

**INDIAN INSTITUTE
OF
TECHNOLOGY
MADRAS**

INDIAN INSTITUTE
OF
TECHNOLOGY
MADRAS

TWELFTH ANNUAL REPORT
1970-71

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Visitor: THE PRESIDENT OF INDIA

The Council of the Indian Institutes of Technology

Chairman :

Sri S. S. Ray, Minister for Education and Social Welfare,
Government of India, New Delhi.

Members :

Sri Biren Mookherjee, Chairman,
Board of Governors, I.I.T. Kharagpur.

Sri G. L. Mehta, Chairman,
Board of Governors, I.I.T., Bombay.

Sri H. V. R. Iengar, Chairman,
Board of Governors, I.I.T., Madras.

Sri Padampat Singhanian, Chairman,
Board of Governors, I.I.T., Kanpur.

Prof. M. S. Thacker, Chairman,
Board of Governors, I.I.T., Delhi.

Prof. R. Choksi, Chairman,
Council of the Indian Institute of Science, Bangalore.

Dr. D. S. Kothari, Chairman,
University Grants Commission, New Delhi.

Dr. Atmaram, Director-General,
Council of Scientific and Industrial Research, New Delhi.

Brig. S. K. Bose, Director,
I.I.T., Kharagpur,

Dr. P. K. Kelkar, Director,
I.I.T. Bombay.

Dr. A. Ramachandran, Director,
I.I.T., Madras.

Dr. M. S. Muthana, Director,
I.I.T., Kanpur.

Prof. R. N. Dogra, Director,
I.I.T., Delhi.

Dr. S. Dhawan, Director,
Indian Institute of Science, Bangalore.

Representatives of the Central Government :

Dr. B. D. Nag Chaudhuri,
Scientific Adviser to the Minister of Defence,
New Delhi.

Sri S. D. Nargolwala,
Financial Adviser,
Ministry of Finance,
New Delhi.

Sri G. K. Chandiramani,
Secretary,
Ministry of Education & Social Welfare,
New Delhi.

Representatives of Parliament :

Sri V. N. Jadhav
Member,
Lok Sabha,
162, North Avenue,
New Delhi.

Sri K. K. Nayar,
Member,
Lok Sabha,
2, South Avenue,
New Delhi.

Sri Arjun Arora,
Member,
Rajya Sabha,
P. B. No. 451, Kanpur.

Representative of the All India Council for Technical Education :

Prof. P. J. Madan,
Pro.-Vice-Chancellor,
Baroda University,
Baroda.

Nominees of the Visitor :

Sri G. Pande,
7, Park Lane,
Lucknow.

Dr. M. N. Dastur,
31, Chowringhee Road,
Calcutta.

Sri Chalapathi Rao,
Chairman, Heavy Engineering Corporation,
Ranchi.

Dr. H. N. Sethna,
Director, Bhabha Atomic Research Centre,
Bombay.

Sri S. M. Patil,
Chairman & Managing Director,
Hindustan Machine Tools Ltd.,
Bangalore.

Secretary :

Sri G. N. Vaswani,
Deputy Educational Adviser (Tech.),
Ministry of Education & Social Welfare,
Government of India,
New Delhi.

The Board of Governors

The Board of Governors met two times during the year. The following were the members of the Board :-

Chairman :

Sri H. V. R. Iengar,
Chairman, The E.I.D.—Parry Group,
Dare House, P. O. Box 12, Madras-1.

Nominees of the State Governments :

Dr. B. L. Shanthamallappa,
Director of Technical Education,
Government of Mysore,
Bangalore.

Sri T. R. Doss,
Director of Technical Education,
Government of Andhra Pradesh,
Hyderabad.

Sri S. Peer Mohammed,
General Manager,
ALIND, Kundara, Kerala.

Sri P. Sivalingam,
Director of Technical Education,
Government of Tamil Nadu, Madras.

Nominees of the Council :

Sri C. B. Cariapa,
General Manager,
Bharat Heavy Electricals Ltd.,
Unit : Ramachandrapuram,
Hyderabad.

Sri A. K. Kaderkutty,
The Western India Plywoods Ltd.,
P.O. Baliapatam, Cannanore District,
Kerala.

Sri M. K. Raju,
Managing Director,
India Pistons Ltd.,
Madras.

Dr. Y. Nayudamma,
Director,
Central Leather Research Institute,
Adyar, Madras.

Director :

Dr. A. Ramachandran,
Indian Institute of Technology, Madras.

Nominees of the Senate :

Dr. D. Venkateswarlu
Professor and Head of the Department of Chemical Engineering,
Indian Institute of Technology, Madras.

Dr. Hans Wagner,
Professor, Department of Applied Mechanics,
Indian Institute of Technology, Madras (till 30-11-1970)

Dr. A. Klein,
Professor, Department of Applied Mechanics,
Indian Institute of Technology, Madras (from 1-12-70)

Secretary :

Sri C. V. Sethunathan,
Registrar, Indian Institute of Technology, Madras.

The Finance Committee

Chairman :

Sri H. V. R. Iengar,
Chairman,
Board of Governors,
I.I.T., Madras.

Members :

Sri B. Sen,
Deputy Educational Adviser,
Ministry of Education and Social
Welfare, New Delhi.

Sri O. P. Mohla,
Deputy Financial Adviser,
Ministry of Finance,
New Delhi.

Dr. B. L. Shantamallappa,
Director of Technical Education,
Government of Mysore,
Bangalore.

Sri C. B. Cariapa,
General Manager,
Bharat Heavy Electricals Ltd.,
Hyderabad.

Dr. A. Ramachandran,
Director,
I.I.T., Madras.

Secretary :

Sri C. V. Sethunathan (Registrar)

The Buildings and Works Committee

Chairman :

Sri H. V. R. Iengar,
Chairman,
Board of Governors,
I.I.T., Madras.

Members :

Dr. A. Ramachandran,
Director,
I.I.T., Madras.

Sri V. Narayanan,
Superintending Engineer,
C.P.W.D., Madras.

Dr. P. C. Varghese,
Professor and Head of the Department of
Civil Engineering, I.I.T., Madras.

Sri K. D. Karambayya,
Chief Engineer (Buildings)
P.W.D., Madras.

Sri C. S. Subramaniam,
Executive Engineer,
I.I.T., Madras.

Secretary :

Sri C. V. Sethunathan (Registrar)

The Senate

The Senate met four times during the year. The following were the members :-

Chairman :

Dr. A. Ramachandran (Director).

Members :

Dr. M. K. Achuthan
Dr. R. S. Alwar (from 4-1-1971)
Dr. V. Anantaraman (from 4-1-1971)
Dr. B. V. A. Rao (from 4-1-1971)
Prof. M. Bantel
Dr. P. Besslich
Dr. T. K. Bose
Dr. N. V. Chandrasekhara Swamy
(from 4-1-1971)
Prof. N. K. Datta
Mr. H. J. Ebert
Dr. (Mrs.) Edith Butenuth (till 27-8-1970)
Dr. H. P. Gerken
Dr. T. Gopichand
Dr. Gottfried Butenuth (till 27-8-1970)
Dr. M. C. Gupta
Prof. R. K. Gupta
Dr. H. Heitmann (till 12-7-1970)
Dr. E. H. Hohmann (till 5-10-1970)
Mrs. Ingrid Davids
Dr. Jens-Ulrich Davids
Dr. Joachim Holtz
Dr. A. Klein (till 21-4-1971)
Dr. J. C. Kuriacose
Sri S.S. Mani
Dr. G. Mennig
Dr. H. W. Meyer (till 30-9-1970)
Dr. B. S. Murthy
Dr. V. G. K. Murti
Prof. R. G. Narayanamurthi
Dr. L. Narjes (till 13-3-1971)

Sri V. S. Nazir Ahmed
Dr. S. D. Nigam
Dr. K. A. V. Pandalai
Dr. J. Plaehn (till 4-4-1971)
Dr. K. P. Rajappan (from 4-1-1971)
Dr. E. G. Ramachandran
Dr. C. Ramasastry
Dr. D. V. Reddy
Dr. G. Rouve (till 12-8-1970)
Dr. F. W. Rutloh (till 23-2-1971)
Prof. S. Sampath (Dy. Director)
Dr. K. S. Sankaran
Dr. M. V. C. Sastri
Dr. V. Sethuraman
Dr. A. K. Sreekanth (from 4-3-1971)
Dr. R. Srinivasan
Dr. S. K. Srinivasan
Dr. V. Srinivasan
Dr. K. Srinivasaraghavan
Dr. P. Srinivasa Rao (Senior Warden)
Dr. N. R. Subramanian (from 1-3-197)
Dr. P. C. Varghese
Dr. R. Vasudevan
Dr. P. Venkata Rao
Dr. V. C. Venkatesh
Dr. D. Venkateswarlu
Dr. M. Venugopal
Dr. H. Wagner (till 31-8-1970)
Dr. H. W. Wagener (till 11-2-1971)
Dr. H. E. D. Zuern (till 9-3-1971)

ominees of the Chairman, Board of Governors :

Prof. T. Balakrishnan Nayar,
"Chitra", Kilpauk Garden Road, Madras-10
Dr. P. L. Bhatnagar,
Vice-Chancellor, Rajasthan University, Jaipur.
Dr. G. S. Laddha,
Director, A. C. College of Technology, Madras-25

ecretary :

Sri C. V. Sethunathan (Registrar).

REPORT BY THE DIRECTOR

I have pleasure in presenting the Twelfth Annual Report (1970-71) of the Indian Institute of Technology, Madras.

The Institute has completed twelve years of service to the Nation in the cause of technical education and has already reached the stature of a major centre for higher technological education at the post-graduate level as has been intended by the Government of India in declaring the Institutes of Technology to be Institutes of national importance. The Institute has already distinguished itself by the stress that it lays on the acquisition of technical skills and design capability by all those whom it trains and by a body of Faculty Members who are interested not only in academic work in their disciplines but get themselves involved in grappling with the live and challenging problems of the country's industrial progress in relevant areas. The Institute has also become a major centre for consultation by a number of industries as well by public sector/autonomous undertakings.

