2. Surface transformation of carbide tools—Study of frozen tools—Venkatesh and Radhakrishnan.
3. High speed machining with ceramic tools—F. W. Lohr, Venkatesh, Francis, Chandramouli.
4. Surface deterioration of contact surfaces, in particular gears—Venkatesh and Veluswamy.
5. Use of geometric, arithmetic and logarithmic progressions in Machine Tools—Lohr.
6. 18 projects by Final Year B. Tech. students aided by section staff on Machinability, Tool Wear, Tool Design, Materials Handling, Plant Layout, Work Study, Industrial Safety and Quality control—Prof. Lohr/Dr. V. C. Venkatesh/ M/s. S. Vaidyanathan / Radhakrishnan / P. Ramachandran / P. K. Philip / M. S. Francis / M. Adithan/J. Chandramouli/ A. Angamuthu.

VI—I. C. ENGINES

1. Investigations on the effect of turbulence frequencies on the mixing process in combustion chambers.

2. Investigation of fuel properties on the BASF test engines.

3. Preparatory test on the combustion process in the MAN-M-multifuel engine.

4. Torsional vibration test on the crank shaft of Ashok Leyland type of Engine.

5. Preparation of computor Programmes for natural frequencies calculations and harmonic analysis for the vibration dampur on the above engine.

6. Computation of heat release rate in a direct injection engine.

7. Theoretical and experimental investigations on Hybridization practice in reciprocating I. C. engines.

8. Problems on cold starting of diesel engines, in consultation with the Birla Institute of Technology, where the programme was started, for the Ministry of Defence, with the permission of I. I. T., Madras.

PAPERS PUPLISHED

1. "High speed machining of Cast Iron and Steel"—V. C. Venkatesh. Paper presented at the 16th annual conference of "International Institution for Production Engineering Research", September 1966, Paris. Published in Annals.

2. "Diffusion Wear of H. S. S. Tools"—V. C. Venkatesh, Paper presented at the 7th International Machine Tool Design and Research Conference", Birmingham, September, 1966, Published in Proceedings MTDR conference.

3. "New Techniques in the Study of Tool Wear" V. C. Venkatesh Paper presented at the 1st All India Machine Tool Design and Research Conference at Jadavpur University, January '67. Published in Proceedings.

4. "Use of geometrical progression in Machine Tools"—F. W. Lohr. Paper presented and published as in Sl. No. 3.

5. "Economics of Cylindrical grinding"—S. Vaidyanathan, Paper presented and published as in Sl. No. 3.

6. "Thermodynamic Advantages of Charge Stratification in Spark Ignition Engines—accepted for publication by the Institution of Engineers (India) by Dr. B. S. Murthy and Associates.

DEPARTMENT OF ELECTRICAL ENGINEERING

Research Work

1. *Electrical Machinery :*

   Autodyne—Sri S. S. Yegnanarayanan.

   Leakage Reactance of Skewed Rotor Induction Motor—Sri G. Sambasiva Rao.

   Axial Forces in Induction Machines—Sri V. Subramaniam

2. *Electrical and Electronic Measurements and Instruments :*

   Stray Loss Measurements—Dr. H. W. Meyer ;

   Current transformer testing—Sri P. Sankaran ;

   Design of a proton magneto-meter—Dr. K. P. Rajappan.

3. *Network Synthesis :*

   Analysis and Synthesis of n-port networks ;
   Study of Equivalence Techniques—Dr. V. G. K. Murti and Sri K. Thulasiraman.

   Enumeration problems in linear graph theory—Dr. V. G. K. Murti, Messrs. P. Sankaran, K. Sankara Rao and V. V. Bapeswara Rao.

4. *Automatic Control and Computation Systems :*

   (a) Transformer Analog Computers for Transfer Function Analysis and Synthesis, Solution of equations and frequency response plotting—Dr. P. V. Rao and Dr. B. Ramaswami.

(b) *Feedback Control Theory* : Linear, Non-Linear and Multivariable systems Generalized third Order system analysis—Phase—equivalent Reduction technique. Analytical approaches to synthesis. Complex-gain plots, equations, charts. Generalisation of frequency domain analysis and synthesis—Dr. V. Seshadri.

(c) *Control Components* : Induction accellerometer Sri P. Sasidhara Rao.

5. *Power Systems : Analysis and Protection :*

Load flow studies by digital computation ; Transient stability studies by digital computation—Dr. M. Venugopal. Synthetic testing of circuit breakers—Sri C. Narayana Reddy. Static Relays—Sri K. S. Metha.

6. *Electronics and Semi-conductor Technology :*

Noise—stability of Operational Amplifiers—Sri Bhanumoorthy. Negative resistance semiconductor devices and circuits—Dr. M. K. Achuthan.

Wide—band amplification with transistor circuitry—Dr. G. N. Garud.

7. *Communication Systems :*

Error correcting Codes for Digital Data—Transmission—Dr. K. P. Rajappan.

8. *Microwave Propagations and Electromagnetic Theory :*
Microwave measurements; components using ferrites—Dr. D. K. Banerjee ;

Theory of surface waves at the interface between vacuum and plasma ; dipoles inside semi-infinite conducting media—Dr. K. Sivaprasad.

PAPERS PUBLISHED

1. "Marginal Stability Equations of Linear Systems by Phase—Equivalent Reduction Technique" by V. Seshadri in I. E. E. E. TRANS. (A. C.), January '66.

2. "Surface Waves at a Plane Interface between Vacuum and Plasma with Magnetostatic Fields Normal to Interface" by Dr. K. Sivaprasad in I. E. E. E. Trans. (A and P), May, 1966.

3. "Application of Equivalence Technique in Linear Graph Theory to Reduction Process in a Power System" by K. Thulasiraman and others in a J. I. E. (I), Pt. EL, August 1966.

4. "Transistor RC Oscillator using Negative Impedances" by S. Pasupathy in 'Electronic Engineering' (U. K.), December 1966.

5. "Generalized Charts for Third Order Type—1 Systems" by V Seshadri in J. I. E. (I) Pt ET May 1967.

6. "On the Choice of Optimum gain for linear Feedback Control Systems" by V. Seshadri and G. C. Das in J. I. T. E. (I) May 1967.

7. "Correlation of frequency Domain and time domain parameters for Linear Systems" by V. Seshadri and V. R. Rao in J. I. T. E. (I) May 1967.

8. "Simplified Formulation of Optimization Indices" by V. Seshadri in J. I. T. E. (I), June 1967.

DEPARTMENT OF CHEMICAL ENGINEERING

RESEARCH WORK

I—PROCESS DEVELOPMENT

1. Studies in the Kinetics of Esterification of Alcohols using ion-exchange resin. (R. Subramaniam and P. Bhimeswara Rao).

   The various parameters in the Kinetic studies of esterification of alcohols with fatty acids are being studied The work is in progress.

2. Compaction of Solids (Y. B. G. Varma and D. Venkateswarlu).

   Porosity, tensile and compressive strengths, ejection pressures and particle—size—distributions for the compacts of inorganic materials have been studied. The project has been completed.

3. Compaction of Solids (C. M. Ramaswamy, Y. B. G. Varma and D. Venkateswarlu).

   Compaction mechanism of organic materials is under investigation. The work is in progress.

4. Granulation studies of heavy chemicals and fertilisers (V. Narayana Rao and Dr. Ing. Emil H. Hohmann).

   A Rotary granulator has been fabricated and erected. All the variables that effect are being studied. The work is in progress.

II—TRANSFER PROCESS

1. Diffusion and Chemical Reaction in Solid System. Ph. D. work by Mr. A. Baradarajan. Guide : Dr. M. Satayanarayana.

   A programme of work has been planned to obtain quantitative information regarding diffusion and reaction in typical solid—solid systems. Experimental investigations to study the effects of particle size, compaction pressure, porosity, reaction temperature and time, are under progress.

2. Particle motions in fluidized beds. (T. Gopichand and N. Subramanian.

   The applicability of Brownian Motion type of equations to describe particle motions in fluid beds, is tested. Theoritical expressions derived for a lean filuid bed, for the variation of bed density with height and probability after effect factors are checked with experiment. The work is submitted as Ph. D. thesis by N. Subramanian.

3. Heat Transfer studies in Fluidization (Ph. D. problem by K. Ramamurthy. Guide : Dr. K. Subbaraju).

   Experiments were conducted to study the bed expansion characteristics in annulous fluidized beds. Heat transfer studies in annulus fluidized beds are now under progress.

III—MECHANICAL SEPARATION PROCESS

1. Beneficiation studies of ores and minerals (D. V. Ramana Rao and Dr. Ing. Emil H. Hohmann).

   A process has been developed for the benefication of low grade Iron ores. The work is in progress.

2. Studies in Size Reduction by Vibration Mills. (Ph. D. problem by R. Vedaraman. Guide : Dr. D. Venkateswarlu ; Co-guide : Dr. N. M. Raghavendra.)

Investigation on the size reduction of materials of different hardness and grindability values and also of different particle sizes and mill charges are being carried out in an experimental vibration mill and to compare the results with the conventional ball mill.

3. Studies in Fluid Energy Grinding. (M. Ramanujam and Dr. D. Venkateswarlu).

   The grinding characteristics of Calcite are being studied in our experimental fluid energy grinding set up as functions of solid feed rate, air rate, solid feed size etc. The work is in progress.

PAPERS PUBLISHED

1. 'Determination of Surface Energy of Solids', Journal of Chemical Engineering Society, 1967—Y. B. G. Varma, A. V. Ramani and D. Venkateswarlu.

2. 'Studies on Neyveli Lignite Tar'—V. Narayana Rao, A. V. Ramani and Y. B. G. Varma—Petroleum and Hydrocarbons *2* No. 1.. 16 (1967).

3. 'Prediction of azeotsopic temperatures in binary systems'—A. Baradarajan and M. Satyanarayana—Trans. I. I. Ch. E., October, 1966, P 126, Vol. 8., No. 4.

4. 'Particle motion in fluid beds'—N. Subramanian and T. Gopichand—Trans. I. I. Ch. E., January 1967.

DEPARTMENT OF METALLURGY

Research Work

1. *Stabilisation of austenite* :

   Effects of mechanical working, nature and proportion of prior constituent and nature, amount and pressure of occluded gas on the reactivity of austenite are to be examined. Literature study and construction of some of the special apparatus required for the above investigations are being carried out.

2. *Stacking faults and work hardening of metallic materials* :

   Literature survey and analysis of x-ray diffeaction properties of some type of stainless steels is being carried out together with work hardness studies of poly-crystalline materials at room and elevated temperatures.

3. *Fatigue at high temperature* :

   Research work involving a study of the interaction of fatigue and creep has been begun under the guidance of one of the Asst. Professors in the Department. A special apparatus for fatigue testing with provision for high temperature work is being constructed. Preliminary theoretical studies have also been carried out.

4. *Structure and properties of electro—deposited alloys* :

   Study of the relevant literature has been carried out with a view to investigating the inter-relationship between the cast and electrodeposited alloys and to examine the role of occluded hydrogen in affecting the latter.

5. *Electrowinning of copper using sulphide anodes* :

   The behaviours of pure cuprous sulphide cast anodes are studied in an aqueous bath. The relationship between physical structure and chemical behaviour of the anodes is studied by x-ray and other techniques.

PAPERS PUBLISHED

1. 'Regarding the effect of specimen shape on the selection of the primary slip plane'—K. S. Raghavan and D. Kuhlmann—Wilsdorf, Materials Science and Engineering Vol. 1, 195 (1966).

2. 'Stacking faults in austenitic alloys of the Fe-Cr-C-N system'—R. Vasudevan and A. Majdic, Transactions of the Indian Institute of Metals, September, 1966.

3. 'Evidence for the Propagation of Crystal Defects from the substrate to an epitaxial overgrowth'. K. Srinivasa Raghavan and D. Kuhlmann-Wilsdorf Transaction of the Indian Institute of Metals, Vol. 19, P. 82, 1966.

DEPARTMENT OF AERONAUTICS & APPLIED MECHANICS

Research Work

I—SOLID MECHANICS

1. "Vibration of a Cylindrical Shell under Initial Stress and containing an Elastic Core" by D. V. Reddy and T. Narayanan.

2. "Frequency Analysis of Curved Members using Newmark's Method" by D. V. Reddy and R. Balasubramanian.

3. ENetwork Analyser for certain Plate Problems" by D. V. Reddy.

4. "Experimental Analysis of Frequencies of Bridge Decks" by D. V. Reddy (Laboratory and Field Tests in Collaboration with the Highways Research Station, Goverment of Madras).

5. "Lower-Bound Solution for the Load Carrying Capacity of a Foundation Slab Clamped along the Edge" by D. V. Reddy and T. Narayanan.

6. "A Comparison of Lumped Mass and Lumped Inertia Methods in Vibration Analysis with particular reference to Grids" by D. V. Reddy and G. Subramanian.

7. "Junction Stresses in Shells" by R. S. Alwar, D. V. Reddy and V. Ramamurti.

8. "Analysis and Design of Stiffener Rings in Rotary Kilns" by R. S. Alwar and V. Ramamurti.

9. "Analysis of Interface Stresses in a Solid Propellant Rocket Motor" by R. S. Alwar and P. Krishna Iyer.

10. "Sandwich Structure Analysis" by R. S. Alwar.

11. "Effect of Welding on the Rigidity and Damping Capacities of Built—up Structures" by B. V. A. Rao, V. Ramamurti and R. Rangarajan.

12. "Design and Development of a Pneumatic Exciter and its application to Vibration Studies" by B. V. A. Rao, V. Ramamurti and Suryanarayana.

13. "Design and Development of a Hydraulic Vibration Exciter and its application" by B. V. A. Rao, V. Ramamurti and M. N. Siddhanty.

14. "Study of automobile vibrations through Analogue Studies" by D. V. Reddy, B. V. A. Rao and C. R. Subramanian.

15. "Minimum Weight Design Based on Structural Reliability" by G. Subramanian.

16. "Deterioration of Contact Surfaces" by M. A. Veluswami and Dr. V. C. Venkatesh.

17. "Function Generation Mechanisms" by M. A. Veluswami.

II—FLUID MECHANICS

18. "Unsteady flow through Circular Conduits" by N. V. C. Swamy.

19. "Friction Coefficient for Turbulent Flow through Smooth Pipes" by N. V. C. Swamy, P. A. Aswathanarayana and B. H. Lakshmana Gowda.

20. "Axisymmetric and Three—dimensional Turbulent Boundary Layer Analysis" by N. V. C, Swamy, P. A. Aswathanarayana and B. H. Lakshmana Gowda.

21. "Experiments on Rotating Bodies" by N. V. C. Swamy and N. S. Subbanarayanan.

22. "Studies on Diffusers with a Central Hub" by A. Klein and J. Mathew.

PAPERS PUBLISHED

1. "Response of an Embedded Spherical Shell to a Plane Wave" accepted for publication in the Journal of Nuclear Engineering and Design, Amsterdam—Shri G. K. Narasimha Murthy and D. V. Reddy.

2. "Ultimate—Load Analysis of Edge—Loaded Foundation Slabs", accepted for publication in The Structural Engineer, Great Britain—Shri D. V. Reddy and E. L. Murphre, Jr.

3. "Frequency Analysis of a Clamped Trapezoidal Plate using Collocation", accepted for publication in the Proceedings of the 10th Congress on Theoretical and Applied Mechanics, Madras—Shri G. K. Narasimha Murthy and D. V. Reddy.

4. "Frequency Analysis of Grids using Difference Equations", Proceedings of the Third Symposium on Earthquake Engineering, Roorkee. 173—178 (1966)—Shri K. Palaniswamy and D. V. Reddy.

5. EUnsteady flow through Circular Conduits", Proceedings of the Symposium on Hydraulics, Indian Institute of Science, Bangalore—Shri N. V. C. Swamy.

6. "Friction Coefficient for Turbulent Flow through Smooth pipes", submitted to the American Society of Civil Engineers for publication—N. V. C. Swamy, P. A. Aswathanarayana and B. H. Lakshmana Gowda.

7. "Torsion Vibrations of Internal Combustion Engines—An experimental study of some locally made and foreign built engines", accepted for publication in Viswakarma.—B. V. A. Rao.

8. "An Interesting Property of Regular Polygons," sent for publication to The American Mathematical Monthly.—Shri G. Subramanian.

9. "Vortex Breakdown Effects on the Low Speed Aerodynamic Characteristics of Slender Delta Wings in Symmetrical Flow", Journal of the Royal Aeronautical Society, April, 1967—Shri D. Hummel and Shri P. S. Srinivasan.

10. " Cavitation Damage in a Flow System ", American Society of Mechanical Engineers, 1967 Cavitation Form— J. Mathew.

11. Effect of Increase in Pressure on a Collapsion of Bubble Causing Cavitation, Indian Journal of Technology, October, 1966.

PAPERS PRESENTED

1. Eleventh Congress of Theoretical and Applied Mechanics, Coimbatore, December 1966.

   " Transient Response of an Embedded Spherical Shell to a Plane Wave"—G. K. Narasimha Murthy and D. V. Reddy.

2. Symposium on Ultimate—Load Method of Design of Structures, Coimbatore, November 1966.

   " Ultimate—Load Analysis of Edge—Loaded Foundation Slabs "—D. V. Reddy and E. L. Murphree. Jr.

3. Third Symposium on Earthquake Engineering, Roorkec, 1966.

   " Frequency Analaysis of Grids using Difference Equations ". K. Palaniswamy and D. V. Reddy.

4. Sixth Symposium on Hydraulics, Indian Institute of Science, Bangalore, January 1966.

   " Unsteady Flow through Circular Conduits ".

   N. V. C. Swamy.

DEPARTMENT OF HUMANITIES

Research Work

I—LANGUAGES

1. Study on 'Indo—Anglian Literature—Dr. A. V. Krishna Rao.

II—PSYCHOLOGY

1. Study on 'Personnel Psychology'—Shri S. G. Asthana.

2. 'Qualities of leadership in different age groups'—Shri T. N. Govindarajan.

III—ECONOMICS

1. 'Migration Differentials in Metropolitan Cities in India'—Miss V. Hamsaleelavathy.

PAPERS PUBLISHED

1. Feminine Sensibility in Indo—Anglian Fiction—Triveni, January '67—Dr. A. V. Krishna Rao.

2. National Symbols in the Novels of R. K. Narayan—Literary half yearly, University of Mysore 1967—Dr. A. V. Krishna Rao.

3. Personality & Occupational Choice'—Journal of the Indian Institute of Personnel Management, March '67—Shri S. G. Asthana.

4. Motivational Rigidity Among Deliquents and Non Deliquents—Indian Journal of Applied Psychology, January 1967—Shri T. N. Govindarajan.

5. World Leadership—A Formula. Journal of Psychological Researches, January, 1967—Shri T. N. Govindarajan.

PAPERS PRESENTED

1. "Socialization for an Unknown Future" in the seminar on Higher Education, Technology and Social change conducted by the Department of Humanities, Indian Institute of Technology, New Delhi (from December 1—3, 1966)—Shri T. N. Govindarajan.

PART II—B

EIGHTH ANNUAL REPORT
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GENERAL

1. COURSES OFFERED :

The Institute offered the following courses during the year under report.