The Institute gratefully acknowledges the magnificent aid from the Federal Republic of Germany which has enabled the Institute to build itself up into its present stature.

II. The emphasis on increasing the post-graduate students strength so as to improve on the target ratio of 1 : 2 between the post-graduate and Under-graduate students keeping the overall strength at about 2000 is continuing. The statement below indicates the current position

Student population (Includes part-time registration also)				
	1969-70	1970-71	1971-72	1972-73 (anticipated)
Under Graduates	1281	1172	1235	1200
Post Graduates	398	414	502	550
Research Scholars	245	326	361	350
Total	1924	1912	2098	2100
Ratio: PG : UG.	1 : 2	1 : 1.6	1 : 1.4	1 : 1.3

III. During the year under review, the Institute initiated work in three major Interdisciplinary areas viz.,

- I. Biomedical Engineering Science
- II. Air and Water Pollution
- III. Desalination

Progress in this regard is briefly described below :

A. Biomedical Engineering Science

A full-fledged Biomedical Engineering Science teaching and research Programme has been initiated. The aim of the programme is to provide a framework for all disciplines of Sciences and Engineering to work in the Biomedical areas and contribute to the development of health and medicare systems and procedures. **From the medical view point, the programme caters** to the study of (i) engineering-physics formulation of biomedical systems to provide some insight into their functional mechanisms and to help develop diagnostic procedures (ii) orthopaedics prosthetics-orthotic devices (iii) organ assist and replacement systems (iv) medical instrumentation and (v) medicare and treatment systems. The problems involved in the development of the abovementioned bio-medical systems are studied by involving the input of the various science and engineering disciplines; hence from the science and engineering point of view the programme has the following streams of activity : Mathematical biology, medical physics, medical electronics, electrophysiology, biological controls, bio-transport and biokinetics, biomedical instrumentation and biomechanics. Naturally, faculty members of nearly all the Departments of the Institute are contributing to the programme by offering lectures, working on research projects and guiding research students. Currently four faculty-members are working full-time in bio-engineering; this number is likely to increase in the coming year. The Bio-engineering courses offered as well as the research projects are outlined below. A number of research scholars are working, in the various Departments, on their Master's and doctoral degree dissertations in the Bio-medical area.

The programme has close ties with the neighbouring Madras Medical College and General Hospital. The medical faculty of these institutions contribute to teaching and have collaborative research projects with the Institute's faculty; among the medical departments engaged in collaborative projects are the Artificial Limb Center, the Anatomy Department, the Neuro-surgery Department, the Physiology Department, the Physical Therapy Department and the Urology Department. Collaborative work is also being conducted with the Central Leather Research Institute, the Central Leprosy teaching and research Institute and the neighbouring Council of Scientific and Industrial Research Regional Center.

The programme is the first full-fledged Bio-engineering Programme in India; it does not just emphasise and revolve around any one particular aspect of Bio-engineering, but attempts to foster all disciplines and branches of Biomedical Engineering Science. The rapid evolution of the programme, its Bio-engineering courses of instruction and the research projects being conducted in the framework of the programme has paved the way for a Bio-engineering Center to be established in the near future. **About 20 Research Projects in varied areas have already been initiated.**

During the current academic year, arrangements have been made for lecture-courses in the following subjects at the Master's level :

Bio-Medical Engineering Science ;

Mathematical Biology ;

Medical Physics, and Bio-medical Instrumentation ;

Bio-mechanics ; and

Biological Transport Phenomena and Artificial Organs.

Most of these courses are inter-disciplinary in character, involving close collaboration among interested Faculty-members of the Institute and members of the medical profession who are specialists in one area or another.

B. Air and Water Pollution

The Internal Combustion Engines Laboratory of the Mechanical Engineering Department of Indian Institute of Technology, Madras is engaged actively in the problem of controlling exhaust-pollution. The pollutants in the spark Ignition Engine exhaust are Carbon Monoxide, unburnt Hydrocarbons and Oxides of Nitrogen, whereas the objectionable features in the Compression Ignition Engine exhaust are the black smoke and odour. The following projects are under investigation and their salient features are indicated below :

(a) Emission Control in S. I. Engines by improved mixture distribution and enhanced after-burning :

Mixture preheating enabling operation of the engines with lean mixtures where the exhaust emission is relatively lower—development of a system to preheat the mixture using the waste heat of the exhaust gases. Inlet manifolds designed to promote mixture circulation to lower the exhaust emissions—A balanced manifold designed and tested—study of comparative merits of mixture distribution with injection versus carburetion.

(b) Development of a Stratified Charge Engine :

The concept allows the use of extremely lean mixtures to reduce exhaust emission with improvement in part load efficiency—An available diesel engine converted into a stratified charge engine and operates successfully on as lean a mixture as 30 : 1 as against a ratio of 17 or 18 : 1 in conventional engines—work in progress on optimising combustion chamber design for minimum exhaust emission.

(c) Effect of Pre-flame reaction on engine exhaust emission :

Pre-flame reactions in a homogeneous air fuel mixture in S. I. engine affects the nature of energy release pattern, efficiency and exhaust emission. The experimental investigations with reactive and non-reactive fuels to determine the

exhaust emissions and the energy content in the exhaust necessitate the analysis of exhaust gassamples under various operating conditions.

The addition of tetra-ethyl lead to the commercial gasoline to suppress the knocking tendency also affects the nature of exhaust emissions. At present investigation is being carried out on a single cylinder engine, which will be extended to multi-cylinder automobile engines. The effect of decreasing the compression ratio on exhaust emission with unleaded fuel also requires exhaust gas sampling and analysis.

(d) Exhaust Emission related to engine combustion reactions :

Trapping samples during various stages of expansion, verifying theoretical predictions and arriving at optimum operating parameters for minimising exhaust emission.

(e) Control of Smoke Emissions from Diesel Engines :

In co-operation with the Tamil Nadu State Transport Corporation, work is in progress on the control of smoke emissions from buses. A number of buses were selected at random for check. Remedial measures like injector setting, reconditioning of the fuel pumps etc. were carried out and their effectiveness studied. It was established that faulty injector setting is the most frequent cause of excessive smoke emission. It is also necessary to establish the optimum periodicity for injector and pump reconditioning. This is being carried out with the help of the Tamil Nadu State Transport Corporation authorities. The preference of Barium fuel additives in controlling smoke emissions is also being investigated.

(f) Development of an Indigenous Smoke Meter :

Working model on the light extinction principle developed and tested. Improvements and refinements being carried out.

(g) Flame Quenching :

The Thermodynamics & Combustion Engineering Laboratory is actively engaged in the project 'Flame Quenching'. Thorough study of the quench effect in evolving methods to reduce the concentration of unburnt hydrocarbons in the exhaust—Experimental set up completed and further study in progress. This project is also supported by the CSIR.

(h) Electrostatic Precipitation :

The Chemical Engineering Department is actively engaged in the project 'Studies in Electrostatic Precipitation of Fine Solids'. Study of precipitation efficiency of fly ash has been undertaken and has made good progress.

(i) *Public Health Engineering* :

Study of effect of different concentrations of sea water on marine structures—feasibility/study of utilising sea water as mix water—effect of inhibitors like calcium chloride etc. on the above. Monitoring work of Adyar river proposed to be undertaken.

(C) Desalination

The following ideas have been discussed for initiating work

1. Concept of "Progressive Desalination"
2. Improvement of absorption of solar energy by additives
3. Continuous freezing unit
4. Desalination by a centrifuged impeller system with porous blades coated with a thin layer of membrane material
5. Prevention of scale formation in boiler tubes by keeping a fluidized system of fine sand
6. Development of co-polymers between ion exchange resins and cellulose acetate to obtain membranes which can effect separation at low pressures

A unit based on item 1 is under construction. A paper covering the work done so far in this regard was presented at the Chemists Convention held at Madras. Procedure for making membranes has been perfected. A Laboratory Test Stand for testing these is planned in the Heat and Mass Transfer Laboratory.

IV. LONG RANGE INTER—INSTITUTIONAL RELATIONSHIP

(i) **Exchange of Faculty Members**

The Institute has been able to get the services of one Professor from the Indian Institute of Science, Bangalore for appointment as Visiting Professor in the Department of Metallurgy in Foundry Techniques. A proposal has also been received for the exchange of a Faculty Member between this Institute and the Indian Institute of Technology, Kharagpur.

(ii) Relationship has been established between the Structural Engineering Research Centre at Madras, the Central Leather Research Institute, Madras, Space Science and Technology Centre, Thumba, National Aeronautical Laboratory, Bangalore, the Department of Atomic Energy, Government of India, Bombay, Research and Development Organisation for Electrical Industry and this Institute. Some staff members of Space Science and Technology Centre and the Structural Engineering Research Centre have been admitted for research programmes in this Institute and will in due course qualify for research degrees of the Institute (M.S./Ph.D).

(iii) A Special Instruments Laboratory has been set up with a number of sophisticated scientific instruments such as the Analytical Mass Spectrometer, Gas Chromatograph, Nuclear Magnetic Resonance Spectrometer, Electron Spin Resonance Spectrometer, High-resolution Wide Range Infra-red Spectrophotometer, Infra-red Spectrophotometer and High-resolution Ultra-violet Spectrometer. These are also made available to research workers from other Educational Institutions and research Institutions in this region.

(iv) A Centre for Systems and Devices has been set up in the Institute for research and training in the Radar and Communications field under sanction from the Government of India. This Institute is concentrating its efforts in the following fields :

- (1) Signal Processing Techniques
- (2) New Semiconductor Devices
- (3) Control and Guidance Systems

This Project will be for a period of five years initially. Preliminary steps have been taken to procure equipment, put up laboratory buildings and recruit Faculty members for the Scheme.

(v) Assistance to Industry

As in the past, the Institute has been maintaining good liaison with local industries, Government Departments/Organisations etc. Many industrial organisations have availed of the consultancy and testing facilities offered by the Institute. The Institute has also accepted several industrial projects for investigation. A report on Assistance to Industry in the form of consultancy, fabrication, development, and sponsored projects has been brought out.

Some of the important Private Industries, Public Sector/Autonomous undertakings with whom the several departments of the Institute have inter-acted are indicated below :

<i>Private Industries</i>	<i>Public Sector/Autonomous Undertakings</i>
(1) Best and Co., Madras	(1) Mazagon Docks, Bombay
(2) K.C.P. Madras	(2) Integral Coach Factory, Perambur, Madras
(3) Hygrodin Private, Madras	(3) Alkali and Chemical Corporation of India, Madras
(4) Carborandum Universal, Madras	(4) Space Science and Technology Centre, Trivandrum
(5) Hindustan Lever, Bombay	(5) Madras Atomic Power Project
(6) EID Parry, Madras	(6) CPWD, Civil Aviation Depart- ment, Meenambakkam
(7) Crompton Engineering Company, Madras	
(8) English Electric Company of India, Madras	

Private Industries

- (9) Hackbridge-Hewittic and Easun, Madras
- (10) Gears India Private, Madras
- (11) The Madras Race Club
- (12) Madras Fertilisers, Madras
- (13) India Cements, Foundry Division, Madras
- (14) Addisons Paints and Chemicals, Madras
- (15) Mettur Chemicals
- (16) Larson and Toubro, Madras

Public Sector/Autonomous Undertakings

- (7) Highways and Rural Works, Department, Tamil Nadu Government
- (8) Ground Water Cell, UN Development Project, Thanjavur
- (9) Hindustan Shipyard, Vishakhapatnam
- (10) Geological Survey of India, Southern Region, Madras
- (11) Neyveli Lignite Corporation, Neyveli
- (12) Hindustan Teleprinters, Madras
- (13) Heavy Electricals, Bhopal
- (14) Central Machine Tool Institute, Bangalore
- (15) Surgical Instruments Plant, IDPL, Madras
- (16) Indian Railways, Research, Design & Standards Organisation
- (17) Indian Standards Institution, Madras
- (18) Government Mechanised Brick Unit, Madras
- (19) Central Electrochemical Research Institute, Karaikudi
- (20) Offshore Fishing Station, Government of India, Cochin
- (21) Hindustan Photo Films Company, Ootacamund

Besides, the Departments also impart training in their laboratories to outside Engineers/Technicians sponsored by the Government, industry, institutions etc. Messrs Auroville Electronics and Allied Industries Limited, Pondicherry, had their technical assistant trained in the Metallurgy Department. Some Officer-Trainees from the Hindustan Aeronautics Limited, Bangalore are receiving instruction in the Departments of Aeronautical and Mechanical Engineering. Messrs. Mini Machine Tools Limited had their engineer trained in the Metrology Laboratory of the Mechanical Engineering Department. Thirteen trainees from the Advanced Training Institute, Guindy, were also given training in the Metrology Laboratory.

(vi) Sponsored Research Schemes/Projects

The Institute has currently a good number of sponsored Research Schemes/Projects financed by organisations like C.S.I.R., Ministry of Defence, Department of Atomic Energy, Space Science and Technology Centre, American Chemical Society, Research and Development Organisation for Electrical Industry, Government of India and the like.

Department of Aeronautical Engineering :

Design and Development of an air Heater for the Space Science and Technology Centre, Trivandrum

*Department of Applied Mechanics :***Space Science and Technology Centre Scheme :**

1. Angular Motion Simulator for Satellites Design, Development and Testing
2. Structural Integrity of case bonded solid propellant grain

*Department of Chemistry :***A. C.S.I.R. Schemes :**

1. Mechanistic studies on the activities of semiconductor oxide catalysts (Principal Investigator : Dr. J. C. Kuriacose)
2. Studies on photo-chemistry of aromatic hydrocarbons (Principal Investigator : Dr. V. Ramakrishnan)
3. Hydride transfer reactions (Principal Investigator : Dr. C. N. Pillai)
4. Mechanistic studies on catalysed substitution of aromatic compounds (Principal Investigator : Dr. J. Rajaram)

B. American Chemical Society—Petroleum Research Fund :

Catalysis on oxide catalysts (Dr. M. V. C. Sastri)

C. Bristol Laboratories, New York :

Research work on compounds synthesised for the physiological activity (Dr. S. R. Ramadas)

D. P. L. 480 funds :

1. Study of transition metal oxides with special reference to their catalytic properties
2. Platinum group metal complexes—their preparation, structure and role in homogeneous hydrogenation reaction.

*Department of Chemical Engineering :**A. C. S. I. R. Scheme :*

Investigation on promotion of dropwise condensation of steams
(Principal Investigator : Dr. T. Venkatram)

B. Messrs. K. C. P. Limited Madras :

Steam Distribution in Conventional Pans (Principal Investigator :
Dr. T. Venkatram)

C. Space Science and Technology Centre, Trivandrum :

Development, Testing production of insulation material for Project
DPS-4

*Department of Civil Engineering :**C. S. I. R. Schemes :*

1. Investigation on rockfill dams for through and overflow (Principal Investigator : Dr. V. Sethuraman)
2. Experimental studies on flow around bends in open channel (Principal Investigator : Dr. V. Sethuraman)
3. Behaviour of concrete flexural members reinforced with Indian deformed steels (Principal Investigator : Dr. P. Srinivasa Rao)

*Department of Electrical Engineering :**A. C. S. I. R. Schemes :*

1. Studies of radio-waves absorption in the lower ionosphere at Madras (Principal Investigator : Dr. D. K. Banerjee)
2. A fast acting excitation controller for alternators in power stations (Principal Investigator : Dr. A. Kuppurajulu)

B. Department of Atomic Energy :

Design and construction of a demonstration digital computer

C. Research Development Organisation for Electrical Industry :

Development of thyristorized speed control scheme for 3 phase squirrel cage induction motor

*Department of Mechanical Engineering :**A. C. S. I. R. Schemes :*

1. Investigations on crankshaft vibrations and development of vibration dampers for I. C. Engines (Principal Investigator : Dr. B. S. Murthy)

2. Investigation on the concentration of the unburnt hydrocarbons in closed vessel combustion (Principal Investigator : Dr. M. C. Gupta)
- B. Research Development Organisation for Electrical Industry :**
Heat transfer in large electrical machines in the Department of Mechanical Engineering
- C. Industrial Projects :**
 1. Device for the measurement of leather surface areas
 2. Processing of intestine

Department of Physics :

- A. Ministry of Defence Scheme :**
Fabrication of Microwave Test bench especially klystrons
- B. Department of Atomic Energy Scheme :**
Surface Wave Propagation in Crystals

(vii) Union Catalogue of books/periodicals :

The Union Catalogue of scientific periodicals has been compiled, printed and released. The supplement to the Catalogue covering other serials like Proceedings of Conferences or Symposia Memoirs, annuals or directories and reports or monographs of irregular periodicity is being compiled on IBM punched cards for reproduction through computer print out.

(viii) Design and fabrication of laboratory apparatus :

A brochure furnishing information regarding equipments, transducers, instruments and apparatus that have been designed and fabricated in the several Departments of this Institute has already been brought out and circulated and this has stimulated interest among the scientific and technical equipment industry.

(ix) Responsibilities of IITs in improving engineering EDUCATION— Faculty Development, Curriculum Development, In-service training, Summer Institutes, Short term courses etc. :

The Institute conducted the following programmes for faculty development of Engineering College teachers.

1. Two year M.Tech. Degree Course :

Thirteen engineering college teachers from Tamilnadu, Andhra Pradesh, Kerala, Mysore, Jammu and Kashmir and Madhya Pradesh were admitted to the M.Tech. Course. They were admitted to the Departments of Applied Mechanics, Civil Engineering, Electrical Engineering and Metallurgy.

2. Doctoral Programme :

Six engineering college teachers from Kerala and Tamil Nadu were admitted to this course. They were admitted to the Departments of Applied Mechanics, Civil Engineering and Mechanical Engineering.

3. *Short-term in-service course :*

A course in Fluid Mechanics was organized from 16-11-1970 to 11-12-1970. Twenty-eight Engineering College teachers from Andhra Pradesh, Bihar, Gujarat, Kerala, Madhya Pradesh, Maharashtra, Mysore, Orissa, Punjab, Tamil Nadu and Uttar Pradesh participated in the Course.

The Course consisted of lectures and laboratory exercises in Fluid Mechanics and Measurement Techniques. Special Lectures on "Use of SI Units" and on "cavitation of Hydraulic Machinery" were also arranged. The laboratory course consisted of a series of experiments illustrating basic and complicated phenomena in Fluid Mechanics.

4. *Curriculum Development in Mechanical Engineering:*

Under this scheme, a one-week Workshop in Curriculum Development for the First degree course in Mechanical Engineering was conducted in January 1971. Forty seven participants from twenty five engineering colleges participated in the Workshop. An outline of the curriculum content for the five-year bachelor's degree programme in Mechanical Engineering based on the semester system has been worked out. Proceedings of the workshop have been brought out as a publication and copies were sent to all centres interested in Curriculum Development.