I. UNDERGRADUATE DEGREE COURSES :

(a) *5-Year Course* leading to the Degree of Bachelor of Technology in

(i) Aeronautical Engineering

(ii) Chemical Engineering

(iii) Civil Engineering

(iv) Electrical Engineering (Heavy current and Light current options)

(v) Mechanical Engineering

(vi) Metallurgy

(b) *3-Year Course* leading to the Degree of Bachelor of Technology in

(i) Chemical Engineering

(ii) Civil Engineering

(iii) Electrical Engineering (Heavy current and Light current options)

(iv) Mechanical Engineering

(v) Metallurgy (II and III years only)

II. POST-GRADUATE DEGREE/DIPLOMA COURSES :—

(a) *2-Year Course* leading to the Degree of Master of Science in

(i) Chemistry

(ii) Mathematic

(iii) Physics

(b) *2-Year Course* leading to the Degree of Master of Technology in

(i) *Chemical Engineering*

(ii) *Civil Engineering :*

(a) Structural Engineering

(b) Hydraulic Engineering

(c) Soil Mechanics and Foundation Engineering

(iii) *Electrical Engineering* :

(a) Power System Engineering

(b) Control System Engineering

(c) Electrical Measurements

(d) Advanced Electronics

(iv) *Mechanical Engineering :*

(a) Machine Design

(b) Machine Tool Design

(c) *One Year Course* leading to the Diploma in Industrial Engineering

III. Ph. D. DEGREE COURSES :

(a) Sciences :

(i) Chemistry

(ii) Mathematics

(iii) Physics

(b) Engineering and Technology :

(i) Aeronautics and Applied Mechanics

(ii) Chemical Engineering

(iii) Civil Engineering

(iv) Electrical Engineering

(v) Mechanical Engineering

(vi) Metallurgy

OTHER PROGRAMMES :

I. 3-Year training Programme for Technical Teachers in Engineering Institutions.

II. Sequential Summer School in Mechanical Engineering for Teachers in Engineering Institutions.

2. THE SENATE :

The Senate met seven times during the year.

MEMBERS OF THE SENATE
AS ON 1—7—1966

Chairman :

1. Prof B. Sengupto (Director).

External Expert Members :

2. Dr. P. L. Bhatnagar,
   Head of the Department of Applied Mathematics,
   Indian Institute of Science, Bangalore-12.
3. Dr. G. S. Laddha,
   Director, A. C. College of Technology, Madras-25.
4. Prof. T. Balakrishnan Nayar,
   " CHITRA," Kilpauk Garden Road,
   Madras-10.

Internal Members :

5. Prof. S. Sampath,
   Head of the Department of Electrical Engineering,
   (Deputy Director since 12-10-1966).
6. Prof. R. G. Narayanamurthy,
   Head of the Department of
   Mechanical Engineering.
7. Dr. E. G. Ramachandran,
   Head of the Department of Metallurgy.
8. Dr. M. V. C. Sastri,
   Head of the Department of Chemistry.
9. Prof. R. Krishnamurti,
   Head of the Department of Humanities.
10. Dr. P. C. Varghese,
    Head of the Department of Civil Engineering.

11. Dr. D. Venkateswarlu,
Head of the Department of Chemical Engineering.

12. Dr. S. Ramaseshan,
Head of the Department of Physics.

13. Prof. R. K. Gupta,
Professor, Department of Humanities.

14. Dr. S. D. Nigam,
Head of the Department of Mathematics.

15. Dr. D. V. Reddy,
Head of the Department of Aeronautics and Applied Mechanics.

16. Prof. T. N. Seshadri,
Professor, Department of Physics.

17. Dr. W. Koch, Professor,
Department of Physics.

18. Dr. G. Stahl, Professor,
Department of Mechanical Engineering.

19. Dr. W. Scheer, Professor,
Department of Mechanical Engineering.

20. Dr. N. Klein, Professor,
Department of Humanities.

21. Dr. G. Rouve, Professor,
Department of Civil Engineering.

22. Dr. H. Heitland, Professor,
Department of Mechanical Engineering.

23. Dr. W. Lutz, Professor,
Department of Mechanical Engineering.

24. Dr. E. Hohmann, Professor,
Department of Chemical Engineering.

25. Prof. F. W. Lohr, Professor,
Department of Mechanical Engineering,

26. Dr. H. W. Meyer, Professor,
Dcpartment of Electrical Engineering.

27. Dr. R. J. H. Bisanz, Professor,
Department of Chemical Engineering.

28. Dr. A Klein,
Professor,
Department of Aeronautics and Applied Mechanics.

28. Shri V. S. Nazir Ahmad,
Librarian.

30. Shri S. S. Mani.
Workshop Superintendent.

31. Dr. B. V. Ramanamurthi,
Asst. Professor,
Department of Physics.

Secretary :

Shri C. V. Sethunathan (Registrar)

MEMBERS OF THE SENATE
AFTER 1—7—1966

Dr. M. Venugopal,
Asst. Professor,
Department of Electrical Engineering.
—(From 12—10—1966 to 7—4—1967. In the place of Prof. S. Sampath.

Dr. B. S. Murthy,
Professor,
Department of Mechanical Engineering.
(From 2—12—1966—Appointment as Professor).

Dr. H. E. D. Zuern,
Professor, Department of Metallurgy.
(From 7—1—1967—Appointment as Professor).

Dr. P. Venkata Rao,
Head of the Department of Electrical Engineering.
(From 8—4—1967—Return from abroad).

Prof. N. K. Datta,
Professor, Department of Humanities
(From 19—4—1967—Appointment as Professor).

Dr. C. Ramasastry,
Dept-in-charge, Department of Physics,
(From 3—5—1967—In the place of Prof. T. N. Seshadri).

Prof. A. L. Krishnan,
Professor, Department of Humanities,
(From 11—5—1967—Appointment as Professor).

MEMBERS WHOSE TERMS OF OFFICE ENDED OR WERE INTERRUPTED

Prof. R. Krishnamurthi,
Head of the Department of Humanities,
(From 6—7—1966—On expiry of term of office).

Dr. M. Venugopal,
Associate Professor,
Department of Electrical Engineering,
(From 8—4—1967—On the return of Dr. P. Venkata Rao from abroad).

Dr. W. Lutz,
Professor, Department of Mechanical Engineering,
(From 19—3—67—on expiry of the term of office).

Prof. T. N. Seshadri,
Head of the Department of Physics,
(From 3—5—1967—on expiry of the term of office).

Dr. S. Ramaseshan,
Head of the Department of Physics,
(From 5—10—1966—Resigned).

3. ADMISSIONS :

Students were admitted into the first year classes as detailed below :

Class	Branch	No. Admitted	
(a) 5-year B. Tech. Degree Course	Aeronautics & Applied Mechanics	18	
	Chemical Engineering	29	
	Civil Engineering	42	
	Electrical Engineering	52	
	Mechanical Engineering	63	
	Metallurgy	36	
			240
b) 3-year B. Tech. Degree Course	Chemical Engineering	31	
	Civil Engineering	26	
	Electrical Engineering	64	
	Mechanical Engineering	32	
			153
(c) M. Sc. Degree Course	Chemistry	8	
	Mathematics	10	
	Physics	10	
			28

(d) *M. Tech Degree Course* :

	No. Admitted			
	Full time Students	Staff Members on part-time basis	Technical Teacher Trainees	Total
Chemical Engineering	16	...	...	16
Civil Engineering	12	3	1	16
Electrical Engineering	23	1	5	29
Mechanical Engineering	10	7	7	24
	61	11	13	85

(e) *Post Graduate Diploma Course in Industrial Engineering* : 20

(f) *Ph. D. Degree Registration during the year :*

Departments		Full Time	Part Time (Staff)
Aeronautics and Applied Mechanics		1	—
Chemical Engineering		—	2
Civil Engineering		—	—
Electrical Engineering		1	4
Mechanical Engineering		1	6
	Total	3	12
Chemistry		3	6
Mathematics		9	—
Physics		3	1
	Total	15	7

Details showing the number of candidates who appeared for the Joint Entrance Examination, for admission to the 5 year B. Tech. Degree Course, the number joined and other particulars are in APPENDIX 1.

Admissions to the 3 year B. Tech., M. Sc., and M. Tech. Degree Courses were made on the basis of the candidate's previous academic records and performance at the interviews.

The strength of the students on rolls at the commencement of the year and in the previous year is in APPENDIX II.

4. EXAMINATIONS :

The following number of students qualified themselves for the award of the respective degrees.

	I Class with Distinction	I Class	II Class	Total
5-year B. Tech. Degree Course	4	119	50	173
3-year B. Tech. Degree Course	...	47	39	86*
M. Sc. Degree Course	2	16	2	20@
M. Tech. Degree Course		27	5	32+
Ph. D. Degree : Full-time.....2				
Part-time.....10				

* Includes three students who completed their course in November 1966.

@ Includes one staff member.

\+ Includes six staff members.

The following have been conferred the Ph. D. Degree at the Third Convocation held in July 1966.

Name	*Department*	*Title of Thesis*
Sri Balagangadhara Varma Yalamanchili (Lecturer)	Chemical Engineering	"Compaction of Solids."
Sri Anil Kumar Singh (CSIR Research Fellow)	Physics	Some investigations in X-ray Crystallography.

The following have been recommended for the award of the Ph. D. Degree which will be conferred at the next Convocation in July 1967.

SCIENCE :

Full-time :

Name	*Department*	*Title of Thesis*
1. Sri Kishan Rao	Mathematics	"The study of Thermal Stresses due to a Nucleus of Thermo-Elastic Strain in Elastic Bodies."

Part-time :

Name	*Department*	*Title of Thesis*
1. Sri Jagdish Rai Jain (Junior Technical Assistant)	Chemistry	"A study of the Mechanism of Catalytic Dehydrations over Alumina."
2. Sri M. Ramakrishna Udupa (Associate Lecturer)	Chemistry	"Studies on Thiourea Complexes of Zinc, Cadmium, Mercury, Cobalt and Nickel."
3. Sri P. Achuthan (Associate Lecturer)	Mathematics	"Studies in the Pionic and Photo Production of Mesons."
4. Sri N. V. Koteswara Rao (Associate Lecturer)	Mathematics	"Studies in Stochastic Point Processes and their Applications."
5. Sri S. Bhimasankara Sastri (Lecturer)	Physics	"Colour centre studies in Sodium Chlorate."
6. Sri Y. V. G. Satyanarayanamurti (Associate Lecturer)	Physics	"Nature of Point Defects in Na No3."

ENGINEERING / TECHNOLOGY :

Part-time :

1. Sri N. Subramanyam (Lecturer)	Chemical Engineering	"Particle Motions in Batch Fluid Beds,"
2. Sri Bellamkonda Ramaswami (Assistant Professor)	Electrical Engineering	"Transformer Analogue Computors for the study of Feed back control systems."

Part-time Name	*Department*	*Title of Thesis*
3. Sri V. Seshadri (Lecturer)	Electrical Engineering	"Certain methods of analysis and synthesis for third order Linear Control Systems and their application to Higher order systems."
4. Sri Makam Chidananda Gupta (Assistant Professor)	Mechanical Engineering	"Quenching, Post-Flame Reaction and Diabetic effects in closed vessel Combustion of Propane-Air and Methane Air Mixtures."
5. Sri S. Padmanabhan (Lecturer)	Mechanical Engineering	"Friction in Sintered Bearings for Instruments."

In addition, the Departments have also been carrying out research work in colloboration with industry. The results of research work have been published in Journals in India and abroad. These are detailed in Part II-A of the report.

The Degree will be conferred on these students at the Fourth Convocation to be held on the 22nd July, 1967. The details of the results of each class and branch after the final examinations held at the end of the 1966—67 academic session are in APPENDIX III.

5, SCHOLARSHIPS & PRIZES :

(*a*) *Scholarships*

Scholarships and Freestudentships were awarded to the students by the Institute as noted below :

Course	*Merit Scholarships*	*Merit-cum-means Scholarships*	*Freestudent-ships*
5-Year B. Tech.	77	190	71
3-Year B. Tech.	23	63	40
M. Sc.	6	9	6
M. Tech.	68	—	—
Ph. D.	51	—	—

The expenditure incurred by the Institute on scholarship was Rs. 7,75,168.

The Government of India, the different State Governments, Social Welfare Boards, Harijan Welfare Departments in the States, the Atomic Energy Commission and other bodies sanctioned scholarships and loans to the students of this Institute as in the previous year.

Needy students were given financial assistance from the Students' Aid Fund of the Institute.

Particulars of the scholarships and loans and the number of students benefited are in APPENDIX IV.

(*b*) *Prizes*

The Institute awarded Merit Prizes to the students in the different disciplines of study, the value of the First Prize being Rs. 50/- and that of the Second Prize being Rs. 25/-. Details are given in APPENDIX V.

Prof. R. Krishnamurti, who was the Professor of English and Head of the Department of Humanities in the Institute, founded an endowment in the Institute with a capital amount of Rs. 500/- for the award of a prize to be called Rajalakshmi Krishnamurti (English) Prize, at this Institute. The terms and conditions for the award of the Prize are detailed in ANNEXURE V-A.

M/s. Siemens Engineering and Manufacturing Company of India, Limited, Madras founded an endowment of Rs. 5,000/ in the Institute, for the award of two Prizes to be called

"The Siemens Prizes". The annual interest accruing on the capital amount is to be utilised for the award of the two Prizes.

6. ACADEMIC SESSION :

Extracts of the academic calendar for 1966-67 for the various courses are given below :—

	Commencement of Session		Close of Session
5-year B. Tech. Degree Course :			
I Year	4-7-1966		6-5-1967
II, III, IV & V Years	11-7-1966	II Year	3-5-1967
		III Year, IV Year and V Year	6-5-1967
3-Year B. Tech. Degree Course :			
I Year	18-7-1966		3-6-1967
II & III Year	11-7-1966	II Year	3-6-1967
		III Year	13-5-1967
M. Sc. Degree Course :			
I Year	18-7-1966		13-5-1967
II Year	11-7-1966		23-5-1967
M. Tech. Degree Course :			
I Year	18-7-1966		28-4-1967
II Year	11-7-1966		20-5-1967
Post Graduate Diploma Course in Industrial Engineering :			
	20-6-1966 (Introductory course)		August 1967
	1-8-1966 (Main course)		

7. SEMINAR / CONFERENCE / SYMPOSIUM ORGANISED BY THE DEPARTMENTS :

The first all-India Symposium on Inorganic Chemistry was held under the auspices of the Department of Chemistry from the 23rd to the 25th February 1967. Prof. K. S. G. Doss, Director, Central Electrochemical Research Institute, Karaikudi, inaugurated the Symposium. The Symposium, which covered many modern aspects of Inorganic Chemistry, was attended by a large number of Scientists from all over the country.

8. INDUSTRIAL VISITS :

As in the previous years, visits to major Industrial units were arranged for the students of the Institute. The final year students of the 5-year and 3-year B. Tech. Degree Courses in Chemical Engineering Branch were taken on a 10-day educational tour to Ernakulam and Alwaye. They visited among others, Fertilizers and Chemicals Travancore Ltd., Premier Tyres, Travancore Chemicals, Indian Aluminium Company Ltd., Indian Rare Earths Ltd., Tata Oil Mills, Cochin Refineries and Ogale Works. In addition, the students also visited factories in and around Madras.

The students of the 3rd and 4th year classes of the 5-Year B. Tech. Degree Course in Aeronautical Engineering Branch were deputed for training in the following establishments during the winter vacation of 1966 and the summer vacation of 1967.

(a) Hindustan Aeronautics Ltd.,
Bangalore Division.

(b) Civil Aviation Research Centre,
New Delhi.

(c) Hindustan Aeronautics Ltd.,
Engines Division, Bangalore.

(d) Hindustan Aeronautics Ltd.,
Barrackpore Division.

(e) Madras Institute of Technology,
Chromepet, Madras.

(f) Indian Airlines Corporation,
New Delhi.

(c) Facilities for research work of Ph. D. scholars are available in all the above laboratories.

(d) Calibration laboratories for precision measurements, analog computers and recording facilities, a card punch and verifier for preparing programs digital compution, and a well equipped departmental workshops are the additional facilities available.

A full-fledged digital computer has also been suggested for acquisition and may become available in the near future.

4. EDUCATIONAL TOURS :

Local visits—Messrs. W. S. Insulators, Porur, were visited by the students in Electrical Engineering Branch (H. C) of the Fourth year class of the 5-year B. Tech. Degree course. Basin Bridge Power Station was visited by the students in Electrical Engineering Branch (H. C.) of the 3rd year class of the 3-year B. Tech. Degree Course, and Auto Exchange in Telephone House, and Mambalam Cross-bar Exchange were visited by the students in Electrical Engineering Branch (L.C.) in the final year class of the 5-year B. Tech. Degree Course.

5. MAJOR EQUIPMENT PROCURED :

The Relay Demonstration Panel received earlier has been commissioned. A D. C. Network Analyzer Unit has been received and is being installed in the Power Systems Laboratory.

6. DEPUTATION TO SEMINARS, ETC. :

Dr. D. K. Banerjee	...	Represented the Department at the Seminar on Defence Electronics organised by the Defence Research and Development Organisation at Hyderabad—7th to 9th August, 1967.
Dr. G. N. Garud	...	Presented a paper at the Tenth Technical Convention of the Institute of Telecommunication Engineers, held in New Delhi-10th to 11th December, 1966.

Dr. V. Seshadri	i.	Presented three papers at 10th Technical Convention of I.T.E. held in New Delhi—10th and 11th December 1966.
	ii.	Delivered five lectures on invitation at the APTI Summer School on Control Systems held at CEERI, Pilani-24th to 26th May, 1967.
	iii.	Contributed two papers to the above Summer School on Control Systems at the end of the seminar—June 1967.
Sri V. Subramaniam		Attended the APTI Summer School on Advanced Numercial Analysis held at Engineering College, Guindy, Madras-3 weeks, May-June, 1967.
Sri A. Chandrasekharan ...		Attended Refresher Course on 'Computer Methods on Power System Engineering' held at I. I. T., Kanpur-3 weeks December 1966 January 1967.
Sri G. Sambasiva Rao ...		do

7. RESEARCH SCHOLARS :

S. No.	*Name*	*Designation*	*Topic*	*Date of Registration*	*Guide*
(a)	*Full Time* :				
(i)	Sri S. Pasupathy	Research Scholar	Negative Resistance Devices.	9-11-'65	Dr. M. K. Achuthan
(ii)	Sri K. S. Metha	do	State Relays	26-10-'66	Dr. H. W. Meyer.

(b) *Part-time* :

1.	Sri B. Ramaswamy	Lecturer	Transformer anologue computers for use in Servo Mechanisms.	1-9-'63	Dr. P. Venkata Rao-
2.	Sri V. Seshadri	do	Control systems	1-1-'65	Dr. V. G. K. Murti.
3.	Sri P. Sankaran	do	Measurements & Networks	27-8-'66	Dr. V. G. K. Murti
4.	Sri S. S. Yegnanarayanan	do	Autodyne	26-11-'63	Dr. M. Venugopal
5.	Sri A. Chandrasekharan	do	Distance Relays	18-2-'67	do
6.	Sri Vedam Subramaniam	do	Axial forces in Induction Motors	19-5-'67	Dr. H. W. Meyer.
7.	Sri K. Thulasiraman	do	n-port Synthesis	4-11-'65	Dr. V. G. K. Murti.
8.	Sri B. S. Bhanumurthi	do	Transistorized Operational Amplifiers	18-2-67	Prof. S. Sampath.

8. LIAISON WITH INDUSTRY :

The Department has carried out consultative and testing work for a number of industrial organisations in and around Madras. The following are some of the Organisations to whom these services were extended :

1. Heavy Vehicles Factory, Avadi (Garrison Engineer, Madras).
2. Reyrolle Agency, Madras.
3. Gam Co., and Madras-7.
4. Easwaran and Sons Private Ltd., Madras.
5. Southern Switchgear, Madras.

The following industrial organisations have expressed a desire to make use of the facilities of this Department in some of their development projects and the collaboration programmes are being worked out.

1. Hindustan Teleprinters, Madras.
2. English Electric Co., Madras.
3. Systems Engineering Co., Madras.
4. Toshniwal Instruments, Madras.
5. W. S. Insulators of India, Madras.

The Department also received preliminary enquiries for certain items of testing and calibration work from the following organisations.

1. Simco Meters, Thiruchirapalli.
2. State Electricity Board, Madras.
3. Carborundum Universal, Madras.
4. Indian Electrical Manufacturers Association, Bombay.
5. Defence Electronics Research Laboratories.

9. OTHER ACADEMIC ACTIVITIES :

The post-graduate instructional programme has been continuously augmented by the compulsory participation of the students in the Post-graduate Seminars wherein each post-graduate student is required to give an exposition on an advanced topic normally not included in the regular curriculum. Senior undergraduate students are also required to work for three weeks intensively on a literature survey design and construction/experimentation project so as to gain experience with the problems and methods of self-study and investigation that would involve them professionally after graduation.