(x) **The Institute also conducted the following programmes :**

1. Advance Summer School in 'Tribology & Machine Dynamics'
2. Seminar on 'Particle Technology'
3. Advanced Summer School in 'Design of Chemical Process Equipment'
4. Short term Course on 'Automatic Process Control'
5. Chemistry Symposium and Convention of Chemists
6. Sequential Summer Schools in Civil, Electrical and Mechanical Engineering
7. Seminar on 'Networks and Systems'
8. Seminar on 'Operations Research'
9. Seminar on 'Self-employment of Engineers'
10. Course on 'Quantitative Technique in Management'
11. All India Machine Tool Design Research Conference
12. Summer School in Heat and Mass Transfer
13. Summer School in physics for the National Science Talent Search Awardees

Besides, the Institute was the venue for the conduct of the Seminar on "Reorientation of Technical Education" in the International Education year, in February 1971. The then Union Minister for Education, Dr. V. K. R. V. Rao delivered the inaugural address. The Seminar was attended by a large number of academicians, educational administrators and leading industrialists.

(xi) **Exchange of Professors between IIT and Germany :**

This institute has already, under an Agreement with the Government of the Federal Republic of Germany, a Faculty Exchange Programme. Under this

Programme, eminent Professors from the Technical Universities and Institutions in West Germany visit this Institute on short-term basis similarly senior faculty members from this Institute visit the Technical Universities and Institutions including industrial establishments in West Germany for short duration. Certain other members of the Faculty from the Institute are deputed for advanced study and research in West German Institutions, under this Agreement. Seven members of staff of the Institute were deputed to Germany. Three Professors from West Germany visited the Institute for short periods.

V. INDO-GERMAN AGREEMENT

The second Indo-German Agreement, which was signed in June, 1966 for the continuance of the aid for a further period of 5 years has helped in consolidating and intensifying work in the 20 laboratories established under the First Indo-German Agreement. Five new laboratories are receiving aid under the Second Indo-German Agreement. Senior Indian members of the staff who have been trained as counterparts for the German Experts have been gradually taking over the Laboratories after the completion of the assignment of the German Experts in the Institute. There are at present 10 German Members of staff working in the Institute, comprising 6 Professors One Associate Professor, two Foreman and one Senior Scientific Assistant. Three Professors from West Germany visited the Institute for short periods.

Gift equipment from West Germany to the value of Rs. 4.5 crores has been received by the Institute so far. About Rs. 45 lakhs worth of equipment is expected to be received during the current year.

Six faculty members were deputed to West Germany during the year under the Long Term Scholarship Programmes and two Faculty Members under Short Term Programmes. Three professors from West Germany visited the Institute for short periods. They had fruitful discussions with the Faculty Members of their specialities in the Institute. Their lectures and participation in the programmes of the Departments have been extremely valuable for the development of the Institute.

Third Indo-German Agreement

The Third Indo-German Agreement has since been signed for the further development of the Institute and for the consolidation of the facilities already established by West German collaboration. A modern large scale computer system will be set up at the Institute with West German aid. This facility will cost about Rs. 1.5 crores and will accelerate to a marked extent the tempo of research activities at the Institute.

The Federal Republic of Germany will also be giving, in addition to the above equipment and spares to the various Laboratories already established under the First and Second Indo-German Agreements. Professors in specialised areas and technical experts for the Central Services in the Institute will also be assigned to the Institute for specified periods. Distinguished West German Professors will be visiting the Institute for short periods, so as to continue and

strengthen the already existing academic relationships between the Faculty of the Institute and the Faculties in the Technical Universities in West Germany.

A number of Fellowships will also be offered for faculty members of the Institute for training and study visits in West Germany. The Indian Institute of Technology, Madras is fortunate in having technical collaboration with leading Technical Universities in West Germany since its inception. This has enabled close contacts being established between Industry and the Indian Institute of Technology, Madras, as in West Germany.

The Third Agreement will enable the Institute to reach its cherished goal as a centre of excellence in the field of higher technological education, research and development in India.

VI. CONVOCATIONS

The Institute has held eight Convocations so far. At the Eighth Convocation held on the 31st of July 1971, Prof. M. G. K. Menon, F. R. S., Director, Tata Institute of Fundamental Research, Bombay, was the Chief Speaker. 437 students took their Degrees and Diplomas as detailed below :

Degree	Branch	Number	
Ph.D	Chemistry	4	
	Mathematics	3	
	Physics	2	
	Chemical Engineering	3	
	Civil Engineering	4	
	Engineering Mechanics	2	
	Mechanical Engineering	1	
M.S.	Mechanical Engineering	5	19
	Metallurgy	1	
M.Sc.	Chemistry	16	6
	Mathematics	18	
	Physics	15	
M.Tech.	Aeronautical Engineering	11	49
	Chemical Engineering	13	
	Civil Engineering	17	
	Electrical Engineering	32	
	Engineering Mechanics	5	
	Industrial Engineering	6	
	Industrial Management	8	
	Mechanical Engineering	27	
	Metallurgy	10	
			129

Degree	Branch	Number	
B.Tech	Aeronautical Engineering	20	
	Chemical Engineering	32	
	Civil Engineering	30	
	Electrical Engineering	57	
	Mechanical Engineering	62	
	Metallurgy	29	
		230	
D. I.I.T.	Chemical Engineering Practice	4	4
	Total	437	

VII. RESEARCH WORK AND ALLIED ACTIVITIES

The promotion of research work has been one of the major endeavours of all the Departments of the Institute. Besides full-time scholars, junior Faculty members are enrolled in programmes of work leading to the award of the Ph.D. Degree. During the year under review, 19 scholars qualified for the Ph. D. Degree, bringing the total number of recipients to 82 over the last 7 years.

A publication summarising the research and allied activities of the Departments including Seminars and Symposia attended by the Faculty members and publications of research papers covering the investigations carried out in the Science and Engineering Departments was placed before the Council.

VIII. PUBLICATIONS

A volume entitled 'Studies in Structural Mechanics' consisting of ten technical papers was brought out by the Department of Aeronautical Engineering.

Four more issues of the Journal of Mathematical and Physical Sciences were brought out during this year. The Journal continues to attract original papers from abroad and inside India.

In the Department of Humanities and Social Sciences in addition to the compilation of German Grammar, work on a text book for the teaching of German was completed. A series of technical articles were translated from German to English for INSDOC, New Delhi.

IX. PROGRESS UNDER "CONSTRUCTION"

The Engineering Unit maintained the tempo of activity during this year and a number of buildings and schemes were completed. The completed buildings were handed over for occupation to the concerned departments. The following are the major works completed during the period :

- (i) Central workshop for Electronic and Electrical Measuring Instrument
- (ii) Departmental workshop for Electrical Engineering Department
- (iii) High velocity hammer test installations
- (iv) Air-conditioning the reading rooms in Library Building
- (v) Sub-station for Library and Administration Block
- (vi) Sub-station for Thermodynamics Laboratory
- (vii) Structures Laboratory

The Applied Chemistry Block is in the final stage of construction and is expected to be completed in 1971-72.

Alteration work to the Central Lecture Theatre to make it suitable for Seminars/Conferences is also in progress and is expected to be completed in 1971-72.

The construction of Gas Dynamics Laboratory and first floor over Aero-Elasticity Laboratory has been taken up and the work is in progress.

In addition to the regular building activities, a number of equipments and instruments were installed in the various departments with necessary modifications and changes to suit the requirements of the German planners and suppliers, for smooth and efficient working of the equipments.

Besides the above, various minor works to the buildings of the Institutes Hostels etc, were executed. Maintenance of buildings, water supply, sewage and electricity distribution were also attended to regularly.

The total amount spent on buildings and works during the year 1970-71 was Rs. 32.88 lakhs.

X. STAFF

During the year no fresh German experts was assigned to the Institute.

The following number of German staff members left for West Germany on completion of their assignments.

1. Professors	12
2. Associate Professor	1
3. Assistant Professor	1
4. Senior Scientific Assistants	8
5. Technical staff members	2

During the year, 2 Professors, 6 Associate Professors, 13 Assistant Professors, 14 Lecturers, 16 Associate Lecturers, 11 Senior Technical Assistants and 7 Technical Assistants were appointed. These include the appointment of 2 Mechanics 'A' as Technical Assistants, 4 Technical Assistants as Senior Technical Assistants, 1 Technical Assistant as Associate Lecturer, 1 Senior Technical Assistant as Associate Lecturer, 7 Associate Lecturers as Lecturers, 3 Senior Technical Assistants as Lecturers, 7 Lecturers as Assistant Professors and 5 Assistant Professors as Associate Professors.

2 Assistant Professors, 2 Lecturers, 9 Associate Lecturers, 5 Senior Technical Assistants and 3 Technical Assistants resigned.

XI. BUDGET PROPOSALS

(i) Approved Budget and the expenditure for the year 1970-71 :

Approved Budget (net) 70-71 i. e. Revised Estimates	Rs. 179.00 lakhs
Amount allotted by the Ministry	Rs. 189.00 lakhs
Actual expenditure 1970-71 (net)	Rs. 188.74 lakhs

(ii) Budget proposals for Revised Estimates 1971-72 and Budget Estimates 1972-73 (Figures in lakhs of rupees)

	Actuals for 1970-71	Budget for 1971-72*	Revised Estimates 1971-72 (as approved by Finance Committee)	Budget Estimates 1972-73 (as approved by Finance Committee)
Recurring	143.41	142.05	158.05	181.86
Non-recurring				
Buildings	32.88	32.00	40.00	48.00
Equipments and others	31.13	24.00	30.42	35.53
Total	207.42	198.05	228.47	265.39
Less income	18.68	14.05	15.90	14.60
Net	188.74	184.00	212.57	250.79
German Equipment (Notional)	82.08	45.00	60.00	45.00

*Allocation approved by the Board on the figures finally intimated by the Ministry.

XII. REVIEWING COMMITTEE

The Reviewing Committee held Three Sessions during the year (First session from the 3rd to the 7th of August, 1970; Second session from the 23rd to the 27th of November, 1970; Third session from the 20th to the 22nd of June 1971). With this, the discussion of the draft report by the Reviewing Committee and the finalisation of the report only remained. During the first session, the reviewing committee visited the several Departments/Laboratories/Workshops/Library and had detailed discussions with the Faculty, Indian and German and the Technical Staff. The Committee had also discussions with the Director, the Deputy Director and the Registrar.