The Department also participates in the training programme of Technical Teacher Trainess who, after a three-year training period under the direct supervision of senior staff members will go out to take up positions as Lecturers in Technical Institutions in the country. Ten such trainess are with us at present, of which five will be completing their teacher-training-cum-M. Tech. Degree Programme at the end of the year 1967-68, and 5 at the end of 1968-69.

DEPARTMENT OF MECHANICAL ENGINEERING

1. ACADEMIC STAFF :

Professors :	(a) German	5
	(b) Indian	2
Assistant Professors	... ...	3
Lecturers	... ...	20
Associate Lecturers	... ...	10
Senior Technical Assistants	... ...	13

2. TEACHING FACILITIES :

Course	*Class*	*Branch*	*Subjects Taught*
5-year B. Tech Degree	I-year	All Branches	Drawing-I
do	do	do	Workshop-I
do	II-year	All Branches	Drawing-II
do	do	do	Workshop-II
do	III-year	Civil	General Mech. Engineering
do	do	Mechanical, Chemical and Aeronautical Engineering & Metallurgy	Applied Thermodynamics
do	do	Mechanical Engineering	Design of Machine Elements
do	do	do	Metrology
do	do	Mechanical & Chemical Engineering	Engineering Laboratory
do	do	Electrical & Chemical Engineering and Metallurgy	Design of Machine Elements

5-year B. Tech Degree	IV-year	Mechanical Engineering	Heat Engines (Steam & ICE)
do	do	do	Workshop Technology and Practice
do	do	do	Turbomachinery
do	do	do	Machine Design
do	do	Electrical & Chemical Engineering	Turbomachinery
do	do	do	Heat Engines
do	do	Mechanical Engineering	Mechanical Engineering Laboratory
do	IV-year	Aeronautical Engineering	Aircraft Power Plants
do	V-year	Mechanical Engineering	Heat Transfer, Refrigeration & Air-conditioning.
do	do	do	Project-Design/ICE/ Turbomachines/Steam/ Thermodynamics
do	do	do	Electives : (a) Design/ICE/Turbo-machines/Steam/ Thermodynamics. (b) Production Engineering (c) Instrumentation
do	do	Chemical Engineering	Production Technology
do	do	Electrical Engineering HC	Thermal & Hydro-Electric Power Plants (Thermal Part)
3-year B. Tech. Degree	I-Term	All Branches	Drawing-I
do	II-Term	Civil, Mechanical & Chemical Engineering	Thermodynamics
do	do	All Branches	Drawing-II

3-year B. Tech Degree	III-Term	Civil Mechanical, Electrical & Chemical Engineering	Applied Thermo-dynamics
do	do	Mechanical Engineering	Design of Machine Elements-I
do	do	Electrical & Chemical Engineering & Metallurgy	Design of Machine Elements-I
do	IV-Term	Mechanical Engineering	Machine Design
do	do	do	Heat Engines-I (ICE & Steam)
do	do	do	Turbomachines-I
do	do	do	Thermal Engineering Laboratory-I
do	do	Electrical Engineering (HC) & Chemical Engineering	Turbomachines & Heat Engines
do	V-Term	Mechanical & Electrical Engineering (HC)	Power Plant Engineering (Thermal)
do	do	Mechanical Engineering	Heat Engines-II (ICE)
do	do	do	Turbomachines-II
do	do	do	Heat Transfer
do	do	do	Workshop Technology & Metrology-I
do	do	do	Design

Course	*Class*	*Branch*	*Subject taught*
3-year B. Tech Degree	V-Term	Mechanical Engineering	Thermal Engineering Laboratory-II
do	do	Chemical Engineering	Production Technology-I
do	VI-Term	Mechanical Engineering	Refrigeration and Air-conditioning
do	do	do	Thermal Engineering Laboratory-III
do	do	do	Workshop Technology and Metrology-II
do	do	do	Electives :
do	do	do	(a) Design/ICE/Turbo-machines / Steam/ Thermodynamics Laboratories
do	do	do	(b) Production Engineering
do	do	Chemical Engineering	Production Technology-II
M. Sc. Degree	Physics		Drawing Workshops
M. Tech. Degree	I-Term	Machine Design	(a) Production Process and Machine Tool Design-I
do	do	do	(b) Machine Design-I
do	II-Term	do	(a) Production Process and Machine Tool Design-II
do	do	do	(b) Automatic Controls-I
do	do	do	(c) Machine Design-II

M. Tech. degree	III-Term	do	(a) Automatic Controls-II
do	do	do	(b) Machine Design-III
do	do	do	(c) Design Project
do	IV-Term	do	Thesis Project Work
do	I-Term	Machine Tools	(a) Machine Tool Technology & Metrology-I
do	do	do	(b) Machine Tool Design-I
do	II-Term	do	(a) Machine Tool Technology & Metrology-II
do	do	do	(b) Automatic Controls-I
do	do	do	(c) Machine Tool Design-II
do	do	do	(d) Metal Cutting
do	III-Term	Machine Tools	(a) Automatic Controls-II
do	do	do	(b) Machine Tool Design-III
do	do	do	(c) Tool Design
do	do	do	(d) Project Work
do	IV-Term	do	Project Work
P. G. Diploma	do	Industrial Engineering	Orientation Course
do	I-Term	do	Production Methods & Operations Planning

3. LABORATORIES/WORKSHOP FACILITIES :

(a) Undergraduate	I. C. Engines
do	Steam Power
do	Thermodynamics & Combustion
do	Turbomachines/Hydraulic Machines
do	Machine/Tools/Production Engineering
do	Metrology
(b) Postgraduate Degree (c) Research (Ph. D.)	I. C. Engines Steam Power Thermodynamics & Combustion
do	Turbomachines/Hydraulic Machines
do	Machine Tools/Production Engineering
do	Metrology
do	Instrumentation
do	Machine Elements
do	Workshops

4. EDUCATIONAL TOURS :

During the year 1966-67, an educational tour to Bangalore, and Industrial visits to Neyveli Lignite Corporation and Basin Bridge Thermal Power Station were arranged.

5. MAJOR EQUIPMENT PROCURED DURING THE YEAR UNDER REPORT:

Intex automatic lathe ; Drill and Lathe Dynamometers.

Micromanipulator ; Slipring Instrumentation ; Swinging field dynamometer with all controls.

Sieman's Oscilloscope ; Climate Cabinet ; Thermocouple welding set ; Flow meters ; Stroboscope.

Electro Flow-meter with indicator and integrator ;

Temperature Controllers ; Audio Frequency Generator ; Impedance Bridge.

6. DEPUTATION TO SEMINARS ETC. :

Staff Member.	Period of deputation	Seminar/Conference/Conventions/Summer Schools.
Dr. V. C. Venkatesh	July—October '66	16th Annual Conference of the International Institution of Production Engineering Research (C. I. R. P.) Paris-7th International Machine Tool Design and Research Conference, Birmingham.
Prof. B. S. Murthy and Prof. M. C. Gupta	February 27 & 28 1967	Symposium on Combustion Problems Relating to Engine and Power Systems held at I. I. T. Kharagpur.
Prof. F. W. Lohr and Dr. V. C. Venkatesh	January 1967	First All India Machine Tools Design and Research Conference at Jadavpur University, Calcutta.
Sri K. Satyanarayana and Sri T. K. Ramakrishna	June '67	Summer School at Bengal Engineering College, Howrah.
Sri R. Ramamurthy	June '67	Summer School on Numerical Analysis, College of Engineering, Guindy, Madras.

7. RESEARCH SCHOLARS :

Name	Research Topic	Date of Registration	Name of Guide
Full-time :			
Shri M. S. Francis	Tool Wear	23-9-'66	Dr. V. C. Venkatesh
Part-time :			
Shri M. C. Gupta	Combustion in Gas Turbines	25-11-'64	Dr. H. Heitland

Shri S. Padmanabhan	Friction in sintered bearings for instruments	12-7-'65	Prof. R. G. Narayanamurthi
Shri M. A. Veluswamy	Deterioration of Contact surfaces	1-1-'66	Dr. V. C. Venkatesh
Shri V. Radhakrishnan	Wear of Cutting Tools	1-1-'66	Dr. V. C. Venkatesh
Shri K. V. Gopalakrishnan	The effect of Turbulance, particularly Turbulance frequency on the process of mixing in combustion chamber models	1-7-'66	Dr. G. Stahl
Shri K. S. Padiyar	Studies on Flame Stabilization and pulsating combustion	2-7-'66	Dr. H. Heitland
Shri K. A. Bhaskaran	Combustion investigations using a shock tube	2-7-'66	Dr. Heitland
Shri V. M. Radhakrishnan	Materials Technology	14-11-'66	Dr. K. Srinivasa Raghavan
Shri S. Vaidyanathan	Spark hardening of Metals	7-3-'67	Prof. F. W. Lohr
Shri P. K. Philip	Secondary Shear Phenomena in Metal Cutting	7-3-'67	Dr. V. C. Venkatesh

8. COLLOBORATION/LIAISON WITH INDUSTRY :

Developmental work was undertaken for Messrs. Ashok Leyland Ltd. An indigenously made rubber hysterisis damper fitted on their engine to replace the imported one, was tested for its performance. Suggestions on the improvement on construction material etc. were given.

The pesticides sprayer from " Aspee Bolo " was tested for its performance. This is the first step in a programme to manufacture or select suitable components from the indigenously available sources.

Short term projects with a number of industries in Madras have been covered on topics :—

Machinability of cylinder liners and piston groves; super-finishing studies, design of indexing devices ; design of fixtures ; wear of cutting tools and grinding wheels ; plant layout ; materials handling; machine capacity studies ; statistical quality control ; Work study ; standardisation ; industrial safety.

The Design, development and ultimately the fabrication of prototype of a small milling machine.

Design, development and manufacture of narrow metallic strips for use in weather balloon transmitters. Ceramic machining, study of special Russian based designed drills ; development of spiral and eccentric cam clamps.

9. OTHER ACADEMIC ACTIVITIES :

Regular Seminars have been conducted throughout the year, staff and post-graduate students participating.

Professor Dr. Ing. Petermann, Director, Pfleiderer Institute, Braunschweig, Technischule, Berlin, visited the Department, as Visiting Professor, and gave a series of lectures on Introduction to the design aspects of axial flow turbomachines, preceded by Dr. Ing. W. Scheer who gave a series of lectures as Introduction to the lectures of Prof. Petermann.

Special Thermdoynamics Laboratory Courses were run for rhe participants of the Technical Teacher Training Institute, Madras.

Prof. Ulrich Senger, Director of the Machine Laboratory, Institute of Heat-Engines & Power Plants and Institute of Turbo-Jet Engines, T. H. Stuttgart, Germany gave a series of lectures on Modern Steam Turbines ; Gas Turbines for Power Plants and Air Crafts ; Design and Economy of high capacity power plants using gas turbine and Turbo Jet Engines.

WORKSHOPS IN THE DEPARTMENT OF MECHANICAL ENGINEERING

(i) Carpentry Shop :

I. Organisation :

	Foreman	...	...	1
	Supervisor	...	...	1
Carpenter	'A' Grade	...	...	2
,,	'B' Grade	...	...	5
,,	'C' Grade	...	...	4
Painters	'C' Grade	...	...	1
Polishers	'C' Grade	...	...	1

II. Work Orders :

Undertakan	...	60
Completed	...	54

III. Jobs undertaken and completed for the Central Workshops 80

IV. Installation of Machinery :

Given the service of Carpenters for the installatian of machinery in the following Shops.

(i) Instrument Shop, (ii) Fitting Shop, (iii) Machine Shop and (iv) Machine Tools Laboratory.

V. Training of Students :

First year class of 5 year B. Tech. Degree Course—251 students.
First year class of 3 year B. Tech. Degree Course—153 students.

(ii) Fitting Shop :

I. Organisation :

	Foreman	...	...	1
	Supervisors	...	...	2
Mechanic	'A' Grade	...	...	2
,,	'B' Grade	...	...	3
,,	'C' Grade	...	...	12

II. Work Orders :

Undertaken	...	128
Completed	...	102

III. Erection of :

(1) Dek Milling Machine

(2) Slit saw grinder

(3) Lathe

(4) Pedastal Grinder

(5) Complete reorganisation of material stores.

IV. Training of Students :

First year class of 5 year B. Tech. Degree Course—250

do 3 year do 121

iii. Machine Shop :

I. Organisation :

	Foreman	... 1	(* On Foreign Deputation)
	Supervisor	... 1	
Mechanic	'A' Grade	... 3	
	'B' Grade	... 6	
	'C' Grade	... 5	

II. Work Orders :

Undertaken	...	189
Completed	...	180
Under progress	...	9

III. Installed one P. T. C. Lathe :

IV. Students Training :

2nd year class of 5-year B. Tech. D. Course 237 Students—105 hrs.

,, 3-year B. Tech. do 108 Students— 84 hrs.

M. Sc. Physics Branch 9 Students— 40 hrs.

Technical Teacher Trainee 1 Student — 30 hrs.

Sri K. S. Venugopal, Foreman has been deputed to W. Germany for advanced training for one year.

iv. Electrical Shop :

I. Organisation :

	Foreman	1	
Mechanic	'A' Grade	3	(2 Electrician & 1 winder)
„	'B' Grade	5	(4 „ & 1 „)
„	'C' Grade	1	
	Helpers	2	

II. Work Orders :

Work Orders received	95
Work Orders completed	94
Under progress	1

III. Installation of Machinery & Equipment :

(i) Power wiring of generators & Motors etc. Turbomachinery Laboratory.

(ii) Power wiring of all machine of 50′ bay Chem. Engineering Department.

(iii) Power wiring of all Machines of 60′ bay Chemical Engineering Department.

(iv) Power wiring carried out Steam lab. (Mechanical Engineering Department.

(v) Power wiring of curtain lifting Mechanism of the Ladies Club.

(vi) Power wiring of forges and other equipments Smithy Shop.

(vii) Power wiring at Central Workshop Mechanical Engineering Department.

(viii) Power wiring at Instrument Workshops.

(ix) Power wiring at Metallurgy Department.

(x) Power wiring and control cable Applied Mechanics Department

(xi) Power wiring of Hydraulics Lab. and pump house.

(xii) Power wiring of ward Leonard set under progress.

(b) *Part-time* :

Sri M. Ramanujam	Fluid Energy grinding.	8-2-63	Dr. D. Venkateswarlu.
Sri R. Vedaraman	Vibration Milling.	11-11-63	Dr. D. Venkateswarlu and Dr. N. M. Raghavendra.
Sri K. Ramamurthy	Heat transfer Fluidised beds.	11-11-63	Dr. K. Subbaraju,
Sri B. C. Bhattacharya	Thin Film Evaporation.	16-3-66	Prof. Dr. Ing. RJH Bisanz.
Sri R. Ramakrishnan*	do	25-8-66	Prof. Dr. Ing. RJH Bisanz.
Sri R. Subramanian	Kinetics of esterification of alcohols.	25-8-66	Dr. P. B. Rao.
Sri T. K. Ramanujam*	Mixing of solids.	25-8-66	Dr. D. Venkateswarlu and Dr. G. S. Davies.
Sri R. Nagarajan	Non-Newtonian Fluids.	25-8-66	Dr. S. D. Nigam Dr. D. Venkateswarlu.
Sri A. Baradarajan	Reaction and Diffusion in solid systems.	25-8-66	Dr. M. Satyanarayana.

* Selected for deputation by IIT Madras to West Germany for advanced training.

8. COLLABORATION/LIAISON WITH INDUSTRY :

(i) Particle size distribution of quartz samples used in the manufacture of electrical insulators :

Particle size analysis by permeability and sedimentation techniques have been carried out and supplied to a firm dealing in the manufacture of electrical insulators.

(ii) Analysis of cell house liquor in caustic soda plant :

The poor performance of the electrolysis unit in a caustic soda plant needed the estimation of trace elements in the cell house liquor. These have been estimated by spectrographic, polarographic and microchemical methods.

(iii) Testing of barium chloride liquor for traces of heavy elements to American Chemical Society standards :

This work has been carried out for a chemical plant by semimicrochemieal methods.

(iv) Centrifugal washing of filter cakes for recovery of valuable material in the cake.

Centrifugal method of washing filter cakes for recovery of valuable medicinal oils in filter cakes has been recommended to a pharmaceutical company and found to be successful.

(v) Reduction of dusts leaving a fluidised solids kiln :

On the request of chemical works, two of the staff members of the Department have studied the performance of a fluidised kiln manufacturing high quality lime from limestone and suggested modification in the size reduction stage to minimise the quantity of fines leaving the kiln and compaction of fines for refeeding to the kiln.

(vi) Studies on lignite tar (undertaken at the instance of Neyveli Lignite Corporation) :

Low temperature tar is processed and ninety five compounds have been identified spectrophotometrically in the front on boiling up to 320°C.

(vii) Separation of tar acids and tar bases from middle oils and higher fraction of lignite tar distillate: (undertaken at the instance of Neyveli Lignite Corporation).

Middle oils (boiling range 160 to 190°C) and higher fraction (boiling range 190 to 220°C) are two main sources of tar acids and tar bases. The separation of different constituents of tar acids and tar bases are of immense technical importance. Investigation has been undertaken to separate these constituents making use of two processes high vacuum distillation and extraction with suitable solvent.

(viii) Recovery of paraffin wax from lignite tar : (undertaken at the instance of Neyveli Lignite Corporation).

Neyveli Lignite tar is a good source for the production of paraffin wax. A solvent extraction process is developed using benzene. as the solvent and acetone as the dewaxing solvent. The optimum conditions for maximum recovery have been determined.

(ix) Utilisation of waste tannin barks: (A problem of importance to the leather industry undertaken on the advice of the Central Leather Research Institute).

In the leather industry, the barks are the waste materials after extraction of tannin. The possibility of production of lignosulphates from waste barks has been investigated.

(x) Utilisation of Waste lime : (A problem of importance to the leather industry undertaken on the advice of the Central Leather Research Institute).

The possibility of utilising waste lime from tanneries for reuse after necessary treatment, extraction of proteins, manufacture of refractories and production of calcium bisulphate has been investigated.

(xi) Spray drying of syntans : (A problem of importance to the leather industry undertaken on the advice of the Central Leather Research Institute).

Optimum conditions for the spray drying of Syntans have been worked out in the experimental spray dryer unit. The spray dried syntan can be easily handled, stored and transported.

(xii) Performance of planetary mill of a ceramic factory :

On the request of a ceramic factory, two of the staff members of the Department studied the performance of a planetary ball mill supplied by a foreign firm for grinding zircon sand and indicated certain steps to be taken before running the plant to optimum capacity.

(xiii) Increasing the rate of solar evaporation : (undertaken on the request of the salt industry).

The problem of increasing the rate of solar evaporation is carried out using different concentrations and types of dyes.

(xiv) Concentration of Neera : (Undertaken at the request of Rural Development Department of the Government of Madras).

Investigation of the methods of concentration of Neera from 15% to 60% solids is in progress.

9. OTHER ACADEMIC ACTIVITIES :

(i) Published the first volume of the Journal of the Chemical Engineering Society.

(ii) Organised a number of lectures by distinguished Chemical Engineers from outside under the auspices of the Chemical Engineering Society and Chemical Engineering Seminar.

(iii) Assisted the Institute of Chemical Technology, Adyar, Madras by deputing the staff members of the Department to deliver lectures in that Institute.

DEPARTMENT OF CIVIL ENGINEERING

1. ACADEMIC STAFF :

Professor : (a) German	1
(b) Indian	1
Assistant Professors	4
Lecturers	16
Associate Lectures	6
Senior Scientific Assistants (German) ...	2
Senior Technical Assistants	5
Junior Technical Assistants	3

2. TEACHING FACILITIES :

Course	*Branch*	*Class*	*Subjects taught*
5 year B. Tech. Degree	Civil Engineering	II-year	Engineering Materials. Civil Engineering Drawing.
do	do	III-year	Civil Engineering Drawing, Fluid Mechanics Estimating Structural Engineering I Engineering Geology Surveying Geology & mineralogy.
do	do	IV-year	Hydraulics & Hydraulic Machines Surveying II & Geodesy, Estimating & Specifications Strength of Materials & Theory of Structures I Structural Engineering II Irrigation Engineering I Soil Mechanics & Foundation Engineering Transportation Engineering Electives including Project work.