During the second session, the reviewing committee considered the response from the Industry and Educational Institutions to the communications sent to them regarding the terms of reference. The committee had discussions with representatives of the Institute Gymkhana, the Heads and Office bearers of the several organisations/associations/amenities in the Institute Campus. The Committee had also discussions with the Council of Wardens, the Senate and the Board of Governors of the Institute.

During the Third Session, the Committee engaged itself in discussions among themselves regarding the Departments and the future of the Institute.



ANNEXURE A

AERONAUTICAL ENGINEERING

The department offers M. Tech/M.S./Ph.D. in Aeronautical Engineering with specialisation in the areas of Structural Mechanics, Aerodynamics and Propulsion. The current developmental and research programmes in these areas are given below :

Developmental Programmes

In the gas dynamics laboratory the supersonic blow down tunnel has been commissioned and at present the calibration is underway. The fabrication work for the induction tunnel has been completed and it is expected to be assembled very shortly.

Most of the developmental projects for the propulsion laboratory such as the liquid and solid propellant rockets, stand burner, supersonic combustion rig and a pebble bed heater are complete.

The work on Structures Laboratory has been completed. There are now 36 experimental set-ups of which 13 are on experimental stress analysis, 15 on beams, 5 on buckling of structures and the rest on general structural engineering. A laboratory manual (Structures) — Volume 1 has been released in this connection.

Research work

(a) Structural Mechanics :

A volume entitled "Studies in Structural Mechanics" consisting of ten technical papers was brought out to honour Dr. N. J. Hoff, Chairman of the Department of Aeronautics and Astronautics, Stanford University, U. S. A. on the occasion of his 65th birthday and was presented to him by Dr. K. A. V. Pandalai, Head of this Department at Stanford University in June, 1971 during the anniversary celebration arranged and participated by the students and friends of Dr. Hoff all over the world. Dr. K. A. V. Pandalai visited George Washington University as Senior Foreign Scientist Fellow of the National Science Foundation and Visiting Research Professor of Engineering and Applied Science, and coordinated for an advanced level course on Structural Dynamics designed for practicing engineers and research scientists working in the area of structural Mechanics.

The research work by the Structural Mechanics group of this Department is mainly concerned with elastic and plastic stress analysis of Plates and Shells,

thermal stress analysis problems, experimental and theoretical investigation of grid works, structural analysis and stability of filament wound and composite structures, vibration of orthotropic and multilayered shells and non-linear vibration of Beams, Plates and Shells.

(b) Aerodynamics :

Stability problems of superposed fluids; Boundary layer stability, Non-linear problems in aerodynamics, Hypersonic Flows; Transonic and Rarefied Flows.

(c) Propulsion :

Supersonic combustion, Solid and liquid propellant rockets, Afterburning rockets, Ramjets and Scramjets, High Temperature Gasdynamics, Nozzle Heat Transfer.

APPLIED MECHANICS

The second batch of seven M. Tech students in Engineering Mechanics graduated in August, 1970 and all of them have been well placed. The M. Tech programme in Mechanical Engineering with Machine Dynamics option will be offered by this Department effective from the academic session 1971-72. The M. Tech (Engineering Mechanics) curriculum was revised to suit the new semester pattern. Currently twelve full-time and ten part-time students are working for their Ph. D. degrees of which one is working under the Quality Improvement Programme. One full-time and one part-time student are working for their M.S. Degrees. Eight students were admitted in August, 1971 for the M. Tech (Engineering Mechanics) programme of which two are under the Quality Improvement Scheme. A new dimension has been added to the Department's growth by the initiation of work in Biomechanics as part of the Interdisciplinary Biomedical Engineering Programme in the Institute.

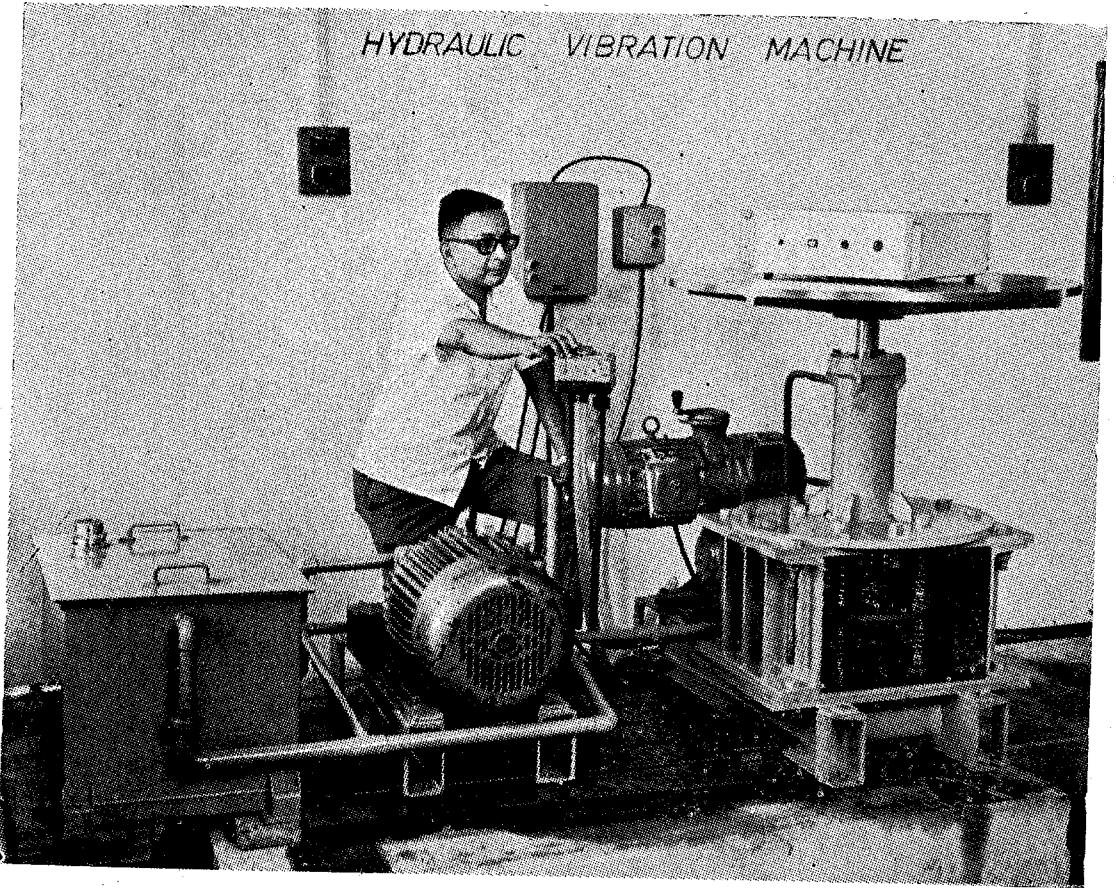
Research Work

The Department was engaged in research in the following fields :

I. Solid Mechanics :

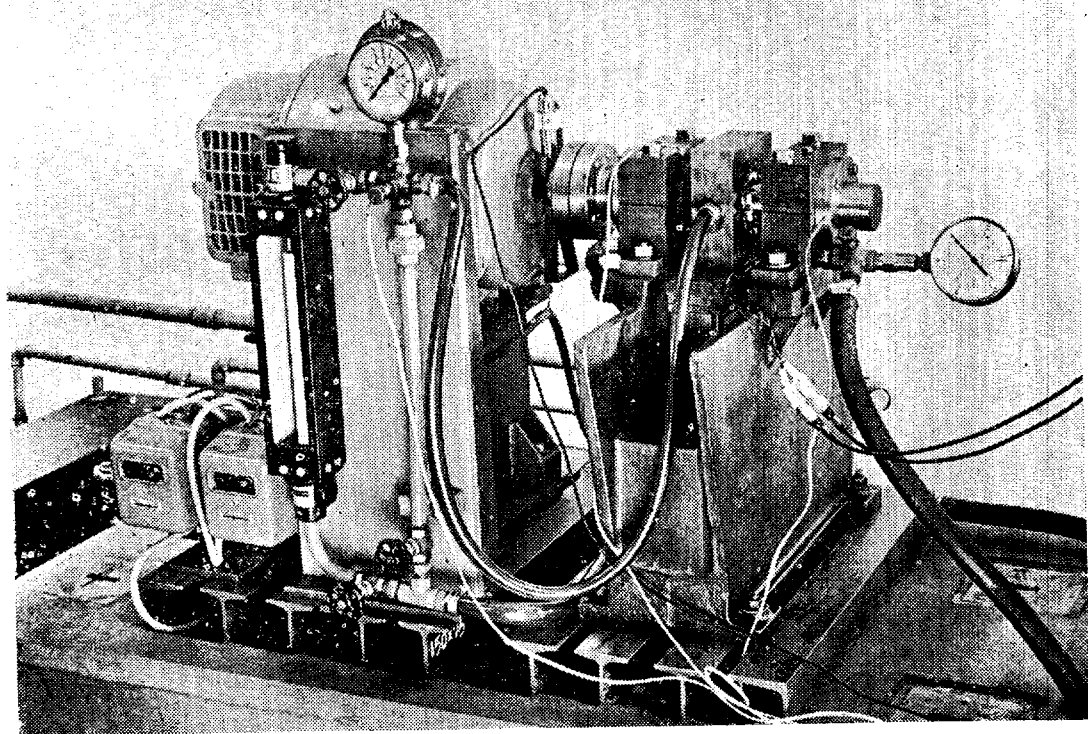
1. The use of Resistive Networks for the Solution of Certain Plate and Shell Problems.
2. Vibrations of Bridge Decks.
3. Temperature Distribution in a Wankel Piston.