2. TEACHING FACILITIES—(*Contd*)

Course	*Branch*	*Class*	*Subjects taught*
5-year B. Tech.	Civil Engineering	V-year	Architecture & Town Planning Public Health Engineering Strength of Materials & Theory of Structures II Structural Engineering II Irrigation Engineering II Electives incl. Project work.
3-year B. Tech. Degree	Civil Engineering	I-Term	Materials of Construction
do	do	III-Term	Hydraulics I Surveying I Civil Engg. Drawing I Geology Building Construction I
do	do	IV-Term	Theory of Structures Theoretical Soil Mechanics, Civil Engineering Drawing II Surveying II Building Construction & Estimation II Hydraulic Engineering II
do	do	V-Term	Theory and Design of Structures Applied Soil Mechanics Transportation Engineering, Irrigation & water Power Engineering Estimating, Public Health Engineering I

3-year B. Tech. Degree	Civil Engineering	VI-Term	Architecture Theory of Structures Design of Structures Irrigation & Water Power Engineering Public Health Engineering II
M. Tech. Degree	Civil Engineering	I-Term	Advanced Structural Engineering
do	do	do	Advanced Soil Mechanics Design of Prestressed Concrete Structures Selected Topics Literature Survey/ Research Advanced Fluid Mechanics Advanced Hydraulics Hydrology & Flood Control Hydraulic Structures
do	do	II-Term	Advanced Structural Engineering Advanced Soil Mechanics Theory of Ptates & shells Selected Topics Literature Survey/ Research Advanced Fluid Mechanics Advanced Hydraulics Hydrology & Flood Control Hydrulic Structures Applied Soil Mechanics

M. Tech. Degree	Civil Engineering	III-Term	Advanced Structural Engineering Structural Engineering Laboratory Theory of Plates & Shells Design of Metal Structures Selected Topics Literature Survey/ Research Hydraulic Laboratory Advanced Hydrulics Hydraulic Structures Advanced Soil Mechanics Soil Mechanics Laboratory Applied Soil Mecеanics Foundation Engineeridg
do	do	IV-Term	Project

3. LABORATORIES/WORKSHOP FACILITIES :

The following eight laboratories are equipped for instruction and research :

1. Structures
2. Hydraulics
3. Soil Mechanics
4. Concrete Materials
5. Geology
6. Highways
7. Public Health Engineering
8. Surveying.

Facilities for post-graduate work leading to the Master's and the Doctorate Degrees are currently available in the following three Branches :

Structural Engineering
Hydraulic Engineering
Soil Mechanics and Foundation Engineering

The recently signed Indo-German agreement provides for the strengthening of the Structures and Hydraulic Engineering Laboratories.

Limited workshops facilities are available in the Department, basides the major facilities available in the General Workshops of the Institute.

4. EDUCATIONAL TOURS :

Educational visits were arranged to the following places :

(*a*) Irrigation Research Station, Poondi.

(*b*) Red Hills Lake and Intake Tower.

(*c*) Kilpauk Water Works.

(*d*) Construction site for U. S. Consulate General, Madras.

(*e*) Madras Harbour

(*f*) Signalling Systems in Madras Central Railway Station.

(*g*) Meteorological Laboratory.

(*h*) Multi-storeyed Tower Block, Mandanam.

5. MAJOR EQUIPMENT PROCURED DURING THE YEAR :

Carl Zeiss—Jena Polariscope

6. DEPUTATION TO SEMINARS :

Name of Staff member	Period of deputation	Seminar/Conference
Dr. D. J. Victor and Dr. P. S. Rao Asst. Professors	25-11-'66 to 26-11-'66	Symposium on Ultimate Load Design of Reinforced Concrete Structures, P. S. G. College of Technology. Coimbatory.
Sri M. H. Abdul Khader	28-12-'66 to 31-12-'66	11th Congress on Theoretical and Applied Mechanics (ISTM) at the Coimbatore Institute of Technology, Coimbatore.

Dr. Gerhard Rouve Professor	18-1-'67 to 21-1-'67	6th Symposium of Civil & Hydraulic Engineering on 'High Velocity Flow' at the Indian Institute of Science, Bangalore.
Dr. V. Sethuraman Assistant Professor	do	do
Sri. B. T. Chenchaiah & Sri M. Ragunathan Teacher Trainces	do	do
Sri C. Ganapathy Chettiar	16-3-'57 to 25-3-'67	Intensive Course on Computer Methods in Structural Engineering I. I. T. Kanpur
Sri C. S. Krishnamurthy Lecturers	do	do
Sri T. R. Ramanna Teacher Trainee	Feb-March 1967	Symposium on "Rock Mechanics" Regional Engineering College Warrangal.
Sri V. Kannan Senior Technical Assistant	20-4-'67 to 3-5-'67	Lectures on "Concrete & Steel Structures, Regional Engg. College Warrangal.
Sri M. S. Subramaniam Lecturer	22-5-'67 to 16-6-'67	Advanced Summer School in Soil Mechanics & Fundation Engg. I. I. T. Delhi.
Sri K. Muthukrishnaiah Associate Lecturer	do	do

7. RESEARCH SCHOLARS :

Name	*Research Topic*	*Date of Registration*	*Guide*
(a) *Full-Time* :			
1. Sri N. Sukesan Nair	Structural Engineering	4- 1-1964	Dr. P. C Varghese

(b) *Part-Time* :

1.	Sri K. S. Sankaran	Soil Mechanics	21-11-1964	Dr. P. C. Varghese
2.	Sri R. Radhakrishnan	Structural Engineering	3- 6-1965	„ „
3.	Sri P. K. Ninam	Soil Mechanics	11- 2-1966	„ „
4.	Sri T. P. Ganesan	Structural Engineering	11- 2-1966	„ „
5.	Sri M. A. Abdul Khader	Fluid Mechanics	11- 2-1966	Dr. G. Rouve

8. COLLABORATION/LIAISON WITH INDUSTRY :

Tests have been conducted in the Department in the following problems, which have been faced by the construction industry in Madras.

(*a*) Effect of cold twisting reinforcing bars and effect of welding on cold twisted bars.

(*b*) Development of low cost floor systems using bricks and R. C. joists.

9. OTHER ACADEMIC ACTIVITIES :

(*a*) Dr. D. J. Victor, Assistant Professor, who rejoined the Institute in August 1966, after higher studies in the U. S. A., conducted a short course in Computer Programming for the benefit of the Faculty members of the Department.

(*b*) In an effort to train students in giving technical talks, the Civil Engineering Association of the Department encouraged students to present technical papers. Prizes, kindly donated by Messrs. Engineering Construction Corporation, Madras, and Messrs. Gannon Dunkerley Co., Ltd., Madras were awarded to the best speakers.

DEPARTMENT OF ELECTRICAL ENGINEERING

1. ACADEMIC STAFF :

Professor :—

(a) German	...	...	...	1
(b) Indian	...	...	...	1
Associate Professors	...	...	...	3
Assistant Professors	...	...	...	6
Lecturers	...	...	...	15
Associate Lecturers	...	...	...	6
Senior Technical Assistants	...	...	...	9
Junior Technical Assistants	...	...	...	8

2. TEACHING FACILITIES :

The Department offers Instruction in Electrical Engineering subjects to :—

(i) 5-year B. Tech. Degree Course.

(ii) 3-year B. Tech. Degree Course.

(iii) 2-year M. Teeh. Degree Course.

Course	*Branch*	*Class*	*Subjects Taught*
5-year B. Tech. Degree	Electrical Engineering	III-year	Electrical & Magnetic Circuits Electrical Measurements.
do	Mechanical Engineering	do	Electrical Technology
do	Aeronautical Engineering	do	Electrical Technology.
do	Chemical Engineering	do	Electrical Technology.
do	Metallurgy	do	Electrical Technology.
do	Civil Engineering	do	General Electrical and Mechanical Engineering.

5-year B. Tech. Degree	Electrical Engineering (HC & LC)	IV-year	Electronics I
do	do	do	Electrical and Electronic Measurements
do	HC	do	Electrical Machines-I (DC).
do	do	do	Electrical Machines-II (AC).
do	do	do	Electrical Transmission and Distribution.
do	LC	do	Line Communication-I
do	do	do	Radio Communication-I
do	do	do	U. H. F. Techniques-I
do	Mechanical Engineering	do	Electrical Technology. Electronic Engineering.
do	Electrical Engineering (HC & LC)	V-year	Automatic Control and Regulation.
do	HC	do	Electrical Machinery-III
do	do		Switchgear and Protective Devices
do	do	do	Electronics-II
do	LC	do	Line Communication-II
do	do	do	Radio Communication-II
do	do	do	Electro-Acoustics
do	do	do	U. H. F. Techniques-II
do	do	do	Electronics-III
do	do	do	Semiconductor Technology
do	Mechanical Engineering	do	Automatic Regulation and Control

3-year B. Tech Degree	Electrical Engineering	II-Term	Basic Electronics
do	Mechanical Engineering	do	Electrical Engineering
do	Chemical Engineering	do	do
do	Civil Engineering	do	do
do	Mechanical Enginering	III-Term	Electrical Technology-I
do	do	do	Electronic Engineering-I
do	Electrical Engineering (HC & LC)	do	Electrical & Magnetic Circuits-I
do	do	do	Electrical Measurements-I
do	do	do	Electrical Machines-I
do	do	do	Electronics-I
do	Mechanical Engineering	IV-Term do	Electrical Technology-II Electronic Engineering-II
do	Electrical Engineering (HC & LC)	do	Electrical and Magnetic Circuits II
do	do	do	Electrical Measure-ments-II
do	do	do	Electrical Machines-II
do	do	do	Transmission and Distri-bution
do	do	do	Elements of Communi-cation Engineering
do	do	do	Electronics-II
do	LC	do	Network Lines
do	do	do	Magnetic Fields

3-year B. Tech. Degree	Electrical Engineering HC	V-Term	Applied Electronics
do	do	do	Electrical Machines
do	do	do	Transmission and Distribution
do	LC	do	Electro Acoustics
do	do	do	Transistor Electronics
do	do	do	Electronics III
do	do	do	U. H. F. Techniques
do	Mechanical Engineering	VI-Term	Automatic Control
do	Electrical Engineering (HC & LC)	do	Control Engineering
do	HC	do	Switchgear and Protective Devices
do	do	do	Electrical Machines
do	do	do	Transmission and Distribution
do	LC	do	Communication Systems
do	do	do	Electronics IV
do	do	do	U. H. F. Techniques
M. Sc. Degree	Chemistry	II-Term	Basic Electronics
M. Tech. Degree	Chemical Engineering	I & II-Term	Applied Electronics
do	Mechanical Engineering	II & III Term	Automatic Control Systems
do	do	I & II-Term	Transients in Linear Systems
do	do	do	Electromagnetic Theory

M.Tech. Degree	Mechanical Engineering	I & II-Term	Electronic Instrumentation and Computation Techniques
do	Electrical Engineering	III & IV Term	Network Synthesis
do	do	do	Pulse Techniques
do	do	do	Communication Systems
do	do	do	Transistor Electronics
do	do	do	Power System Analysis
do	do	do	Power System Stability
do	do	do	High Voltage Engineering
do	do	do	Energy Conversion
do	do	do	Non-linear on Controls
do	do	do	Servo System Components
do	do	do	Modern Control Theory
do	do	do	Servo System Components
do	do	do	Special Topics I in measurements
do	do	do	Special Topics II in measurements

3. LABORATORIES/WORKSHOP FACILITIES :

(a) Undergraduate students are offered facilities of laboratory work mainly in the Electrical Machines Laboratory, Electrical Measurements Laboratory and Electronics and Transistor Laboratory. They also do a few experiments each in the Control Engineering Laboratory, Analog Computer Laboratory and High Voltage laboratory.

(b) Post-graduate (M· Tech.) students are offered laboratory training in the Control Engineering Laboratory, Analog and Special-purpose Computation Laboratories, Electronic Measurements and Digital Techniques laboratories, Electronic and Transistor Circuits Laboratories, Microwaves Laboratory and the High Voltage and Relay Laboratories, depending upon their areas of specialisation.

(c) Facilities for research work of Ph. D. scholars are available in all the above laboratories.

(d) Calibration laboratories for precision measurements, analog computers and recording facilities, a card punch and verifier for preparing programs digital compution, and a well equipped departmental workshops are the additional facilities available.

A full-fledged digital computer has also been suggested for acquisition and may become available in the near future.

4. EDUCATIONAL TOURS :

Local visits—Messrs. W. S. Insulators, Porur, were visited by the students in Electrical Engineering Branch (H. C) of the Fourth year class of the 5-year B. Tech. Degree course. Basin Bridge Power Station was visited by the students in Electrical Engineering Branch (H. C.) of the 3rd year class of the 3-year B. Tech. Degree Course, and Auto Exchange in Telephone House, and Mambalam Cross-bar Exchange were visited by the students in Electrical Engineering Branch (L.C.) in the final year class of the 5-year B. Tech. Degree Course.

5. MAJOR EQUIPMENT PROCURED.:

The Relay Demonstration Panel received earlier has been commissioned. A D. C. Network Analyzer Unit has been received and is being installed in the Power Systems Laboratory.

6. DEPUTATION TO SEMINARS, ETC. :

Dr. D. K. Banerjee	...	Represented the Department at the Seminar on Defence Electronics organised by the Defence Research and Development Organisation at Hyderabad—7th to 9th August, 1967.
Dr. G. N. Garud	...	Presented a paper at the Tenth Technical Convention of the Institute of Telecommunication Engineers, held in New Delhi-10th to 11th December, 1966.

Dr. V. Seshadri	i.	Presented three papers at 10th Technical Convention of I.T.E. held in New Delhi—10th and 11th December 1966.
	ii.	Delivered five lectures on invitation at the APTI Summer School on Control Systems held at CEERI, Pilani-24th to 26th May, 1967.
	iii.	Contributed two papers to the above Summer School on Control Systems at the end of the seminar—June 1967.
Sri V. Subramaniam		Attended the APTI Summer School on Advanced Numercial Analysis held at Engineering College, Guindy, Madras-3 weeks, May-June, 1967.
Sri A. Chandrasekharan ...		Attended Refresher Course on 'Computer Methods on Power System Engineering' held at I. I. T., Kanpur-3 weeks December 1966 January 1967.
Sri G. Sambasiva Rao ...		do

7. RESEARCH SCHOLARS :

S. No.	*Name*	*Designation*	*Topic*	*Date of Registration*	*Guide*
	(a) *Full Time* :				
(i)	Sri S. Pasupathy	Research Scholar	Negative Resistance Devices.	9-11-'65	Dr. M. K. Achuthan
(ii)	Sri K. S. Metha	do	State Relays	26-10-'66	Dr. H. W. Meyer.

(b) *Part-time* :

1.	Sri B. Rama-swamy	Lecturer	Transformer anologue computers for use in Servo Mecha-nisms.	1-9-'63	Dr. P. Ven. kata Rao-
2.	Sri V. Seshadri	do	Control systems	1-1-'65	Dr. V. G. K. Murti.
3.	Sri P. Sankaran	do	Measure-ments & Networks	27-8-'66	Dr. V. G. K. Murti
4.	Sri S. S. Yegna-narayanan	do	Autodyne	26-11-'63	Dr. M. Venugopal
5.	Sri A. Chandra-sekharan	do	Distance Relays	18-2-'67	do
6.	Sri Vedam Subramaniam	do	Axial forces in Induction Motors	19-5-'67	Dr. H. W. Meyer.
7.	Sri K. Thulasi-raman	do	n-port Synthesis	4-11-'65	Dr. V. G. K. Murti.
8.	Sri B. S. Bhanu-murthi	do	Transisto-rized Operational Amplifiers	18-2-67	Prof. S. Sampath.

8. LIAISON WITH INDUSTRY :

The Department has carried out consultative and testing work for a number of industrial organisations in and around Madras. The following are some of the Organisations to whom these services were extended :

1. Heavy Vehicles Factory, Avadi (Garrison Engineer, Madras).
2. Reyrolle Agency, Madras.
3. Gam Co., and Madras-7.
4. Easwaran and Sons Private Ltd., Madras.
5. Southern Switchgear, Madras.

The following industrial organisations have expressed a desire to make use of the facilities of this Department in some of their development projects and the collaboration programmes are being worked out.

1. Hindustan Teleprinters, Madras.
2. English Electric Co., Madras.
3. Systems Engineering Co., Madras.
4. Toshniwal Instruments, Madras.
5. W. S. Insulators of India, Madras.

The Department also received preliminary enquiries for certain items of testing and calibration work from the following organisations.

1. Simco Meters, Thiruchirapalli.
2. State Electricity Board, Madras.
3. Carborundum Universal, Madras.
4. Indian Electrical Manufacturers Association, Bombay.
5. Defence Electronics Research Laboratories.

9. Other Academic Activities :

The post-graduate instructional programme has been continuously augmented by the compulsory participation of the students in the Post-graduate Seminars wherein each post-graduate student is required to give an exposition on an advanced topic normally not included in the regular curriculum. Senior undergraduate students are also required to work for three weeks intensively on a literature survey design and construction/experimentation project so as to gain experience with the problems and methods of self-study and investigation that would involve them professionally after graduation.

The Department also participates in the training programme of Technical Teacher Trainess who, after a three-year training period under the direct supervision of senior staff members will go out to take up positions as Lecturers in Technical Institutions in the country. Ten such trainess are with us at present, of which five will be completing their teacher-training-cum-M. Tech. Degree Programme at the end of the year 1967-68, and 5 at the end of 1968-69.

DEPARTMENT OF MECHANICAL ENGINEERING

1. ACADEMIC STAFF :

Professors : (a) German	...	...	...	5
(b) Indian	...	...	...	2
Assistant Professors	...	...	...	3
Lecturers	...	...	...	20
Associate Lecturers	...	...	...	10
Senior Technical Assistants	...	...	...	13

2. TEACHING FACILITIES :

Course	*Class*	*Branch*	*Subjects Taught*
5-year B. Tech Degree	I-year	All Branches	Drawing-I
do	do	do	Workshop-I
do	II-year	All Branches	Drawing-II
do	do	do	Workshop-II
do	III-year	Civil	General Mech. Engineering
do	do	Mechanical, Chemical and Aeronautical Engineering & Metallurgy	Applied Thermodynamics
do	do	Mechanical Engineering	Design of Machine Elements
do	do	do	Metrology
do	do	Mechanical & Chemical Engineering	Engineering Laboratory
do	do	Electrical & Chemical Engineering and Metallurgy	Design of Machine Elements

5-year B. Tech Degree	IV-year	Mechanical Engineering	Heat Engines (Steam & ICE)
do	do	do	Workshop Technology and Practice
do	do	do	Turbomachinery
do	do	do	Machine Design
do	do	Electrical & Chemical Engineering	Turbomachinery
do	do	do	Heat Engines
do	do	Mechanical Engineering	Mechanical Engineering Laboratory
do	IV-year	Aeronautical Engineering	Aircraft Power Plants
do	V-year	Mechanical Engineering	Heat Transfer, Refrigeration & Air-conditioning.
do	do	do	Project-Design/ICE/ Turbomachines/Steam/ Thermodynamics
do	do	do	Electives : (a) Design/ICE/Turbo-machines/Steam/ Thermodynamics. (b) Production Engineering (c) Instrumentation
do	do	Chemical Engineering	Production Technology
do	do	Electrical Engineering HC	Thermal & Hydro-Electric Power Plants (Thermal Part)
3-year B. Tech. Degree	I-Term	All Branches	Drawing-I
do	II-Term	Civil, Mechanical & Chemical Engineering	Thermodynamics
do	do	All Branches	Drawing-II

3-year B. Tech. Degree	III-Term	Civil Mechanical, Electrical & Chemical Engineering	Applied Thermo-dynamics
do	do	Mechanical Engineering	Design of Machine Elements-I
do	do	Electrical & Chemical Engineering & Metallurgy	Design of Machine Elements-I
do	IV-Term	Mechanical Engineering	Machine Design
do	do	do	Heat Engines-I (ICE & Steam)
do	do	do	Turbomachines-I
do	do	do	Thermal Engineering Laboratory-I
do	do	Electrical Engineering (HC) & Chemical Engineering	Turbomachines & Heat Engines
do	V-Term	Mechanical & Electrical Engineering (HC)	Power Plant Engineering (Thermal)
do	do	Mechanical Engineering	Heat Engines-II (ICE)
do	do	do	Turbomachines-II
do	do	do	Heat Transfer
do	do	do	Workshop Technology & Metrology-I
do	do	do	Design

Course	*Class*	*Branch*	*Subject taught*
3-year B. Tech Degree	V-Term	Mechanical Engineering	Thermal Engineering Laboratory-II
do	do	Chemical Engineering	Production Technology-I
do	VI-Term	Mechanical Engineering	Refrigeration and Air-conditioning
do	do	do	Thermal Engineering Laboratory-III
do	do	do	Workshop Technology and Metrology-II
do	do	do	Electives :
do	do	do	(a) Design/ICE/Turbo-machines / Steam/ Thermodynamics Laboratories
do	do	do	(b) Production Engineering
do	do	Chemical Engineering	Production Technology-II
M. Sc. Degree	Physics		Drawing Workshops
M. Tech. Degree	I-Term	Machine Design	(a) Production Process and Machine Tool Design-I
do	do	do	(b) Machine Design-I
do	II-Term	do	(a) Production Process and Machine Tool Design-II
do	do	do	(b) Automatic Controls-I
do	do	do	(c) Machine Design-II

M. Tech. degree	III-Term	do	(a) Automatic Controls-II
do	do	do	(b) Machine Design-III
do	do	do	(c) Design Project
do	IV-Term	do	Thesis Project Work
do	I-Term	Machine Tools	(a) Machine Tool Tecnology & Metrology-I
do	do	do	(b) Machine Tool Design-I
do	II-Term	do	(a) Machine Tool Tecnology & Metrology-II
do	do	do	(b) Automatic Controls-I
do	do	do	(c) Machine Tool Design-II
do	do	do	(d) Metal Cutting
do	III-Term	Machine Tools	(a) Automatic Controls-II
do	do	do	(b) Machine Tool Design-III
do	do	do	(c) Tool Design
do	do	do	(d) Project Work
do	IV-Term	do	Project Work
P. G. Diploma	do	Industrial Engineering	Orientation Course
do	I-Term	do	Production Methods & Operations Planning

3. LABORATORIES/WORKSHOP FACILITIES :

(a) Undergraduate	I. C. Engines
do	Steam Power
do	Thermodynamics & Combustion
do	Turbomachines/Hydraulic Machines
do	Machine/Tools/Production Engineering
do	Metrology
(b) Postgraduate Degree (c) Research (Ph. D.)	I. C. Engines Steam Power Thermodynamics & Combustion
do	Turbomachines/Hydraulic Machines
do	Machine Tools/Production Engineering
do	Metrology
do	Instrumentation
do	Machine Elements
do	Workshops

4. EDUCATIONAL TOURS :

During the year 1966-67, an educational tour to Bangalore, and Industrial visits to Neyveli Lignite Corporation and Basin Bridge Thermal Power Station were arranged.

5. MAJOR EQUIPMENT PROCURED DURING THE YEAR UNDER REPORT:

Intex automatic lathe ; Drill and Lathe Dynamometers.

Micromanipulator ; Slipring Instrumentation ;
Swinging field dynamometer with all controls.

Sieman's Oscilloscope ; Climate Cabinet ; Thermocouple welding set ; Flow meters ; Stroboscope.

Electro Flow-meter with indicator and integrator ;

Temperature Controllers ; Audio Frequency Generator ; Impedance Bridge.

6. DEPUTATION TO SEMINARS ETC. :

Staff Member.	Period of deputation	Seminar/Conference/Conventions/Summer Schools.
Dr. V. C. Venkatesh	July—October '66	16th Annual Conference of the International Institution of Production Engineering Research (C. I. R. P.) Paris-7th International Machine Tool Design and Research Conference, Birmingham.
Prof. B. S. Murthy and Prof. M. C. Gupta	February 27 & 28 1967	Symposium on Combustion Problems Relating to Engine and Power Systems held at I. I. T. Kharagpur.
Prof. F. W. Lohr and Dr. V. C. Venkatesh	January 1967	First All India Machine Tools Design and Research Conference at Jadavpur University, Calcutta.
Sri K. Satyanarayana and Sri T. K. Ramakrishna	June '67	Summer School at Bengal Engineering College, Howrah.
Sri R. Ramamurthy	June '67	Summer School on Numerical Analysis, College of Engineering, Guindy, Madras.

7. RESEARCH SCHOLARS :

Name	Research Topic	Date of Registration	Name of Guide
Full-time :			
Shri M. S. Francis	Tool Wear	23-9-'66	Dr. V. C. Venkatesh
Part-time :			
Shri M. C. Gupta	Combustion in Gas Turbines	25-11-'64	Dr. H. Heitland

Shri S. Padmanabhan	Friction in sintered bearings for instruments	12-7-'65	Prof. R. G. Narayanamurthi
Shri M. A. Veluswamy	Deterioration of Contact surfaces	1-1-'66	Dr. V. C. Venkatesh
Shri V. Radhakrishnan	Wear of Cutting Tools	1-1-'66	Dr. V. C. Venkatesh
Shri K. V. Gopalakrishnan	The effect of Turbulance, particularly Turbulance frequency on the process of mixing in combustion chamber models	1-7-'66	Dr. G. Stahl
Shri K. S. Padiyar	Studies on Flame Stabilization and pulsating combustion	2-7-'66	Dr. H. Heitland
Shri K. A. Bhaskaran	Combustion investigations using a shock tube	2-7-'66	Dr. Heitland
Shri V. M. Radhakrishnan	Materials Technology	14-11-'66	Dr. K. Srinivasa Raghavan
Shri S. Vaidyanathan	Spark hardening of Metals	7-3-'67	Prof. F. W. Lohr
Shri P. K. Philip	Secondary Shear Phenomena in Metal Cuting	7-3-'67	Dr. V. C. Venkatesh

8. COLLOBORATION/LIAISON WITH INDUSTRY :

Developmental work was undertaken for Messrs. Ashok Leyland Ltd. An indigenously made rubber hysterisis damper fitted on their engine to replace the imported one, was tested for its performance. Suggestions on the improvement on construction material etc. were given.

The pesticides sprayer from " Aspee Bolo " was tested for its performance. This is the first step in a programme to manufacture or select suitable components from the indigenously available sources.

Short term projects with a number of industries in Madras have been covered on topics :—

Machinability of cylinder liners and piston groves; super-finishing studies, design of indexing devices ; design of fixtures ; wear of cutting tools and grinding wheels ; plant layout ; materials handling ; machine capacity studies ; statistical quality control ; Work study ; standardisation ; industrial safety.

The Design, development and ultimately the fabrication of prototype of a small milling machine.

Design, development and manufacture of narrow metallic strips for use in weather balloon transmitters. Ceramic machining, study of special Russian based designed drills ; development of spiral and eccentric cam clamps.

9. OTHER ACADEMIC ACTIVITIES :

Regular Seminars have been conducted throughout the year, staff and post-graduate students participating.

Professor Dr. Ing. Petermann, Director, Pfleiderer Institute, Braunschweig, Technischule, Berlin, visited the Department, as Visiting Professor, and gave a series of lectures on Introduction to the design aspects of axial flow turbomachines, preceded by Dr. Ing. W. Scheer who gave a series of lectures as Introduction to the lectures of Prof. Petermann.

Special Thermdoynamics Laboratory Courses were run for rhe participants of the Technical Teacher Training Institute, Madras.

Prof. Ulrich Senger, Director of the Machine Laboratory, Institute of Heat-Engines & Power Plants and Institute of Turbo-Jet Engines, T. H. Stuttgart, Germany gave a series of lectures on Modern Steam Turbines ; Gas Turbines for Power Plants and Air Crafts ; Design and Economy of high capacity power plants using gas turbine and Turbo Jet Engines.

WORKSHOPS IN THE DEPARTMENT OF MECHANICAL ENGINEERING

(i) Carpentry Shop :

I. Organisation :

	Foreman	...	...	1
	Supervisor	...	...	1
Carpenter	'A' Grade	...	...	2
,,	'B' Grade	...	...	5
,,	'C' Grade	...	...	4
Painters	'C' Grade	...	...	1
Polishers	'C' Grade	...	...	1

II. Work Orders :

Undertakan	...	60
Completed	...	54

III. Jobs undertaken and completed for the Central Workshops 80

IV. Installation of Machinery :

Given the service of Carpenters for the installatian of machinery in the following Shops.

(i) Instrument Shop, (ii) Fitting Shop, (iii) Machine Shop and (iv) Machine Tools Laboratory.

V. Training of Students :
First year class of 5 year B. Tech. Degree Course—251 students.
First year class of 3 year B. Tech. Degree Course—153 students.

(ii) Fitting Shop :

I. Organisation :

	Foreman	...	...	1
	Supervisors	...	...	2
Mechanic	'A' Grade	...	...	2
,,	'B' Grade	...	...	3
,,	'C' Grade	...	...	12

II. Work Orders :

Undertaken	...	128
Completed	...	102

III. Erection of :

(1) Dek Milling Machine

(2) Slit saw grinder

(3) Lathe

(4) Pedastal Grinder

(5) Complete reorganisation of material stores.

IV. Training of Students :

First year class of 5 year B. Tech. Degree Course—250

do 3 year do 121

iii. Machine Shop :

I. Organisation :

	Foreman	... 1	(* On Foreign Deputation)
	Supervisor	... 1	
Mechanic	'A' Grade	... 3	
	'B' Grade	... 6	
	'C' Grade	... 5	

II. Work Orders :

Undertaken	...	189
Completed	...	180
Under progress	...	9

III. Installed one P. T. C. Lathe :

IV. Students Training :

2nd year class of 5-year B. Tech. D. Course		237 Students—	105 hrs.
,,	3-year B. Tech. do	108 Students—	84 hrs.
	M. Sc. Physics Branch	9 Students—	40 hrs.
	Technical Teacher Trainee	1 Student —	30 hrs.

Sri K. S. Venugopal, Foreman has been deputed to W. Germany for advanced training for one year.

iv. Electrical Shop :

I. Organisation :

	Foreman	1	
Mechanic	'A' Grade	3	(2 Electrician & 1 winder)
,,	'B' Grade	5	(4 ,, & 1 ,,)
,,	'C' Grade	1	
	Helpers	2	

II. Work Orders :

Work Orders received	95
Work Orders completed	94
Under progress	1

III. Installation of Machinery & Equipment :

(i) Power wiring of generators & Motors etc. Turbomachinery Laboratory.

(ii) Power wiring of all machine of 50' bay Chem. Engineering Department.

(iii) Power wiring of all Machines of 60' bay Chemical Engineering Department.

(iv) Power wiring carried out Steam lab. (Mechanical Engineering Department.

(v) Power wiring of curtain lifting Mechanism of the Ladies Club.

(vi) Power wiring of forges and other equipments Smithy Shop.

(vii) Power wiring at Central Workshop Mechanical Engineering Department.

(viii) Power wiring at Instrument Workshops.

(ix) Power wiring at Metallurgy Department.

(x) Power wiring and control cable Applied Mechanics Department

(xi) Power wiring of Hydraulics Lab. and pump house.

(xii) Power wiring of ward Leonard set under progress.

IV. Training of Students :

First and Second year of the 3 year B. Tech. Degree, and Second year of 5 year B. Tech. Degree and M. Sc. Degree Courses.

v. Welding Shop :

I. Organisation :

	Foreman	...	1
Mechanic	'A' Grade	...	3
,,	'C' Grade	...	1

II. Work Orders :

Undertaken	...	194
Completed	...	193

III. Installation of Machinery :

One Seam Welding and one Welding Machine.

IV. Training of Students :

First year class of 5-year and 3-year B. Tech. Degree Courses and Fourth year class of 5-year B. Tech. Degree Course Metallurgy Students.

V. Special work :

Undertaken the fabrication of Trusses for the Auto Shop.

vi. Foundry :

I. Organisation :

	Foreman	...	1
Mechanic	'A' Grade	...	5
	'B' Grade	...	1
	'C' Grade	...	2
	Helper	...	1

II. Work Orders :

Undertaken	...	56
Completed	...	47

III. Installation of Machinery :

Installed the Moulding Machine and Shot Blasting Machine.

IV. Training :

Second year classes of the 5-year and 3-year B. Tech. Degree Courses.

vii. Smithy Shop :

I. Organisation :

	Foreman	...	...	1
Mechanic	'A' Grade	...	...	1
,,	'C' Grade	...	...	3
Helper	do	...	...	1

II. Work Orders :

Undertaken	...	27
Completed	...	26
Under progress	...	1

III. Fabrication and installation of the entire duct work in the Smithy. Installation of the Twin burner oil fired Furnace.

IV. Training of the students, of the 1st year classes for 5 year and 3 year B. Tech. Degree Courses and also processing of the various Work orders from different departments.

viii. Instrument Shop :

Organisation :

	Foreman	...	...	1
	Supervisor	...	...	Nil.
Mechanic	'A' Grade	...	...	1
,,	'C' Grade	...	...	3

Work Orders :

Undertaken	...	30
Completed	...	28
Under progress	...	2

Installation of Machinery :

1. Leinen Precision Lathe
2. Tool makers Lathe
3. Twist Grinding machine
4. Shaping machine (Cooper)
5. Pedestal Grinder
6. Test pump (Manual)
7. Electrical Muffle furnace
8. Vacuum meter testing pump
9. Pressure gauge testing machine
10. Rectifier unit
11. Voltage stabiliser
12. Gas ballast pump
13. Universal Litho engraving machine
14. Universal calibrating and testing unit for temperature, of upto 600 deg. cent.
15. Single tip cutter grinder
16. Testing apparatus for pressure gauges.

Students Project training : No. of students : 10.

ix Workshop Stores/Office :

Organisation :

U. D. C.	...	...	1
L. D. C.	...	...	1
Storekeepers	...	...	2
Store Attenders	...	...	2
Peon	...	...	1

x. Automobile Shop :

Organisation :

	W/S Supervisor	..	1	
Mechanic	B Grade	...	1	
,,	C Grade	...	2	(1 Truck driver + 1 Mech.)
	Lab. Attdt	...	1	
	Helpers	...	3	

Maintenance & Repairs, painting etc. to Institute vehicles.

xi. Pattern Shop :

Organisation :

	Supervisor	...	1
Mechanic	'A' Grade	...	1
,,	'B' Grade	...	1
,,	'C' Grade	...	2

Work Orders :

Undertaken	...	32
Completed	...	25
Under progress	...	7

Works completed for Central workshops-10.

DEPARTMENT OF METALLURGY

1. ACADEMIC STAFF :

Professors :		
(a) German	...	1
(b) Indian	...	1
Assistant Professors :	...	2
Lecturers :	...	5
Associate Lecturers :	...	3
Senior Tech. Assistants :	...	3
Junior Tech. Assistants :	...	2

2. TEACHING FACILITIES :

Course	*Branch*	*Class*	*Subjects taught*
5-year B. Tech. Degree	All Branches	II-year	Engineering Materials (Metals)
do	Metallurgy	III-year	Metallurgical Analysis
do	Mechanical, Electrical, Chemical and Aeronautical Engineeting	III-year	Engineering Metallurgy
do	Metallurgy	IV-year	Refractories, Furnace Technology and Pyrometry
do	do	do	Electrometallurgy and Corrosion
do	do	do	Metallurgical Thermodynamics
do	do	do	Ferrous Production Metallurgy
do	do	do	Physical Metallurgy-I
do	do	do	Non-ferrous Extraction Metallurgy-I
do	do	do	Mechanical Metallurgy-I
do	do	do	Joining of Metals
do	do	V-year	Foundry Technology
do	do	do	Powder Metallurgy
do	do	do	Metallurgical Plant Design
do	do	do	Advanced Metallurgical Techniques
do	do	do	Ferrous Production Metallurgy
do	do	do	Physical Metallurgy-II
do	do	do	Non-ferrous Extraction Metallurgy-II
do	do	do	Mechanical Metallurgy-II
do	do	do	Instrumentation

Course	*Branch*	*Class*	*Subjects Taught*
3-year B. Tech. Degree	All Branches	I-Term	Materials of Construction (Metals)
do	Mechanical Engineering	IV-Term	Engineering Metallurgy
do	Metallurgy	V-Term	Physical Metallurgy II
do	do	do	Mechanical Metallurgy II
do	do	do	Ferrous Production Metallurgy-II
do	do	do	Non-ferrous Extraction Metallurgy-I
do	do	do	Advanced Metallurgical Techniques-I
do	Metallurgy	VI-Term	Ferrous Production Metaliurgy-III
do	do	do	Non-ferrous Extraction Metallurgy-II
do	do	do	Instrumentation
do	do	do	Advanced Metallurgical Techniques-II
do	do	do	Metallurgical Plant Design
do	do	do	Powder Metallurgy
do	do	do	Physical Metallurgy-III
do	do	do	Mechanical Metallurgy-III
M. Tech. Degree	All Branches	I-Term	Materials Science and Technology

3. LABORATORY/WORKSHOP FACILITIES :

Undergraduate : Physical Metallurgy
Mechanical Metallurgy
Metals Joining
Foundry
Advanced Metallurgical Techniques
Electrometallurgy and Corrosion
Refractories,
Metallurgical Analysis
Metallurgical Plant Design.

4. EDUCATIONAL TOURS :

Factory based practical training was given to the final year students in the Metallurgy Branch of the 5 year B. Tech. Degree Course during the winter vacation at TISCO, National Metallurgical Laboratory, and Hindustan Steel Plants at Rourkela and Bhilai. The training included lectures given by specialists in various fields of ferrous production metallurgy and tests in these subjects.

5. MAJOR EQUIPMENT PROCURED DURING THE YEAR :

Microhardness Tester, Polarograph.

6. COLLABORATION/LIAISON WITH INDUSTRY :

Small projects involving work useful to industry have been taken up, such as the study of the influence of vacuum melting on the properties of alloy steels, investigation of the problem of remelting and casting of alloy steel scrap, etc.

The following facilities are offered by the Department as aid to industry.

1. Metallography and Hardness Testing of Metals and non-metals.
2. High temperature mechanical testing.
3. Fatigue testing of normal samples and of springs.
4. Chemical analysis of ferrous and non-ferous materials.
5. Flaw detection using radiographic, ultrasonic and magnetic methods.

Among the industries which have approached the Department for technical assistance are the Integral Coach Factory, Bharath Heavy Electricals, Surgical Instruments Factory and Wheels India Ltd., to name only a few.

7. OTHER ACADEMIC ACTIVITIES :

A staff member of the Deparrment gave a series of 32 lectures on Materials Science to post-graduate students from the various centres participating in the Sequential Summer School, held in the I. I. T. Madras.

As usual, some of our staff members gave series of lectures at other educational institutions. They also acted as reviewers of text books and research publications.

As aids to teaching, numerous models have been planned and constructed in the Department.

DEPARTMENT OF CHEMISTRY

1. ACADEMIC STAFF :

Professor : (a) Indian	...	One
Assistant Professors	...	4
Lecturers ...	...	9
Senior Technical Assistants	...	4
Junior Technical Assistants	...	5

2. TEACHING FACILITIES :

Course	*Branch*	*Class*	*Subjects taught*
5-year B. Tech. Degree	All	I-year	Physical Inorganic and organic Chemistry.
do	Metallurgy	III-year	Phycial and Inorganic Chemistry.
do	Chemical Engineering	do	Inorganic and Organic Chemistry.
do	do	IV-year	Physical Chemistry.