HYDRAULIC VIBRATION MACHINE



(Applied Mechanics)

UNIVERSAL JOURNAL BEARING TESTING MACHINE



(Applied Mechanics)

4. Application of Finite Element Method in Elasto-Plasticity.
5. Limit Analysis of Slabs of Arbitrary shapes.
6. Analysis, Design and Testing of a Hyperbolic Paraboloidal Shell.
7. Application of the Finite Element Techniques to Limit Analysis of Slabs.
8. Transfer Matrix Analysis for the Vibration of Ring-stiffened Circular Cylindrical Shells.
9. Limit Analysis of Plates.
10. Vibration Analysis of swept-back Aircraft Wings with Masses attached.
11. Stress Distribution Around Cut-outs in Thin Shells.
12. Some Studies in Sandwich Structures.
13. Large Deflection of skew Plates.
14. Some Studies in Adhesive Joints.
15. Dynamic Relaxation Applied to Large Deflection Problems.
16. Theoretical and Three-dimensional Photoelastic Analysis of Thick plates.
17. Two and Three-dimensional Inelastic Stress Analysis.
18. Design and Development of Strain Rate Controlled Testing Machine.
19. Vibration and Dynamics of Shells.
20. Vibration and Buckling of Plates.
21. Free Vibration and Buckling of Helically Wound Conical Shells.
22. Transient Response of Structures under Thermal and Mechanical Loads.
23. Stress Analysis of Nose-cone Type Structures.
24. Buckling of Helically Wound Multi-layered Circular Cylindrical Shells.
25. Development of a Method for the Experimental Determination of Elastic Compliances of Composites.
26. Analysis of Plates and Shells by Numerical Methods.
27. Nonlinear Viscoelastic Buckling of Columns.

28. Elasto-plastic Analysis of Rectangular Plates.
29. Elasto-plastic and Fully Plastic Behaviour of Anisotropic Plates subjected to Biaxial Tension.
30. Bending, Stability and Vibration Analysis of Rectilinear Anisotropic Plates of Variable Thickness.

II. Tribology and Machine Dynamics :

1. Study of Automobile Shock Absorbers.
2. Determination of Natural Frequencies and Nodal Patterns of Structures by Acoustic Measurements.
3. Rotor Instabilities due to Oil Film in Journal Bearings.
4. Rotor Instabilities in Gas Lubricated Bearing.
5. Response of Structures Excited by Random Acoustic Loadings.
6. Similitude Techniques in Shock and Vibration.
7. Some Theoretical and Experimental Studies Connected with Shock Phenomena.
8. Studies on the Critical Speed and Response of Rotors Supported on Hydrodynamic Journal Bearings.
9. Some studies on Hydrostatic Thrust Bearings.
10. Synthesis of Mechanisms using Analogue Computers.
11. Computer oriented Design of Machine Bed Structures.

III Fluid Mechanics :

1. Experimental Investigation of a Incompressible Turbulent Boundary Layer on a Flat Plate in an Expanding Jet.
2. Experimental Investigation of three-dimensional Turbulent Boundary Layers.
3. Aerodynamic Interference Between Fuselage and Nacelles in case of Rear-mounted Engines.

4. Investigation of the Incompressible Flow in Nozzles.
5. Experimental Investigations of Optimum Axi-symmetric Diffusers.

Design and Development

The following units were designed and developed in the various laboratories attached to this Department :

A Ligtenberg Moire equipment for the analysis of plates, Impact testing machine, Plate buckling frame, Universal testing machine including torsion, Test beds for Dynamic Structural analysis, Shock testing machine, Hydraulic Vibration Machine, Torsional vibration exciter, Bearing testing machine for dynamic loads, Electrodynamic exciter, Hydrostatic bearing testing rig, Air bearing testing machine, Oscillating bed and Turn-table for the big wind tunnel.

General

(1) The Department offered a Winter School in Fluid Mechanics under the Faculty Development Programme in Mechanical Engineering during the period November-December, 1970 and an Advanced Summer School in Tribology and Machine Dynamics (June 1971). It also participated actively in teaching certain courses of the Sequential Summer School in Mechanical Engineering (May/June 1971).

(2) A number of distinguished visitors from abroad delivered lectures in the Department. A number of staff members were deputed to various assignments in India and abroad. All the M.Tech students were sent for practical training to different industries and the research laboratories during the Summer vacation.

(3) Dr. S. T. Ariaratnam, Professor of Civil Engineering, University of Waterloo, Waterloo, Canada, was a Visiting Professor for the period January to August 1971 and offered courses in Random Vibrations and Continuum Mechanics.

CHEMICAL ENGINEERING

Brief review of the activities of the Department in teaching, research and industrial liaison work is given below :

Teaching

M.Tech. programme is revised to provide for depth in fundamentals and a broad choice for specialisation. Five electives, Transfer Operations and Reaction Engineering, High Polymer Engineering, Chemical Plant Design and a number of new courses of both fundamental and applied nature are introduced. The new programme will be effective from 1971-72 academic year.

In line with the Institute's policy of increasing the intake of post-graduate students, the students on rolls are as follows during 1970-71 :

B.Tech....122 (last 3 years); M.Tech. ...44 (I & II Year); M.S....9 and Ph.D... Full time—17 and Part time—9.

A new undergraduate laboratory in Reaction Engineering was set up and 5 experiments were given this year. Efforts to develop the High Polymer Engineering, Process Dynamics and Control were proceeding as scheduled.

Research work

Three scholars completed their Ph.D. work during 1970-71

The first batch of three M. S. scholars submitted their thesis during 1970-71.

The research activities of the department are being categorised, to develop group effort and the main areas of activity and the specializations are given below :

1. Transfer Operations : Fluidization, Heat and Mass Transfer in systems with phase change, Heat and Mass Transfer in systems with chemical change, Rheology, Computer oriented analysis.

2. Reaction Engineering and Thermodynamics : Vapour phase Gas-solid catalytic reactors, Solid-solid reactions, Residence Time Distribution, High temperature reactions, Flow photo reactors.
3. Process Dynamics and Control : Dynamics of fluid beds and Heat exchangers, Heat pipes, *ph* control system.
4. Particle Technology : Fluid energy grinding, Vibration milling, Hydroclones, Flotation, Electrostatic separation, sedimentation, Particle Size Analysis.
5. High Polymer Engineering : Design and Fabrication of Moulds for processing, Rheological behaviour and Material properties, Technology of High polymers.
6. Chemical Plant Design : Vessel design, corrosion engineering, Process Engineering.

Staff members of the department are taking active participation in the inter-departmental R & D Groups—Desalination, Bioengineering, Reaction Technology, Heat and Mass Transfer Fluid Mechanics, Control Engineering.

Industrial Liaison

The department has assisted industry, by under-taking problems involving use of facilities available in the department, participation in testing new design methods and handled about 30 projects.

Dr. D. Venkateswarlu, Dr. M. Ramanujam, Sri B. Pitchumani and Sri R. Sappani have been awarded Inventions Promotion Board award for import-substitution of a Fluid Energy Mill. Dr. T. Gopichand from the Department had participated in the "Task Force" set up by C. L. R. I. for the renovation of Spraying-Drying Leather finishing machine.

CHEMISTRY

Besides teaching under-graduate and post-graduate courses in Chemistry for students of engineering disciplines (B. Tech. and M. Tech. degrees), several improvements have been made in the courses for the post-graduates in Chemistry. In brief, these comprise the introduction in the M.Sc. course of 14 elective subjects covering various branches of specialisation, the up-grading of M. Sc. project-work into a short Research Project and the systemisation of course-work for Ph. D. scholars. During the year, 16 post-graduate students of the Department qualified for the M.Sc. Degree and 4 for the Ph.D. degree.

Research Programmes

The year under review witnessed a further stepping up of the research activity of the Department. Thirty full-time research scholars and six staff members have been engaged in research work for the Ph. D. degree. The subjects of research covered important areas of heterogeneous and homogeneous catalysis, chemical kinetics, polymer chemistry, photochemistry, electro-chemistry, theoretical chemistry, solid state chemistry, co-ordination chemistry, bio-inorganic chemistry, synthetic organic chemistry, organic reaction mechanisms and analytical chemistry. These included more than a dozen projects of potential technological importance, such as the development of new catalysts for industrial reactions, oxidic materials with special electrical and magnetic properties and a new process for organic hydrogenation. The Department had participated actively in two inter-disciplinary Institute Projects of national importance, namely, De-salination of sea-water and Environmental Pollution. Thirty papers were published by the faculty-members in scientific journals in India and abroad, twenty had been accepted for publication and twenty presented at seminars and conferences.

The Department conducted a highly appreciated "Short Course on Interpretation of Mass Spectra" and took a leading role in organising two major conferences in Chemistry, namely the D.A.E. Symposium on Inorganic and Nuclear Chemistry and the Indian Chemical Society's Annual Convention of Chemists. Besides papers were presented at conferences and seminars held elsewhere in the country, such as the annual Seminar on Electro-chemistry held at Karaikudi and the Symposium on Thermal Analysis held at Bombay.

The Department had also rendered assistance by way of analytical, technical and consultancy services to a number of industrial organisations, government departments and educational institutions, in the region.

CIVIL ENGINEERING

During the year, the department continued to offer courses in B.Tech and M.Tech in Civil Engineering and research courses in M.S. and Ph.D. in various branches of Civil Engineering. 30 students of the department qualified for B.Tech and 17 for M.Tech in the three branches namely Hydraulic Engineering, Soil Mechanics and Structural Engineering. 4 candidates were awarded Ph.D. degree. In addition 26 scholars are working for Ph.D. (including part-time) and 2 scholars for M. S. with various specialisation.

Curriculum for one year post-graduate diploma course in Civil Engineering leading to D. I. I. T. (Building Technology) has been finalised, the course is expected to commence in July, 1971.