3-year B. Tech. Degree	All	I-Term	Physical, Inorganic and organic Chemistry.
do	Chemical Engineering	III-Term	Physical Chemistry.
M. Sc. Degree.	Physics	I-Term	Physical, Inorganic and organic Chemistry.
do	Chemistry	I-Term	Physical, Inorganic Organic and Theoretical Chemistry.
do	do	II-Term	do
do	do	III-Term	Physical, Inorganic, Organic and Nuclear Chemistry.
do	do	IV-Term	Physical, Inorganic and Organic Chemistry.
do	do	do	Chemical Process Principles.
M. Tech. Degree.	All	II-Term	Material Sciences (Inorganic & Organic Polymers.)
Ph. D. Degree	Chemistry	I-year	Orientation and background courses in Physical, Inorganic Organic and Theoretical chemistry for new registrants.

3. LABORATORIES/WORKSHOP FACILITIES :

(a) *Undergraduate* :

Facilities are available for conducting loboratory exercises in Physical, Inorganic, organic and Analytical chemistry.

(b) *Postgraduate* :

Laboratory facilities are available (i) for conducting experiments in Physical, Inorganic, Organic and Nuclear Chemistry ; (ii) for getting thoroughly familiarised with the use of electro-chemical instruments, gas chromatograph, gas adsorption apparatus and analytical nuclear instruments ; (iii) for training in glass blowing.

(c) *Ph. D.* :

Facilities are available for research work in Physical Chemistry (Electrochemistry, Heterogeneous and Homogeneous catalysis, Chemical Kinetics, Photochemistry) Inorganic Chemistry (solid state, coordination and Analytical Chemistry) and Organic Chemistry.

4. MAJOR ITEMS OF EQUIPMENT PROCURED DURING THE YEAR UNDER REPORT :

(i) Precision pH—meter

(ii) Vacuum Drying Oven

(iii) Universal Centrifuge

(iv) High Pressure Shaking Autodave

(v) Oscillo—titrator

(iv) Recording Polarograph

(vii) X—ray Diffraction Unit.

5. DEPUTATION TO SEMINARS ETC. :

Name of Staff member	Period of deputation	Seminar
Shri M. R. Udupa	6-weeks	Referesher course in Nuclear and Radio Chemistry at Bhaba Atomic Research Centre, Bombay.
Dr. C. S. Swamy	14-Months	Third International Seminar for Research and Education in Chemical Engineering and Physical Chemistry at the Technical Institute, Karlsruhe, W. Germany. Organised in Co-operation with UNESCO.

6. RESEARCH SCHOLARS :

(a) *Full-Time* :

Name	*Research Topic*	*Date of Registration*	*Guide*
Shri J. R. Jain	Study of catalytic alkylations	4-10-63	Dr. C. N. Pillai
Shri S. R. Rajagopalan	Physico-chemical study of Interface and interfacial Processes	16-12-63	Prof. M. V. C. Sastri
Shri S. V. Kannan	Esterification and Etherification Reactions on Oxide Catalysts	27-7-64	Dr. C. N. Pillai
Shri B. Viswanathan	Physico-chemical Studies on Oxide Catalysts	1-8-64	Dr. M. V. C. Sastri Dr. V. Srinivasan
Shri R. Swaminathan	Mechanistic investigation of Heterogeneous Catalalytic Reactions	1-8-64	Dr. J. C. Kuriacose
Shri M. Santhanam	Mechanism of Photosensitised Oxidations	1-9-65	Dr. V. Ramakrishnan
Shri N. Chandrasekharan	Studies on Adsorption of gases in relation of Heterogeneous Catalysis	1-9-65	Dr. V. Srinivasan

Shri D. Venkappayya	Complexes containing Morpholine or Morpholinium ion	1-9-65	Dr. G. Aravamudan
Shri C. Daniel	A study of the dual Behaviour of chromia alumina catalysts	8-9-65	Dr. J. C. Kuriacose
Shri N. Chattanathan	Acid-Base reactions in non-aqueous media	11-5-66	Dr. C. Kalidas
Shri S. Santhanagopalan	Reactions catalysed by oxide catalysts	23-8-66	Dr. C. N. Pillai
Shri J. Radhakrishnan	Approaches towards the synthesis of Oxa-analogues of Oestrone and equilenin	29-8-66	Dr. S. R. Ramadas
Shri S. Sampath	Solid State Studies on Uranium, Chromium and Vanadium Compounds	5-9-66	Dr. G. Aravamudan
(b) *Part-Time* :	(Staff members)		
Shri K. Narayanan	Study of the Dehydration of alcohols and oxide catalysts	19-10-62	Dr. C. N. Pillai
Shri J. Rajaram	Kinetics and Mechanism of the Bromination of p-bromophenol	19-10-62	Dr. J. C. Kuriacose

Shri M. Rama-krishna Udupa	Studies on thiourea complexes of zinc, cadmium mercury, cobalt & nickel	2-11-63	Dr. G. Arava-mudan
Shri V. R. Satya-narayana Rao	Chloramine Oxidations	13-8-66	Dr. G. Arava-mudan
Shri D. V. Ramana	Friedel-Crafts and Related reactions	22-8-66	Dr. C. N. Pillai
Shri R. Ramaswamy	Mechanistic study of reactions by electro-chemical techniques	2-9-66	Dr. J. C. Kuriacose
Shri C. S. Venkata-chalam	Kinetics of electrode reactions by polarography	19-9-66	Dr. M. V. C. Sastri
Shri K. Vasudevan	Charge-tranfer interactions	19-9-66	Dr. V. Rama-krishnan

7. OTHER ACADEMIC ACTIVITIES :

(a) An outstanding event of the year was the first All-India Symposium on Inorganic Chemistry organised by the Department from the 23rd to 25th February 1967. The Symposium covering many modern aspects of Inorganic Chemistry drew a large number of scientists from all over the country.

(b) The Department was well represented with research contributions at the Seminar on 'Chemisorption and Catalysis' held at Loyola College under the auspices of the University Grants Commission and the University of Madras.

(c) The Department as usual held a number of colloqiua and Seminar meetings at which eminent research scientists from outside as also the students and staff of the department took part.

(d) The American Chemical Society has made a research grant of $ 17,000 out of its Petroleum Research Fund to Prof. M. V. C. Sastri, Dr. J. C. Kuriacose and Dr. C. N. Pillai for carrying out fundamental research in the field of petroleum.

DEPARTMENT OF HUMANITIES

1. ACADEMIC STAFF :

Professors :	(a) German	...	...	1
	(b) Indian	...	...	3
Assistant Professors :		...	...	3
Lecturers :	...	...	...	5
Associate Lecturers :		...	...	3
Senior Technical Assistants		...	...	3
Junior Technical Assistant		...	...	1

2. TEACHING FACILITIES :

(a) Under-graduate classes :

Five year B. Tech. Degree Course

I year	...	English
II year	...	English and German
III year	...	History and Culture
IV year	...	Economics
V year	...	Industrial Economics, Planning, Cost Accounting and Book-keeping, General and Industrial Psychology and Industrial Management.

Three year B. Tech. Degree Course

I Term	...	German
II Term	...	History and Culture
III Term	...	History and Culture and Economics
IV Term	...	Economics and General Psychology
V Term	...	Cost Accounting and Book-keeping and Industrial Psychology
VI Term	...	Industrial Economics, Planning and Industrial Management.

(b) Post-graduate Classes :

A significant development in the year under review has been the incorporation into the Department a one year Post-graduate Diploma Course in Industrial Engineering. Generally graduates in all branches of Engineering/Technology with about two years of experience in Industry are eligible for admission to the course. This Diploma course in the Department with its emphasis on Project work has opened up fruitful avenues of problem oriented research in industries, besides promoting Post-graduate studies in an important area of technical education.

3. LABORATORIES/WORKSHOP FACILITIES :

Industrial Engineering Laboratories are in the process of being set up.

4 MAJOR EQUIPMENT PROCURED DURING THE YEAR UNDER REPORT :

(a) Epidiascope
(b) Facit Calculating Machine
(c) Tape Recorder
(d) Drafting Machine
(e) Kilburn Sirius Copier
(f) Bench Grinder
(g) Drilling Machine
(h) Hacksaw Machine
(i) Handfly Press
(j) Bending Machine
(k) Tool Room Lathe
(l) IBM Card Punch Alphabetical
(m) IBM Alphamerical Verifier
(n) Stop watches
(o) Gestnetner Duplicator.

DEPARTMENT OF MATHEMATICS

1. ACADEMIC STAFF :

Professor :—

Indian	...	...	...	1
Assistant Professors	...	...	...	2
Lecturers	...	...	...	5
Associate Lecturers	...	...	...	3
Senior Technical Assistants	...	...	...	5

2. TEACHING FACILITIES :

Course	*Branch*	*Class*	*Subjects Taught*
5-year B. Tech. Degree	All Branches	I to V	Mathematics
3-year B. Tech. Degree	Chemical Engineering	II-Term	Mathematics
do	Civil Engineering	I-Term	do
do	Electrical Engineering	V-Term	do
do	Mechanical Engineering	VI-Term	do
M. Sc. Degree	Physics	I-Term	Methods of Mathematical Physics.
do	Chemistry	I-Term II-Term	Methods of Mathematics for Chemists.
do	Mathematics	I-Term	Linear Algebra I Advanced Calculus Complex Analysis Advanced Mechanics I
do	do	II-Term	Linear Algebra II Gemometry
do	do	do	Differential Equations I
do	do	do	Advanced Mechanics II

M. Sc. Degree.	do	III-Term	Topology and Modern Analysis
do	do	do	Differential Equations II
do	do	do	Continuum Mechanics I
do	do	do	Numerical Analysis.
do	do	IV-Term	Measure Theory and Functional Analysis
do	do	do	Continuum Mechanics II
do	do	do	Methods of Mathematical Physics.
do	do	do	Special Subjects.
M. Tech. Degree	Civil Engineering	I-Term	Advanced Calculus
do	Chemical Engineering	do	Vector Analysis
do	Electrical Engineering &	do	Differential Equations
do	Mechanical Engineering	do	Complex Variables.
do	do	II-Term	Transform Techniques
do	do	do	Numerical Analysis
do	do	do	Probability and Statistics
P. C. Diploma in	Industrial Engineering	do	Advanced Mathematics Statistics and Probability Theory.
do	do	do	Operations Research.

3. LABORATORY/WORKSHOP FACILITIES :

Facilities are available for numerical computation through desk calculating machines-(hand and electrically operated).

4. DEPUTATION TO SEMINARS ETC :

Name of staff members	*Period*	*Seminar/Conference*
S D. Nigam S. K. Srinivasan U. N. Srivastava S. N. Venkatarangan S. Kumaraswamy R. Subramanian L. V. K. V. Sarma	December 1966	The Eleventh Conference of the Indian Society of Theoretical and Applied Mechanics-Coimbatore.
S. D. Nigam	September 1966	Seminar on Mathematical Sciences-Bangalore.
S. D. Nigam S. K. Srinivasan	September 1966	Matscience Summer School-Bangalore.
S. K. Srinivasan S. D. Nigam P. Achuthan	January 1967	Matscience Annual Symposium-Madras.
U. N. Srivastava	May 1967	Seminar on Fluid Mechanics-Bangalore
K. R. Parthasarathy	June 1967	Summer School on Graph Theory Coding Theory Bombay.

5. RESEARCH SCHOLARS :

(a) *Full-Time* :

Name	*Research Topic*	*Date of Registration*	*Guide*
K. S. Ramesh	Operations Research	24-10-66	R. Subramanian
A. Rangan	Stochastic Processes	22-9-66	S. K. Srinivasan
A. Avudainayagam	Application of Variational methods to Compressible flows	24-9-66	S. D. Nigam

M. D. Gaur	Fluid Mechanics	27-9-66	S. D. Nigam
B. Srinivasa Rao	Piezo-electricity	29-10-66	H. S. Paul
P. V. Arunachalam	Two-body problems in Fluid Mechanics	24-11-66	S. D. Nigam
G. B. Narasimha Rao	Non-Linear Oscillations	20-9-66	D. S. Subramanyam
G. V. Prabhakar Rao	Free-Surface Waves	7-9-66	V. Subba Rao
M. R. Sridharan	Enumeration Problems in the Graphy Theory	14-9-66	K. R. Parthasarathy
G. Rajamannar	Stochastic Processes	25-8-65	S. K. Srinivasan
D. V. Krishna	Some filow problems in stratified fluids	2-9-65	L. V. K. V. Sarma
R. Seetharamaswamy	A study of cross-field effects in MHD Flows	27-4-65	L. V. K. V. Sarma
R. N. Sarkar	Some aspects of Elemenary Particle Physics	26-8-65	S. K. Srinivasan
S. N. Majhi	Viscous Flow at Small Reynolds numbers	23-9-66	S. D. Nigam
V. P. Muthuswamy	Plasticity	25-8-64	S. C. Das
K. Kishna Rao	Thermo-elasticity	8-9-64	S. C. Das

(b) *Part-Time* : (Staff Members)

A. V. Gopalakrishna	Relativistic Fluid Mechanics	11-8-64	S. D. Nigam
A. Ramachandra Rao	Wave propagation in Rotating Liquids	6-8-64	S. D. Nigam
S. N. Venkatarangan	Variational Approach for Stability problems	4-8-64	S. D. Nigam
C. V. Raghava Rao	Viscous rotating flow past bodies	4-8-64	L. V. K. V. Sarma
U. N. Srivastava	Boundary Layer	4-8-64	S. D. Nigam
S. Kumaraswamy	Stochastic Differential Equations	1-1-66	S. K. Srinivasan
N. V. Koteswara* Rao	Stochastic Processes	30-10-62	S. K. Srinivasan
P. Achuthan*	Fundamental Particle Interactions	7-10-63	S. K. Srinivasan
D. S. Subramaniyam @	Differential Difference Equations	7-10-63	Prof. Dr. W. Hahn

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@ Ph. D. Degree Confered at the Third Convocation in July 1966.

* Ph. D. Degree to be Conferred at the Fourth Convocation in July 1967.

6. OTHER ACADEMIC ACTIVITIES :

(a) Work is being done in 'Kinetic Theory of Fluids' and 'Study of Response to Nervour System' by S. K. Srinivasan in collaboration with Prof. R. Vasudevan of the Institute of Mathematical Sciences (Matscience), Madras.

b) *I. I. T.—Matscience Seminar* :

Six Seminar lectures were arranged at the Matscience and I. I. T., on topics in various branches of Mathematics and Theoretical Physics.

(c) *Departmental Seminar* :

Regular seminar lectures were held at the Department. A few special invited lectures have also been arranged.

(d) Worked on the Theory of Couple-stresses with Prof. W. H. Hoppmann—II, at the Department of Mechanics, Rensselaer Polytechnic Institute. Troy, New York, U. S. A. from September 1966 to February 1967.

DEPARTMENT OF PHYSICS

1. ACADAMIC STAFF :

Professor : (a) German	1	
,, (b) Indian	1	(Honorary)
Assistant Professors	4	
Lecturers	6	
Associate Lecturers	8	
Senior Technical Assistants ...	7	
Junior Technical Assistants ...	3	
Pool Officer	1	

2. TEACHING FACILITIES :

Course	*Branch*	*Class*	*Subjects Taught*
5-year B. Tech.	Mechanical, Electrical, Chemical, Civil, and Aeronautical Engineering and Metallurgy	I	Physics
do	do	II	do
do	do	III	Physics (Optics)
do	do	IV	Modern Physics
do	do	V	Physics (Elective)
			(a) Elements of Solid State Physics
			(b) Elements of nuclear Physics.
			(c) Non-destructive Testing.
			(d) Technical Acoustics.
3-year B. Tech. Degree	Mechanical, Electrical, Chemical and Civil, Engineering	I-Term	Physics
do	do	II-Term	do
do	Mechanical, Electrical, Chemical, & Civil Engineering & & Metallurgy	V-Term	Atomic Physics.
do	do	VI-Term	(a) Solid State Physics
do	do	do	(b) Reactor Physics
do	do	do	(c) Acoustics.

M. Sc. Degree.	Chemical Mechanics	I-Term	Physics
do	Physics	do	Electronics
do	do	do	Mechanics
do	do	do	Experimental Techniques
do	do	do	Atomic, Electronic and Molecular Physics
do	do	do	Physics Practical
do	do	II-Term	Mathematical Physics I
do	do	do	Mechanics II and Statistical Mechanics
do	do	do	Experimental Techniques
do	do	do	Atomic, Electronic and Molecular Physics II
do	do	do	Electronics Practical
do	do	do	Physics Practical
do	do	do	Workshop and Drawing
do	do	III-Term	Mathematical Physics II
do	do	do	Electromagnetic Theory and Relativity
do	do	do	Experimental Techniques
do	do	do	Optics and Spectroscopy
do	do	do	Nuclear Physics I
do	do	do	Quantum Mechanics
do	do	do	Solid State Physics
do	do	do	Physics Practicals

M. Sc. Degree.	do	IV-Term	Electromagnetic Theory and Relativity
do	do	do	Experimental Techniques IV
do	do	do	Nuclear Physics II
do	do	do	Quantum Mechanics II
do	do	do	Solid State Physics II
do	do	do	Optics and Spectroscopy II
do	do	do	Electives
			(a) X-Ray Crystallography
			(b) Microwave Physics
			(c) Semiconductor Technology
do	do	do	Elective Practical
do	do	do	Dissertation and Vivavoce
do	do	do	Seminar
M. Tech. Degree	All	I-Term	Measurements
do	do	do	Materials Sceience and Technology
do	Chemical Engineering	do	Experimental Techniques
do	All	II-Term	Meterials Science and Technology
do	Chemical Engineering	do	Experimental Techniques
do	Mechanical Engineering	III-Term	Automats Control
do	do	IV-Term	Instrumentation and Controls

3. LABORATORIES/WORKSHOPS FACILITIES :

(a) Undergraduate Course. First, Second and Third year classes of the 5 year B. Tech. Degree Course.

(b) Post graduate course, M. Sc. Degree Course—I & II year classes : (i) Micrawave Physics (ii) Semiconductor (iii) X-ray Crystallography.

(c) Ph. D. : X-ray Crystallography, Microwave Physics Semiconductor Physics.

4. DEPUTATION TO SEMINARS ETC :

Sl No.	*Name of the staff member*	*Period of deputation*	*Seminar/conferences/conventions/summer schools*
1.	Dr. C. Ramasastry Shri Y. V. G. S. Murthy Shri S. B. S. Sastry	2 days	Solid State session of the Symposium on Inorganic Chemistry. I. I. T. Madras, 1967.
2.	Shri B. S. V. Gopalam	7 days	Symposium on Semiconductor Electronics at the Birla Institute of Technology, Pilani, Rajasthan 1967.
3.	Shri G. D. Nigam „ S. Natarajan	2 days	Symposium on Crystal Growth and Crystal Structure organised by the Defence Science Laboratories, Kanpur.
5.	Dr. C. Santaram	9th to 18th Jan '67	International Conference on Spectroscopy, Bombay, 1967.

5. RESEARCH SCHOLARS :

Name	*Subject*	*Date of registration*	*Research Guide*
1. Sri N. Hari hara Iyer	Investigations on some of the optical and magnetic properties of alkali sulphates.	13-8-'64	Dr. J. Sobanadri
2. Sri K. Millikarjuna Rao	Spectroscopy	14-8-'64	Dr. C. K. Narayanaswamy
3. Sri G. D. Nigam	X-ray study of crystal structure of 3-Nitro ludine.	8-10-'64	Dr. B. V. Ramanamurthy
4. Kum. Vijayalakshmi	Flow at small Reynolds numbers	10-8-'64	Dr. S. D. Nigam
5. Sri C. S. Sastry	Measurement of radioactivity and its application to problems in Solid State Physics	10-9-'64	Dr. Sivaramakrishnan
6. Sri T. P. Srinivasan	Plasma waves	9-9-'65	Dr. S. D. Nigam
7. Sri S. Natarajan	(1) Crystal structure of Monothiourea cadmium sulphate dihydrate solved in projection. (2) Structure of $Cd(NO_3)_2(SC(NH_2)_2)2H_2O$	13-9'-65	Dr. S. V. Ramanamurthy & Dr. E. M. Gopalakrishnan
8. Sm. Kamala Balaraman	Fatigue of Materials	5-10-'66	
9. Kum. Janaki Lakshmi	Solid State Spectroscopy	30-11-'66	Dr. C. Ramasastry
10. M. Veerabhadra Rao	Crystal structure analysis	23-1-67	

APPENDIX I

STATEMENT No. 1.

JOINT ENTRANCE EXAMINATION—1966

Statement showing the number of applications received for admission to the I Year Classes (pertaining to Centres located in the Southern Zone) giving Statewise distribution and first choice of Institute.

S. No.	STATE	FIRST CHOICE OF INSTITUTE					Total
		Bombay	Delhi	Kanpur	Karagpur	Madras	
1.	Andhra ...	109	41	30	305	918	1403
2.	Assam ...	—	—	—	1	—	1
3.	Bihar ...	—	—	—	—	—	—
4.	Delhi ...	1	5	—	2	1	9
5.	Gujarat ...	2	—	—	—	9	11
6.	Goa ...	—	—	—	—	—	—
7.	Himachal Pradesh ...	—	—	—	—	—	—
8.	Jammu & Kashmir ...	—	—	1	—	1	2
9.	Kerala ...	93	23	18	108	788	1030
10.	Madhya Pradesh ...	2	1	—	—	1	4

11.	Madras	...	31	41	10	114	2242	2438
12.	Maharashtra	...	9	1	—	2	6	18
13.	Manipur	...	—	—	—	—	—	—
14.	Mysore	...	291	14	15	67	415	802
15.	Nagaland	...	—	—	—	—	—	—
16.	Orissa	...	1	—	—	3	2	6
17.	Pondicherry	...	—	2	—	3	27	32
18.	Punjab	...	2	7	2	2	—	13
19.	Rajasthan	...	1	—	1	—	3	6
20.	Tripura	...	—	—	—	—	—	—
21.	Uttar Pradesh	...	1	—	5	4	3	13
22.	West Bengal	...	2	—	—	5	8	15
23.	Andaman (Union Teritory)	...	—	—	—	—	—	—
24.	Displaced Persons (RF)	...	1	—	—	—	—	1
25.	Foreign Countries	...	—	2	—	1	3	6
	Total	...	546	137	82	617	4427	5809

STATEMENT No. 2.

JOINT ENTRANCE EXAMINATION, 1966

Statement showing the number of candidates who actually took the examination in the various Centres in the Southern Zone

S. No.	CENTRE		Maths.	English	GROUP-A		GROUP-B	
					Physics	Chemistry	Phy. & Chem.	Drawing
1.	Anantapur	...	74	70	54	54	11	11
2.	Hyderabad	...	218	213	187	180	20	19
3.	Kakinada	...	139	135	119	114	11	11
4.	Secunderabad	...	75	75	69	67	4	4
5.	Tirupati	...	67	65	62	60	—	—
6.	Vijayawada	...	366	360	331	315	18	17
7.	Waltair	...	128	126	108	101	15	15
8.	Warangal	...	25	23	17	17	6	6
9.	Calicut	...	110	109	100	96	3	3
10.	Trichur	...	266	262	251	240	2	1

11.	Trivandrum	...	416	407	396	386	8	8
12.	Chidambaram	...	81	82	78	77	2	1
13.	Coimbatore	...	206	204	194	192	8	8
14.	Madras (A. M. Jain)	...	406	400	385	379	13	13
15.	Madras (Pachaiyappa's)	...	401	398	364	358	31	28
16.	Madras (Sir Theagaraya)	...	90	88	84	78	6	6
17.	Madras (Vivekananda)	...	366	366	343	340	22	22
18.	Madurai	...	328	326	305	296	10	10
19.	Salem	...	123	124	121	115	2	2
20.	Tiruchirapalli	...	277	269	265	255	3	3
21.	Bangalore	...	364	358	342	337	10	10
22.	Dharwar	...	176	172	168	163	2	2
23.	Mangalore	...	109	106	94	94	8	8
24.	Mysore	...	68	68	62	62	4	3
	Total	...	4879	4806	4499	4376	219	211

STATEMENT No. 3.

JOINT ENTRANCE EXAMINATION, 1966

Distribution of marks in various subjects

	Mathematics	English	Physics Gr. 'A'	Chemistry Gr. 'A'	Physics Gr. 'B'	Chemistry Gr. 'B'	Drawing Gr. 'B'
Total No. of candidates who took the examintion ...	4879	4806	4499	4376	219	219	211
No. of candidates getting 80% and above ...	3 (0.06%)	45 (0.93%)	62 (1.4%)	2 (0.04%)	10 (4.5%)	6 (2.74%)	2 (0.95%)
No. of candidates getting between 60% and 79% ...	28 (0.57%)	570 (11.86%)	251 (5.6%)	24 (0.55%)	35 (16%)	21 (9.59%)	16 (7.6%)
No. of candidates getting between 50% and 59% ...	75 (1.54%)	853 (17.75%)	310 (6.9%)	59 (1.35%)	24 (10.9%)	21 (9.59%)	16 (7.6%)
No. of candidates getting between 30% and 49% ...	568 (11.64%)	2405 (50.04%)	953 (21.2%)	435 (9.94%)	46 (21%)	51 (23.3%)	55 (23.65%)

STATEMENT NO. 4.

JOINT ENTRANCE EXAMINATION—1966

Statement showing the number of Scheduled Caste/Scheduled Tribe candidates registered for the examination (State-wise) in the Southern Zone.

S. No.	STATE		Scheduled Caste/Scheduled Tribe	Total
1.	Andhra	...	16	16
2.	Madras	...	26	26
3.	Mysore	...	4	4
4.	Kerala	...	2	2
5.	Pondicherry	...	1	1
			49	49

STATEMENT No. 5.

JOINT ENTRANCE EXAMINATION, 1966

No. of candidates who qualified in the written examination and were called for interview at I. I. T. Madras for admission to the I-Year of the 5-year B. Tech. Degree Courses (Distribution shown State-wise)

S. No.	STATE		FIRST CHOICE OF INSTITUTE					Tota
			Bombay	Delhi	Kanpur	Kharagpur	Madras	
1.	Andhra Pradesh	...	4	1	—	4	12	21
2.	Assam	...	—	—	—	—	—	—
3.	Bihar	...	—	—	—	—	—	—
4.	Delhi	...	—	—	—	—	—	—
5.	Goa	...	—	—	—	—	—	—
6.	Gujarat	...	—	—	—	—	—	—
7.	Himachal Pradesh	...	—	—	—	—	—	—
8.	Jammu & Kashmir	...	—	—	1	—	—	1
9.	Kerala	...	3	—	2	10	38	53
10.	Madhya Pradesh	...	—	—	—	—	—	—

11.	Madras	...	2	3	2	5	121	133
12.	Maharashtra	...	—	—	—	—	1	1
13.	Manipur	...	—	—	—	—	—	—
14.	Mysore	...	10	—	2	4	24	40
15.	Nagaland	...	—	—	—	—	—	—
16.	Orissa	...	—	—	—	—	—	—
17.	Pondicherry	...	—	—	—	—	1	1
18.	Punjab	...	—	—	—	1	—	1
19.	Rajasthan	...	—	—	—	—	—	—
20.	Tripura	...	—	—	—	—	—	—
21.	Uttar Pradesh	...	—	—	3	1	1	5
22.	West Bengal	...	—	—	—	2	1	3
23.	Andaman	...	—	—	—	—	—	—
24.	Displaced Persons	...	1	—	—	—	—	1
25.	Foreign Countries	...	—	—	—	—	—	—
	Total	...	20	4	10	27	199	260

STATEMENT No. 6.

JOINT ENTRANCE EXAMINATION, 1966

SOUTHERN ZONE

S. No.	Date of interview	Mark Range	First choice of Institute					Total
			Bombay	Delhi	Kanpur	Kharagpur	Madras	
1.	15—6—1966	230 and above	4	1	5	7	48	65
2.	17—6—1966	215 to 229	3	1	3	3	43	53
3.	20—6—1966	205 to 214	4	—	—	6	36	46
4.	22—6—1966	195 to 204	6	1	2	1	35	45
5.	24—6—1966	185 to 194	3	1	—	10	37	51
			20	4	10	27	199	260

JOINT ENTRANCE EXAMINATION—1966.

STATEMENT 7.

Consolidated Statement relating to condidates from the Southern Zone for admission to the I-year of the 5-year Integrated Courses (Session 1966—67.)

S. No.	STATE	No. of app. received	No. qualified for interview	No. admitted as on 1-8-1966					Branch						
				Madras	Bombay	Delhi	Kanpur	Kharag	Mech	Aero	EE (Lc)	EE (Hc)	Chem	Met	Civil
1.	Andhra ...	1403	21	11	—	1	—	—	2	—	1	2	2	2	3
2.	Assam ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—
3.	Bihar ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.	Delhi ...	9	—	—	—	5	—	—	1	1	—	3	—	—	—
5.	Goa ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6.	Gujarat ...	11	—	—	—	—	—	—	—	—	—	—	—	—	—
7.	Himachal Pradesh ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8.	Jmmu & Kashmir ...	2	1	—	—	—	—	—	—	—	—	—	—	—	—
9.	Kerala ...	1030	53	38	—	2	1	2	15	4	5	1	9	5	4
10.	Madhya Pradesh ...	4	—	—	—	—	—	—	—	—	—	—	—	—	—

11. Madras ...	2438	133	99	3	10	—	—	27	9	12	14	11	26	12
12. Maharashtra ...	18	1	1	3	2	—	2	3	—	—	4	—	—	1
13. Manipur ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—
14. Mysore ...	802	40	23	—	1	1	1	8	4	3	—	7	3	1
15. Nagaland ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—
16. Orissa ...	6	—	—	—	—	—	—	—	—	—	—	—	—	—
17. Pondicherry ...	32	1	1	—	—	—	—	—	—	1	—	—	—	—
18. Punjab ...	13	1	—	—	1	—	—	—	—	—	1	—	—	—
19. Rajasthan ...	5	—	—	—	—	1	—	1	—	—	—	—	—	—
20. Tripura ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—
21. Uttar Pradesh ...	13	5	1	—	1	5	1	2	—	—	2	—	—	4
22. West Bengal ...	15	3	1	—	—	—	4	3	—	1	1	—	—	—
23. Andaman ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—
24. Displaced Persons (RF) .	1	1	—	—	—	—	—	—	—	—	—	—	—	—
25. Foreign Countries ...	6	—	—	—	—	—	—	—	—	—	—	—	—	—
Total ...	5809	260	174	6	23	8	10	62	18	23	28	29	36	25

Total number of candidates admitted to I. I. T. Madras from : Bombay 6 ; Delhi 23 ; Kanpur 8 ; Kharagpur 10 ; Madras 174 ; Total 221

STATEMENT NO. 8.

Statement showing the number of candidates who have been called for inteview on the 25-6-1966 and the 3-7-1966 outside the All-India Merit List for admission to Civil Engineering branch at I. I. T. Madras.

STATE		NO. OF CANDIDATES	
		Called for interview	Offered admission and joined as on 1-8-1966
Andhra	...	14	4
Delhi	...	1	—
Kerala	...	16	2
Madras	...	32	6
Mysore	...	9	2
Pondicherry	...	1	1
Punjab	...	1	—
West Bengal	...	1	1
		75	16

Total number offered admission from All-India Merit List 221

Total number offered admission from outside All-India Merit List (25-6-66 & 3-7-66 interviews). 16

Total offered and joined as on 25-7-1966 237

STATEMENT NO. 9.

JOINT ENTRANCE EXAMINATION, 1966

Statement showing the number of candidates (distributed branch-wise) admitted to the Indian Institute of Technology, Madras after interview at the I. I. Ts.

I. I. T.	Mechanical Engineering	Aeronautical Engineering	Electrical (L. C.)	Electrical (H. C.)	Chemical Engg.	Metallurgy	Civil Engg	Total
Bombay ...	—	—	—	5	—	—	1	6
Delhi ...	8	2	1	8	—	—	4	23
Kanpur ...	2	—	—	1	1	—	4	8
Kharagpur ...	6	—	1	2	—	—	1	10
Madras ...	46	16	21	12	28	36	15	174
Total ...	62	18	23	28	29	36	25	221

APPENDIX II

STRENGTH OF STUDENTS ON THE ROLLS

(as on 1—4—1967)

5-year B. Tech. Degree Course

CLASS	1965-66	1966-67
I year	236	232
II year	212	231
III year—		
Civil Engineering ...	27	26
Mechanical Engineering ...	70	65
Electrical Engineering ...	41	46
Chemical Engineering ...	44	37
Metallurgy ...	26	24
Aeronautical Engineering ...	15	15
IV year—		
Civil Engineering ...	33	26
Mechanical Engineering ...	58+1*	69
Electrical Engineering ...	36+2*	38
Chemical Engineering ...	37+1*	42
Metallurgy ...	19	28
Aeronautical Engineering ...	—	14
V year—		
Civil Engineering ...	18	33+1*
Mechanical Engineering ...	37	53
Electrical Engineering ...	34	34
Chemical Engineering ...	17	37
Metallurgy ...	23	18

* External Students.

3-year B. Tech. Degree Course

Class	1965-66		1966-67	
	I Term	*II Term*	*I Term*	*II Term*
I year	92	98*	153	122
1I year	96	91*	104*	101
III year	74	73	87	87
M. Sc. Physics I year	5	5	10	9
II year	9	9	5	5
M. Sc. Chemistry I year	6	6	8	8
II year	6	6	5	5
M. Sc. Mathematics I year	10	8	10	8
II year	6	6	8	8
M. Tech. Degree Chemical Engg.				
I year	11	10	16	16
II year	6	6	10	10
M. Tech. Degree Civil Engg.				
I year	10	8	12	9
II year	8	7	8	8
M. Tech. Degree Electrical Engg.				
I year	16	7	23	13
II year	8	8	7	5
M. Tech. Degree Mechanical Engg.				
I year	4	3	10	7
II year	4	4	3	3

* Includes external Students.

APPENDIX III

Results of Examinations at the end of 1966—67 Academic Session

Class	Branch	No. of Students on rolls	No. permitted to take final Examination.	Total passed	Total Failed	Percentage
5 year B. Tech. Degree Course :						
I year	All	232	228	217	11	95%
II year	All	231	227	221+1	5	98%
III year						
	Civil Engineering	26	25	23+1*	1	96%
	Mechanical Engineering	65	65	63	2	97%
	Electrical Engineering	46	45	40	5	89%
	Chemical Engineering	37	37	37	Nil	100%
	Metallurgy	24	22	18	4	82%
	Aeronautical Engineering	15	15	13	2	87%
IV year						
	Civil Engineering	26	26	24	2	92%
	Mechanical Engineering	69	68	63	5	93%
	Electrical Engineering	38	35	32	3	91%
	Chemical Engineering	42	42	40	2	95%
	Metallurgy	28	28	28	Nil	100%
	Aeronautical Engineering	14	14	11+1*	2	86%
V year						
	Civil Engineering	34@	34	32	I	94%
	Mechanical Engineering	53	53	53	Nil	100%
	Electrical Engineering	34	34	33	1	97%
	Chemical Engineering	37	37	37	Nil	100%
	Metallurgy	18	18	18	Nil	100%

* Students who did not appear for final examination during 1966—67 Session but were permitted to go to next higher class and appear for Final examination for the Subjects not completed at the end of 1967—68 Session.

@ One student did not appear for V. B. Tech. Final Examination last year and completed the course this Session.

Course	No. Appeared		No. Passed		No. Failed		Percentage of Pass	
	I Term	II Term	I Term	II Term	I Term	II Term	I Term	II Term
3-year B. Tech. Degree Course :								
I year	123	122	122	121	1	1	99%	99%
II year	104	101	102	98	2	3	98%	90.7%
III year	86	86	84	86	2	—	97.7%	100%
M.Sc. Degree Course : I-year								
Chemistry	8	8	8	8	—	—	100%	100%
Mathematics	9	8	8	7	1	1	89%	87.5%
Physics II-year	9	9	9	9	—	—	100%	100%
Chemistry	5	5	5	5	—	—	100%	100%
Mathematics	8	8	8	8	—	—	100%	100%
Physics	6	6	6	6	—	—	100%	100%
M. Tech. Degree Course :								
Civil Engineering : I-year								
(a) Hydraulics	2	1	1	1	1	—	50%	100%
(b) Soil Mechanics & Foundation Engineering	2	2	2	2	—	—	100%	100%

(c) Structural Engineering	6	6	6	5	—	1	100%	83%
Mechanical Engineering :								
(a) Machine Design	4	4	4	4	—	—	100%	100%
(b) Machine Tools	3	3	3	3	—	—	100%	100%
Electrical Engineering :								
(a) Electronics	4	4	4	4	—	—	100%	100%
(b) Measurements	3	3	3	3	—	—	100%	100%
(c) Power System	7	4	4	4	3	—	57%	100%
(d) Control Systems	3	2	2	2	1	—	66.6%	100%
Chemical Engineering	15	13	12	13	3	—	80%	100%
M. Tech. Degree Course : II-Year								
Civil Engineering :								
(a) Hydraulics	2	2	2	2	—	—	100%	100%
(b) Soil Mechanics & Foundation Engineering	2	2	2	2	—	—	100%	100%
(c) Structural Engineering	7	7	7	7	—	—	100%	100%
Mechanical Engineering	4	4	4	4	—	—	100%	100%
Electrical Engineering :								
(a) Control System	4	4	4	4	—	—	100%	100%
(b) Measurements	1	1	1	1	—	—	100%	100%
(c) Power System	2	2	2	2	—	—	100%	100%
Chemical Engineering	10	10	10	10	—	—	100%	100%

APPENDIX IV

SCHOLARSHIPS AND LOANS

1. INSTITUTE SCHOLARSHIPS :

		Merit Scholar-ships	Merit-cum-Means Scholarships	Free-student-ships
(i)	*5-year B. Tech. Degree Course* :	77	190	71
(ii)	3-*year B. Tech. Degree Course* :	23	63	40
(iii)	*M. Sc. Degree Course* :	6	9	6
	M. Tech. Degree Course :			
	Chemical Engineering	—	23	—
	Civil Engineering	—	17	—
	Electrical Engineering	—	18	—
	Mechanical Engineering	—	10	—
	P. G. Diploma in Industrial Engineering	—	16	—
	Research Scholarships	—	48	—
	Ph. D. Degree Course :			

INDIAN INSTITUTE OF TECHNOLOGY, MADRAS

II External Scholarships and Loans

Sl. No.	Name of the Sanctioning Authority	Nature of Scholarships	No. of students awarded	Value per annum per student
ANDHRA PRADFSH :				
1.	Director of Higher Education, Hyderabad	National Scholarships	12	1,320/
2.	do	Special Merit Scholarship	5	1,500/-
3.	do	Government of India Merit Scholarship for children of Secondary/Primary School Teachers	1	1,100/-
4.	do	State Merit Scholarships	2	900/-
5.	do	National Loan Scholarships	5	970/-
ASSAM :				
6.	Director of Technical Education, Shillong	Engineering Scholarship	1	900/-
DELHI :				
7.	Director of Education, Delhi	National Loan Scholarship	1	1,320/-
8.	do	National Loan Scholarship	1	970/-
GUJARAT :				
9.	Director of Education, Ahmedabad	National Scholarship	1	540/-

HIMACHAL PRADESH :				
10.	Director of Education, Himachal Pradesh Administration, Simla	Merit Scholarship	1	750/-
KERALA :				
11.	Director of Collegiate Education, Trivandrum	National Scholarships	11	1,320/-
12.	do	National Loan Scholarships	6	970/-
MADHYA PRADESH :				
13.	Dirccter of Technical Education, Bhopal	Engineering Scholarship	1	1,000/-
MADRAS :				
14.	Director of Higher Education, Madras	National Scholarships	73	1,320/-
15.	do	National Loan Scholarships	28	970/-
16.	do	Government of India Scholarships to Children of Sec/Pry. School Teachers	5	1,100/-
17.	Director of Harijan Walfare, Madras	Government of India (decentralized) Scholarships for SC/ST/OBC	1	977/-
18.	do	State Scholarships for Backward Class	1	802/-
MAHARASHTRA :				
19.	Director of Education, Poona.	National Scholarships	3	1,320/-

II External Scholarships and Loans—(contd.)