Structural Engineering Laboratory was commissioned on 31st March, 1971. A get-together on 'Teaching and Research in Structural Engineering' was held on 12th and 13th March, 1971 in which 40 persons from various engineering colleges in southern zone participated.

The department concluded the third sequence of the Sequential Summer School for technical teachers, during May-June 1971 and certificates were awarded to the participants.

Research work

Research activity in the department maintained its growth in variety and volume. During the year, 57 research programmes which include faculty research, M.Tech. M.S. and Ph.D. programmes were on hand. 5 research programmes, sponsored by C. S. I. R. are under way.

In the year under review over thirty technical papers and discussions were published in important technical journal in India and abroad, while thirty more were accepted for later publication. The faculty members and research scholars either submitted or presented twenty six papers at technical conferences/symposia held in India and abroad.

Liaison with industry has been further strengthened and several projects including testing work have been undertaken by the department, for various Government and private agencies.

ELECTRICAL ENGINEERING

During the year under review, 44 students of the Department qualified for the B. Tech. Degree and 32 students for the M. Tech Degree. The total number of persons registered for the Ph. D. Degree was 26, out of which six candidates had completed their research work and had their thesis under review of examiners at the close of the year.

Research Work

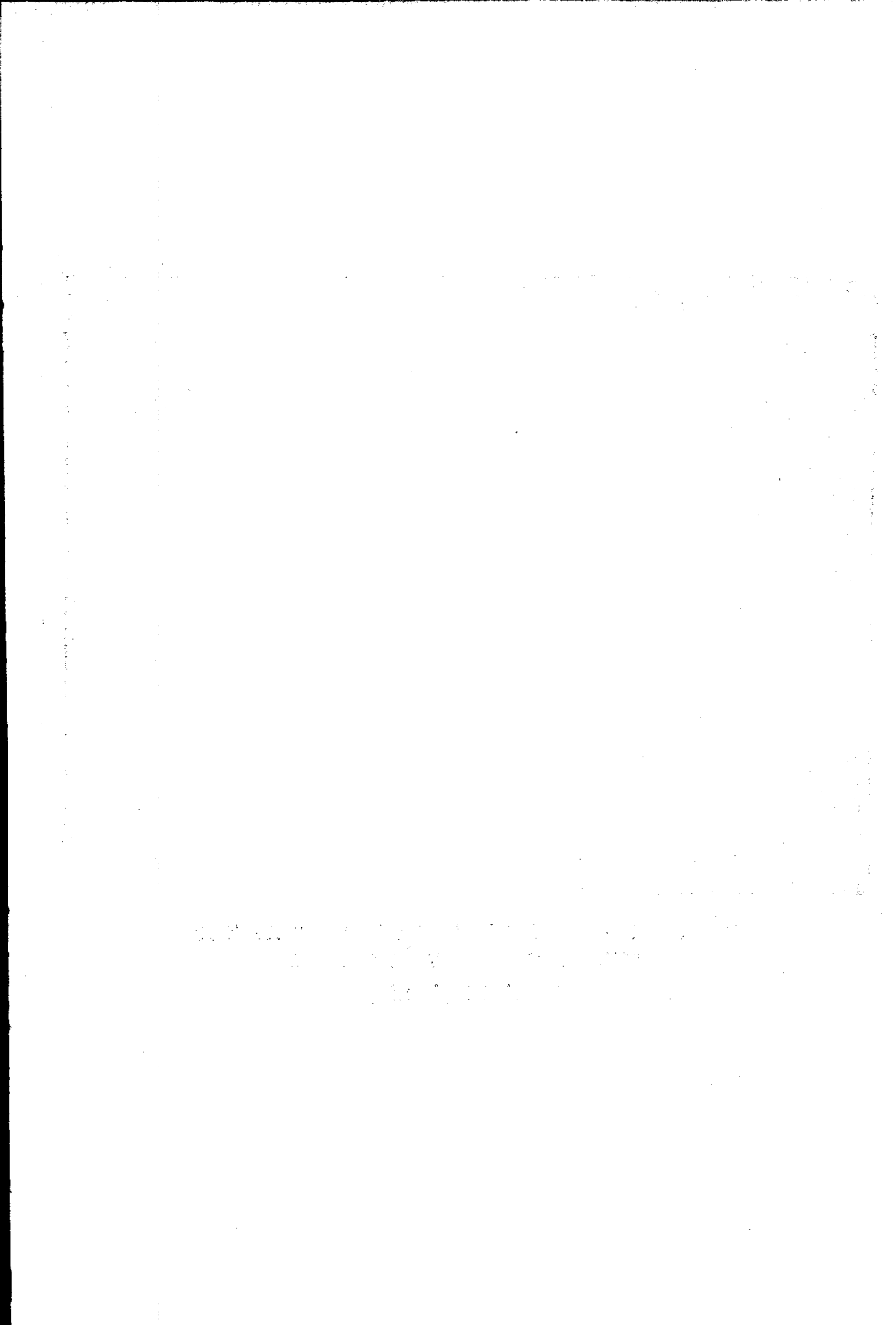
Research activity in the Department had maintained its growth in variety and volume. During the year, about 27 research papers from the Department were published in important technical journals in India and abroad, while 27 more were accepted for publication later. The faculty members of the Department also presented 14 papers at technical conferences in India and abroad.

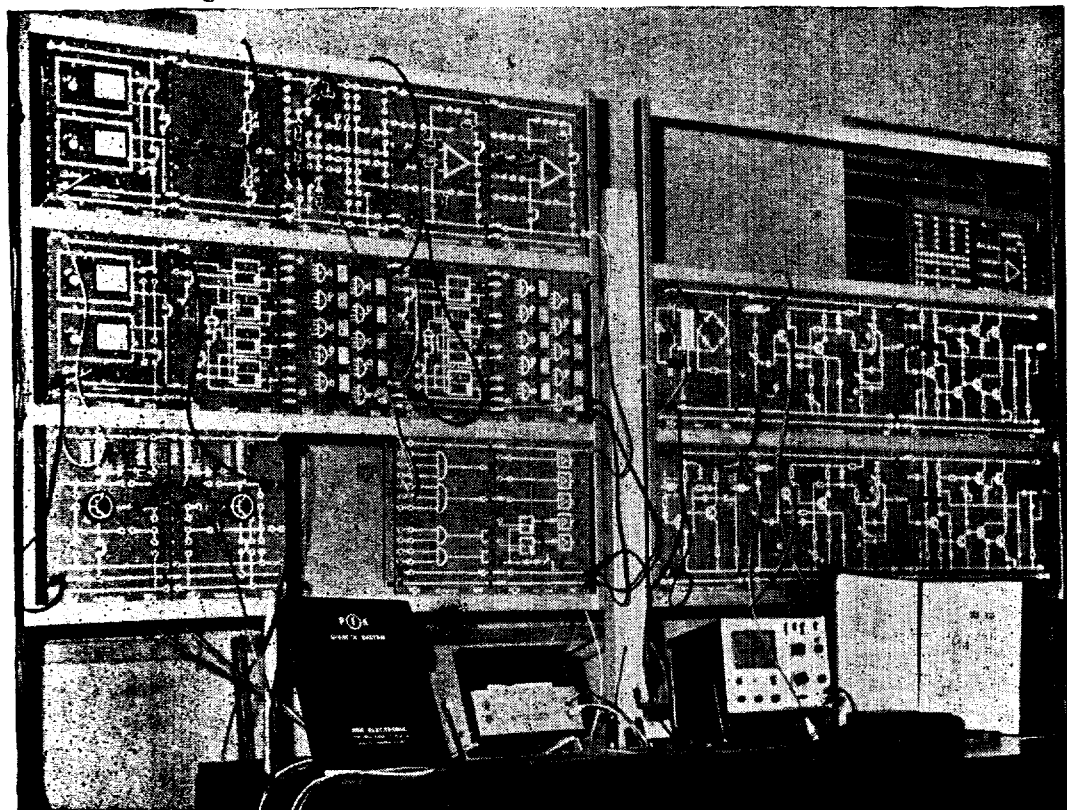
Important Projects

The C.S.I.R. Project on 'Fast Response Excitation Controller for Alternators', was continued during the year in the Power Systems Laboratory. Work on a project on the development of a demonstration digital computer was started in the Digital Techniques Laboratory under the sponsorship of the Department of Atomic Energy. The Control Engineering Laboratory accepted a development contract with the Research and Development Organisation for Electrical Industry, Bhopal for the design and construction of a smooth variable speed thyristor controlled drive for Three Phase Induction Motor, to be implemented during the coming year based on a prototype already nearing completion in the Laboratory. The Control Laboratory has also undertaken to support the Machine Dynamics Laboratory in a project for the design and assembly of a Satellite Motion Simulator for the Space Science and Technology Centre of the Indian Space Research Organisation at Thumba.

Faculty & Laboratory Development

During the year, three staff members returned after training from West Germany, while three other faculty members and two technical staff members left for training there. While Prof. Rutloh of the High Voltage Laboratory left on completing his assignment, Prof. Besslich of the Electronics Laboratory returned after a period of absence for reasons of health. The stay of Prof.





**ELECTRONIC-CIRCUIT TRAINER BOARDS AT THE
ELECTRONICS SERVICE CENTRE**

(Electrical Engineering)

Holtz with the Control Engineering Laboratory has been extended for another year. At the Electronic Instruments Service Centre, Mr. Ansorge has been succeeded by Mr. Rekhop. The set-up of this centre is rapidly nearing completion.

Centre for Systems and Devices

The Ministry of Defence has approved this Department as one of the centres for carrying out research and conducting advanced courses for the benefit of the defence technical personnel. Research activities in the fields of (i) Signal processing techniques (ii) New Semiconductor devices and (iii) Control and Guidance Systems have been recognised for support. Besides, an M.Tech. course on 'Control Systems and Guidance' is to be offered by the Department for the defence personnel who may be deputed to undergo such a course. Additional short-term courses will also be offered by the Centre for the defence personnel as per requirements of the Ministry of Defence from time to time.