Sl. No.	Name of the Sanctioning Authority	Nature of Scholarships	Name of students awarded	Value per annum per student
MYSORE :				
20.	Direetor of Collegiate Education, Bangalore	National Scholarships	20	1,320/-
21.	do	National Loan Scholarships	2	970/-
22.	do	Govt. of India Scholarships to children of Sec/Pry. School Teachers	2	1,100/-
ORISSA :				
23.	Education Department, Govt. of Orissa, Bhubaneswar	Loan Stipend for Engineering studies	1	1,375/-
PONDICHERRY :				
24.	Director of Public Instruction, Pondicherry	National Scholarships	3	1,320/-
25.	do	State Merit Scholarships	2	1,100/-
PUNJAB :				
26.	Director of Public Instruction, Chandigarh	Govt. of India (decentralised) Scholarships for SC/ST/OBC	1	1,127/-
27.	do	National Loan Scholarship	1	960/-

28.	Director of Technical Education Chandigarh	Loan Stipend for Engineering studies.	2	600/-
29.	do	do	3	450/-
UTTAR PRADESH:				
30.	Director of Education, Allahabad	National Scholarships	2	1,320/-
31.	do	National Loan Scholarship	1	970/-
32.	Director of Technical Education, Kanpur	Loan Stipend	1	1,000/-
WEST BENGAL:				
33.	Director of Public Instruction, Calcutta	National Scholarship	4	1,320/-
34.	Ministry of Education, Govt. of India	T. C. S. (Colombo Plan) Scholarships for Nepal scholar	5	3,000/-
35.	do	General (Cultural) Scholarships for Ceylon Scholars	3	3,000/-
36.	M/s. Tata Iron & Steel, Jamshedpur	Jubilee Scholarship	3	1,500/-
37.	do	Scholarship to children of TISCO Workers	1	960/-
38.	Prime Minister's Aid Fund	Financial Assistance	1	900/-
39.	Lala Santram Tirathram Public Charitable Trust, Amritsar	Educational Stipend	1	600/-

APPENDIX IV—A

The Students' Aid Fund Committee during the year was as detailed below :

1.	Prof. S. Sengupto Director	Chairman
2.	Shri C. V. Sethunathan Registrar	Member (Ex-officio)
3.	Dr. M. Venugopal (Associate Professor, Department of Electrical Engineering)	Secretary
4.	Dr. W. Lutz (Professor, Department of Mechanical Engineering)	Member
5.	Dr. S. Ramaseshan (Head of the Department of Physics)	Member (Till 4-10-1966)
6.	Dr. C. Ramasastry (Assistant Professor, Department of Physics)	Treasurer
7.	Dr. B. V. A. Rao (Assistant Professor, Department of Aeronautics and Applied Mechanics)	Member

The year commenced with an opening balance of Rs. 19,076.92. During the year, a sum of Rs. 16,397.00 was received as contribution from students of the Institute through their respective hostels. Professor B. Sengupto and Mrs. Santha Ramachandran donated Rs. 50/- and Rs. 100/- respectively towards the fund. A sum of Rs. 2,180.00 was repaid by the students who had been given aid out of the Fund. Financial assistance amounting to Rs. 4,150.00 was given to ten students.

The following is the statement of receipts and charges for the year :

RECEIPTS		CHARGES	
	Rs. Ps.		Rs. Ps.
Opening Balance	19,076.92	Financial assistance given :	
Contributions by students	16,397.00	Shri Prem Inder Singh	450.00
		Shri R. Neelamegam	500.00
Donations	150.00	Shri Y. Gopal Rao	500.00
Repayment of Loans	2,180.00	Shri K. Shridhara Bhat	500.00
		Shri K. Sundar	300.00
		Shri D. Jayaram	300.00
		Shri Subash Chandar Jolly	300.00
		Shri T. V. Padmanabhan	500.00
		Shri M. Muralidhara Rao	300.00
		Shri B. Sitarama Rao	500.00
			4,150.00
		Honorarium paid to clerk	50.00
		Bank commission	2.80
		Closing Balance	33,601.12
TOTAL	37,803.92	TOTAL	37,803.92

APPENDIX V

PRIZES FOR ACADEMIC DISTINCTION AT THE END OF 1966—'67 ACADEMIC SESSION

(a) *Prizes to be awarded at the Fourth Convocation* :

President's Prize : For the student of the B. Tech. Degree course with the best academic record.

Shri Gursharan S. Sidhu—Mechanical Engineering—5 year B. Tech.

Governor's Prize : For all round proficiency in the B. Tech. Degree Course (Curricular and extra curricular).

Shri Thomas Victor—Mechanical Engineering—5 Year B. Tech.

Institute Special Merit Prize : For the student of the 3 year B. Tech. Degree Course with the best academic record.

Shri Naresh Puri—Electrical Engineering—3 year B. Tech.

Institute Merit Prizes : For the student with the best academic record in each discipline of each course.

5-year B. Tech. Degree Course :

Shri R. Neelamegam	...	Chemical Engineering
Shri P. S. Govindarajan	...	Civil Engineering
Shri R. Kalyanakrishnan	...	Electrical Engineering
Shri Gursharan S. Sidhu	...	Mechanical Engineering
Shri Gajanan Rajaram Kamat	...	Metallurgy

5-year B. Tech. Degree Course :

Shri Gopal Krishna Chauhan	...	Chemical Engineering
Shri K. Janakiraman	...	Civil Engineering
Shri Naresh Puri	...	Electrical Engineering
Shri P. Suryaprakasa Rao	...	Mechahical Engineering
Shri P. S. A. Narayanan	...	Metallurgy

M. Tech. Degree Course :

Shri N. R. Neeiakantan	...	Chemical Engineering
Shri L. S. Jayagopal	...	Civil Engineering
Shri P. Raghavan	...	Electrical Engineering
Shri R. Raman	...	Mechanical Engineering

M. Sc. Degree Course :

Shri B. R. Ramachandran	...	Chemistry
Shri R. Part ar athy	...	Mathemat:cs
Shri M. V. Krishnan	...	Physics

Siemens Prizes : For the student with the best academic records in Electrical Engineering Branch of the 5 year B. Tech. and M. Tech. Degree Courses.

5-year B. Tech. Degree Course :

Shri N. S. Sridharan	...	Electrical Engineering (H. C)

M. Tech. Degree Course :

Shri P. Raghavan

(b) INSTITUTE MERIT PRIZES

Name of the Student & Year		*Prize awarded*	*Value of Prize Rs.*
5-year B. Tech. Degree Couse :			
FIRST YEAR :			
Shri S. Ramdhyani	...	I	50
Shri N. Subbiah	...	II	25
Shri S. Narayanamurthy	...	II	25
Shri V. Jagadeesh	...	II	25
SECOND YEAR :			
Shri T. T. Jagannathan	...	I	50
Shri S. Ramakrishnan	...	II	25
THIRD YEAR :			
Mechanical Engineering :			
Shri J. Srinivasan	...	I	50
Civil Engineering :			
Shri M. Hariharan	...	I	50
Electrical Engineering :			
Shri Vikram Prabhu	...	I	50
Chemical Engineering :			
Shri R. Mutharasan	...	I	50
Metallurgy :			
Shri V. Nagarajan	...	I	50
Aeronautical Engineering :			
Shri D. L. N. Sastry	...	I	50
FOURTH YEAR :			
Mechanical Engineering :			
Shri K. Chandrasekharan	...	I	50
Civil Engineering :			
Shri Pawan Kumar Jain	...	I	50
Electrical Engineering :			
Shri D. Santhanam	...	I	50
Chemical Engineering :			
Shri S. Sivaramakrishnan	...	I	50

Metallurgy :			
Shri Dilip Bhandarkar	...	I	50
Aeronautical Engineering :			
Shri Dev Dayal Bansal	...	I	50
3-year B. Tech. Degree Course :			
FIRST YEAR :			
Shri P. Raghavendran	...	I	50
SECOND YEAR :			
Mechanical Engineering :			
Shri G. Raghavan	...	I	50
Civil Engineering ;			
Shri Ravinder Pal Singh Malik	...	I	50
Electrical Engineering :			
Kumari M. A. Vedavalli	...	I	50
Chemical Engineering :			
Shri T. N. Kannan	...	I	50
M. Sc. Degree Course :			
FIRST YEAR :			
Physics :			
Shri B. K. Satyan	...	I	50
Chemistry :			
Shri G. Kothandaraman	...	I	50
Mathematics :			
Shri R. Rathakrishnan	...	I	50
M. Tech. Degree Course :			
FIRST YEAR :			
Mechanical Engineering :			
Shri S. Sampath	...	I	50
Civil Engineering :			
Shri B. V. Subramanian	...	I	50
Electrical Engineering :			
Shri T. J. Vitto	...	I	50
Chemical Engineering :			
Shri M. Balasubramanian	...	I	50

APPENDIX V-A.

Terms aad conditions for the award of the Rajalakshmi Krishnamurti (English) Prize.

This Prize was founded by Prof. R. Krishnamurthi on the eve of his relinquishing the post of Professor of English and Head of the Department of Humanities in the Indian Institute of Technology and was accepted by the Board of Governors at its meeting held on the 29th July, 1966.

The endowment at present consists of Rupees Five Hundred only invested in Fixed Deposit.

The prize will be awarded subject to the following terms and conditions :—

1. The prize shall be called "The Rajalakshmi Krishnamurti (English) Prize".

2. The annual interest accruing on the capital amount shall be utilised for the award of the Prize.

3. The Prize shall be awarded on the Institute Day.

4. The Prize shall be awarded annually in the shape of books (English Literature) with effect from the 1967-'68 academic session.

5. The Prize shall be awarded each year to the student in the third year class of the five-year B. Tech. Degree Course, who is adjudged the best student on the basis of his performance in the subject 'English' during his first and second years taken together.

6. If, in any year, the Prize be not awarded, the unexpended interest shall be added to the corpus of the fund.

7. The Board of Governors of the Institute shall have the power to make such changes in the conditions of the award as new circumstances may render desirable.

APPENDIX VI

TECHNICAL TEACHER TRAINEES

Name of the Teacher Trainee	Guide	Date of Joining	Date of Completion	Whether enrolled for M. Tech. or not	Teaching work done		
					Course	Year	Subject
Department of Aeronautics & Applied Mechanics :							
1. Shri M. N. Siddhanty	Dr. B. V. A. Rao	8-11-1965	7-11-1968	Yes	5-year B. Tech.	III-year	Applied Mechanics Laboratory
					3-year B. Tech.	I-year	Applied Mechanics II
					During summer, assisted Dr. B.V.A. Rao and Prof. A. H. Church in teaching Vibrations to participants of Sequential Summer School for Technical Teachers.		

APPENDIX VI—(*contd.*)

TECHNICAL TEACHER TRAINEES

Name of the Teacher Trainee	Guide	Date Joining	Date of Completion	Whether enrolled for M. Tech. or not	Teaching work done		
					Course	Year	Subject
Department of Civil Engineering :							
1. Shri M. Inbasakaran	Dr. P. C. Varghese	16-8-1965	15-8-1968	Yes	5-year B. Tech.	II-year	Engineering Materials
					do	III-year	Civil Engineering Drawing
					do	V-year	Public Health Design and Drawing.
2. Shri B. T. Chenchiah	Dr. V. Sethuraman	28-8-1965	27-8-1968	Yes	do	IV-year	Docks and Harbour
					3-year B. Tech.	III-year	do
					5-year B. Tech.	III-year	Fluid Mechanics

						do	II-year	Civil Engineering Drawing	
						do	V-year	Irrigation Design and Drawing	
						3-year B. Tech	I-year	Engineering Materials	
3.	Shri S. Rangarajan	Dr. P. C. Varghese	16-9-1965	15-9-1968	Yes	5-year B. Tech	IV-year	Estimating and concrete Laboratory project.	
						do	V-year	P. H. Design and Drawing	
4.	Shri M. Ragunathan	Dr. G. Rouve	16-9-1965	15-9-1968	Yes	do	IV-year	Irrigation	
						3-year B. Tech	II-year	Hydraulics	
						5-year B. Tech	V-year	Electives	
						3-year B. Tech	I-year	Civil Engineering Drawing	

APPENDIX VI—(*contd.*)

TECHNICAL TEACHER TRAINEES

	Name of the Teacher Trainee	Guide	Date of Joining	Date of Completion	Whether enrolled for M. Tech. or not	Teaching work done		
						Course	Year	Subject
5.	Shri C. Vijayan	Shri K. S. Sankaran	1-9-1966	31-8-1969	Yes	5-year B. Tech	II-year	do
						3-year B. Tech	I-year	do
6.	Shri T. R. Ramanna	Dr. P. C. Varghese	9-8-1966	1-year term	No			
Department of Electrical Engineering :								
1.	Smt. Sarasu Eapen John	Dr. H. W. Meyer	3-9-1965	2-9-1968	Yes	5-year B. Tech	III-year	Electrical Measurements Laboratory
						do	IV-year	Electrical & Mechanical Measurements Laboratory
						3-year B. Tech	II-year	Mechanical Electrical Technology

2.	Shri C. Eswaran	Dr. H. W. Meyer	6-9-1965	5-9-1968	Yes	5-year B. Tech.	IV-year Mechanical	Measurements Laboratory
						do	III-year Chemical & Metallurgy	Electrical Technology
3.	Shri K. Ramar	Dr. H. W. Meyer	6-9-1965	5-9-1968	Yes	5-year B. Tech.	III-year Electrical	Electrical & Magnetic circuits (Tutorial)
						3-year B-Tech.	I-year Electrical	Electrical Engineering (Tutorial)
						5-year B-Tech.	IV-year Electrical	Measurements Laboratory
						do	III-year Electrical	do
						3-year B. Tech.	I-year	do

APPENDIX—IV(*Contd.*)

TECHNICAL TEACHER TRAINEES

	Name of the Teacher Trainee	Guide	Date of Joining	Date of Completion	Whether enrolled for M. Tech. or not	Teaching work done		
						Course	Year	Subjeet
4.	Shri M. Someswara Rao	Dr. M. Venugopal	20-9-1965	19-9-1968	Yes	3-year B. Tech.	III-year Electrical	Switchgear & Protection
						5-year B. Tech.	III-year Mechanical & Aeronautical	Electrical Technology (Tutorial)
						do	V-year Electrical (H. C.)	High Voltage Laboratory
						3-year B. Tech.	III-year Electrical (H. C.)	do

						5-year B. Tech.	IV-year HC & LC	Drawing
5.	Shri G. T. Manohar	Dr. P. Venkata Rao (From April '67)	20-9-1965	19-9-1968	Yes	5-year B. Tech.	IV-year Electrical	Drawing
						do	IV-year Mechanical	Measurements Laboratory
						do	III-year Electrical	do Electrical Technology
						do	III-year Chemical & Metallurgy	
6.	Shri K. Narayana Bhat	Dr. G. N. Garud	8-8-1966	7-8-1969	Yes	3-year B. Tech.	III-year Electrical (HC)	Machines Laboratory
						5-year B. Tech.	V-year Electrical (HC)	do
						do	IV-year Electrical & Mechanical	do

APPENDJX VI—(*contd.*)

TECHNICAL TEACHER TRAINEES

	Name of the Teacher Trainee	Guide	Date of Joining	Date of Completion	Whether enrolled for M. Tech or not	Teaching work done		
						Course	Year	Subject
7.	Shri M. C. Vaidyalingam	Dr. K. P. Rajappan	8-8-1966	7-8-1969	Yes	5-year B-Tech.	III-year Electrical	Measurements Laboratory
						3-year B. Tech	I-year Electrical	Basic Electronic Engineeting (Tutoriai)
8.	Shri R. Karivaradarajan	Dr. V. Seshadri	9-8-1966	8-8-1969	Yes	5-year B. Tech.	V-year Electrical	do Machines Laboratory
						do	IV-year Electrical	do
						do	IV-year Mechanical	do
						3-year B. Tech.	III-year Electrical	do

9.	Shri C. Vekata-seshaiah	Dr. M. Venugopal	3-9-1966	2-9-1969	No	5-year B. Tech.	V-year Electrical	High Voltage Engineering
						3-year B Tech.	III-year Electrical	Laboratory do
						5-year B. Tech.	V-year Electrical (HC)	Power system (Electives)
						3-year B. Tech.	III-year Electrical (HC)	do
10.	Shri S. Yuva-rajan	Dr. V. G. K. Murthi	5-10-1965	4-10-1969	Yes	5-year B. Tech.	III-year Electrical	Measurements Laboratory
						3-year B. Tech.	III-year Electrical	Control Engineer-ing (Tutorial)
						do	I-year Electrical	Basic Electronic Engineering (Tutorial)
11.	Shri R. Parimel-alagan	Dr. K. P. Rajappan	10-10-1966	9-10-1969	Yes	5-year B. Tech.	III-year Electrical	Measurements Laboratory
						3-year B. Tech.	I-year Electrical	Basic Electronic Engineering (Tutorial)
						do	III-year Electrical	Control Engineer-ing Electrical (Tutorial)

APPENDIX VI—(*contd.*)

TECHNICAL TEACHER TRAINEES

Name of the Teacher Trainee	Guide	Date of Joining	Date of Completion	Whether enrolled for M. Tech or not	Teaching work done		
					Course	Year	Subject
Department of Mechanical Engineering :							
1. Shri K. V. Chalapathi Rao	Dr. Ing. Lutz	17-8-1965	16-8-1968	Yes	5-year B. Tech.	III-year Civil	General Mechanical Engineering
2. Shri G. John Sunder Rao	Dr. G. Stahl/Dr. B. S. Murthy	16-8-1965	15-8-1968	Yes	3-year B. Tech.	III-year Mechanical	Heat Engines II (ICE)
					5-year B. Tech.	IV-year Mechanical & Aeronautical	I. C. Engines Laboratory
					3-year B. Tech.	III-year Mechanical	I. C. Engines Laboratory
					5-year B. Tech.	III-year Aeronautical, Chemical, Electrical & Mechanical	General Machines Laboratory

3.	Shri K. Rama-murthy	Dr. V. C. Venka-tesh	10-8-1966	9-8-1969	Yes	5-year B. Tech.	V-year Mecha-nical	Machine Tool Laboratory
						do	V-year Chemical	Production Technology
						do	IV-year Mechanical	Metrology
4.	Shri M. Ravindran	Dr. W. Scheer	9-8-1966	8-8-1969	Yes	5-year B. Tech.	IV-year	Tutorials
						do	III-year Mecha-nical, Chemical, Aerona-utical & Metallurgy	General Mechines Laboratory
5.	Shri N. Venkat-rayulu	do	18-8-1966	17-8-1969	Yes	5-year B. Tech.	IV-year	Tutorials
						do	III-year Mecha-nical Chemical, Aerona-utical & Metallurgy	General Machines Laboratory

APPENDIX VI—(*contd.*)

TECHNICAL TEACHER TRAINEES

	Name of the Teacher Trainee	Guide	Date of Joining	Date of Completion	Whether enrolled for M. Tech or not	Teaching work done		
						Course	Year	Subject
6.	Shri V. Nagarajan	Dr. Ing. Lutz	10-8-1966	9-8-1969	Yes	3-year B. Tech.	III-year Mechanical	Heat Transfer (Tutorial)
7.	Shri T. Nagarajan	Shri G. V. N. Rayudu	9-9-1966	8-9-1969	Yes	5-year B. Tech.	III-year Mechanical	Design of Machine Elements (Tutorial)
						3-year B. Tech.	II-year Mechanical	do
						5-year B. Tech.	II-year	Descriptive Geometry
						do	III-year	General Machines Laboratory

Printed at Gotety Printers, 21 New Tandavagramani Street, Tondiarpet, Madras-21.