HUMANITIES AND SOCIAL SCIENCE

Research work

The fields in which research was going on during the year were Demography, Economic History, Statistics and Industrial Engineering. Two staff members had completed and presented their thesis for the award of the Ph.D. Degree. One more staff member had almost completed the work.

Thirty one research papers were published or presented at various conferences and two had been submitted for publication.

The Department, with a view to encouraging the objective of liaison with industry, had arranged lectures by prominent executives in industry for the benefit of the post-graduate students in Industrial Management and Industrial Engineering. Besides this, the Department had been deputing the post-graduate students to various industries for practical training and project work in various fields covered by the post-graduate programmes. Thirty four industries were covered in this scheme and the I and II year M.Tech. students submitted project reports on the work they did in these industries.

MATHEMATICS

The Department continued to undertake teaching for the B.Tech., M.Tech., M.Sc., M.S., and Ph.D. Courses. The curricula for M.Sc. and M.Tech. courses have been revised.

The faculty members were actively engaged in research work in the following areas :

(i) Continuum Mechanics, (ii) Differential Equations, (iii) Stochastic Processes, (iv) Operations Research, (v) Quantum Mechanics and Fields, (vi) Graph Theory and (vii) Mathematical Biology and Bio-engineering.

About 40 research papers were published during this year.

The Department continued its collaboration in research programme with Hydraulic Engineering Laboratory, Fluid Mechanics Laboratory, Heat and Mass Transfer Laboratory and Industrial Engineering (Operations Research).

Members of the Department participated in some of the Conferences, Symposia, Summer Schools, etc. held in India and abroad.

Few more issues of the Journal of Mathematical and Physical Sciences were brought out during this year. The Journal continues to attract original papers from abroad and inside India.

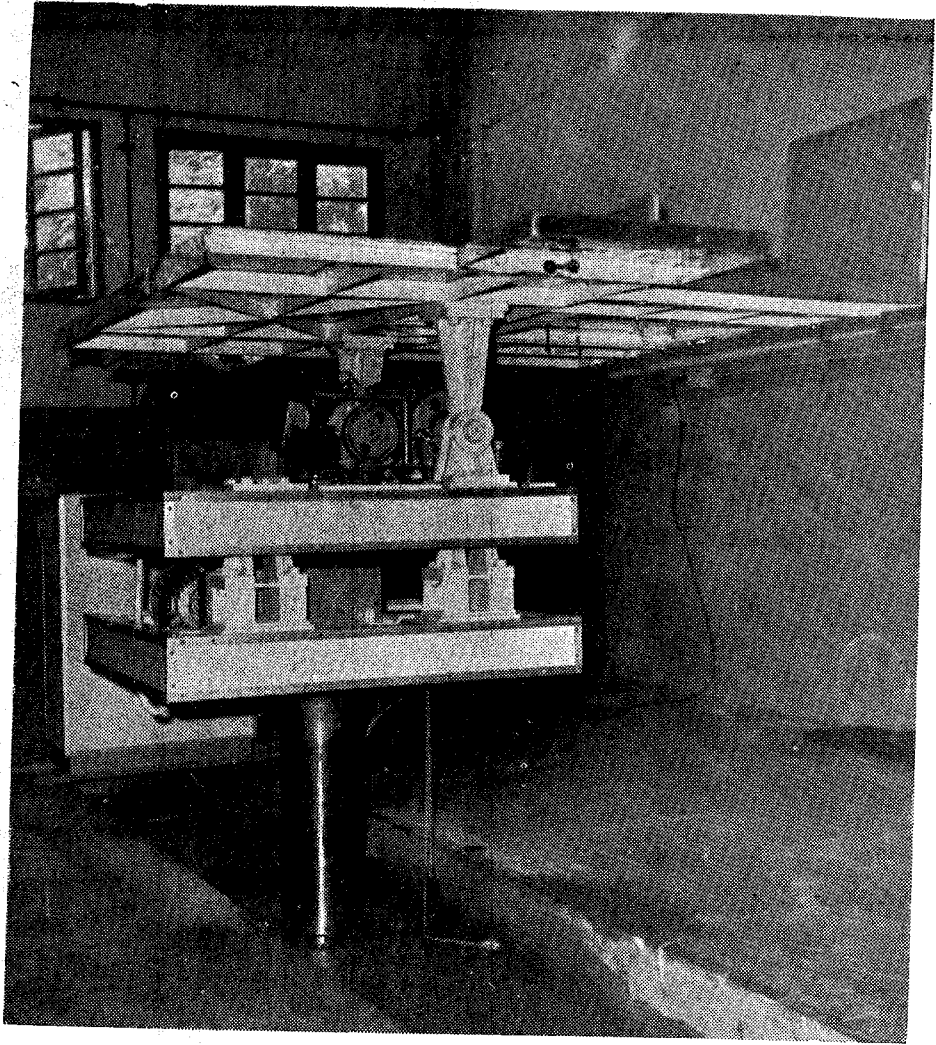
MECHANICAL ENGINEERING

During the year, the Department concentrated in fulfilling the major objectives of the Department : imparting training at the under-graduate level, organising post-graduate course, promoting research activities, undertaking research & developmental work, projects sponsored by industry & other agencies and organising faculty development & continuing education activities.

At the under-graduate level, the Department offered instruction in forty-nine subjects to the students of the B.Tech. Degree course. This included instruction offered to the students of sister Departments as well. Sixty-two students completed their B.Tech degree course.

At the post-graduate level, the Department offered fifty-seven courses to the students of M.Tech. degree in Mechanical Engineering and other branches. At the end of the year twenty-seven students were eligible for award of M.Tech. degree in Mechanical Engineering.

One staff member of the Department completed his requirements for the Ph.D. degree. Five students completed their requirements for the M.S. Degree. Two research scholars have registered for the M.S. degree and six for the Ph.D. Twenty-eight staff members were working as part-time scholars for Ph.D. and seven for M.S. Degree. Forty-two papers were published/presented during the year in various National and International Journals and Conferences.



EQUINE OPERATION TABLE
(Mechanical Engineering)



ELECTRO-CHEMICAL DIE-SINKING MACHINE
(Machine Tools Section, Mechanical Engineering)

Research work

The Department intensified its research activities in the areas of Machine Elements, Mechanical Handling, Production Engineering, Machine Tools, Fine Technics, Heat Transfer & Thermal Power, Internal Combustion Engines, Thermodynamics and Combustion Engineering, Thermal Turbomachines, Hydro Turbomachines, Refrigeration & Air-conditioning.

The second Sequential Summer School in Mechanical Engineering was conducted by the Department during the Summer May/June 1971.

A Summer School in Heat and Mass Transfer was conducted during April/May 1971 for the Engineering College Teachers under the Quality Improvement Programme of the Ministry of Education.

The Fourth Machine Tool Design and Research Conference was organised at the Institute during December, 1970 in collaboration with the Department. Two hundred and twenty delegates participated. Seventy-two papers were presented. A machine tool exhibition was also organised in connection with the conference and many leading firms exhibited their machine tools.

The Curriculum Development Cell of the Department organised a one week workshop on curriculum development in Mechanical Engineering in January, 1971. Thirty professors of Mechanical Engineering from various Universities participated in the programme.

The Department took an active part in organising and conducting the seminar on Environmental Pollution in Madras City, held in June, 1971 at the World University Centre, Madras.

The following projects under C. S. I. R. schemes are in progress at the Department :

1. Investigation on crankshaft vibrations and development of vibration dampers for I. C. Engines.
2. Investigation on the concentration of Unburnt hydrocarbons in closed vessel combustion.

The Department continued to maintain close liaison with local industries. A few of the industries with whom the Department has inter-acted are indicated below :

Engineering Construction Corporation Limited, Madras ; K. C. P. Limited, Madras ; National Co-operative Sugar Mills, Alanganallur ; Best & Co., Madras ; Industrial Diamonds and Tools Co., Madras ; South Arcot Kid Leather (Pvt) Ltd ; R.D.O.E.I. Bhopal ; Agro Engines ; I.A.E.C.

CENTRAL WORKSHOPS

1. Work orders completed during 1970-71 ... 1,854 Nos.
2. Outstanding jobs done during 1970-71

Sl. No.	Description of Job	Department/Laboratory
1.	Calibration Unit for Transduce type pressure Cell.	... Central Leprosy Teaching & Research Centre, Chingleput.
2.	Inclined Multiple Manometer	... Fluid Mechanics Laboratory.
3.	Vertical attachment for Varhist Milling Machine	... Production Engineering Laboratory.
4.	Hydraulic Jack	... -do-
5.	Fly Press	... -do-
6.	Watch Makers Lathe	... -do-
7.	Pneumatic Drill	... Turbomachines Laboratory.
8.	Probe Traversing Mechanism	... -do-
9.	Displacement Apparatus Components	... Aeronautical Engineering.
10.	Punch and Die Assembly	... Production Engineering Laboratory.
11.	Schliern Stand	... Aeronautical Engineering.
12.	Electro-Chemical Grinding Machine Parts	... Production Engineering Laboratory.
13.	Vertical Boring Machine	... -do-
14.	Gears and Parts for Deep hole drilling Machine	... -do-

METALLURGY

Research work

Research activity in the Department increased further with four new registrations for the Ph.D. degree, bringing the total number working in the Department for the doctorate to sixteen. Two new registrations for the M.S. degree were also made.

One thesis for the Ph.D. degree and two for the M.S. were submitted during the period under review. One of the latter has been approved.

Research and project work investigations on the following topics were carried out :—

1. Stabilisation of austenite
2. Dispersion strengthening
3. Elastic constants by ultrasonic excitation
4. Deep drawing of sheet metals
5. Rolling tests on finned tubes
6. Nature of the cold worked state in metallic materials
7. Fatigue hardening and fatigue softening
8. Interaction of fatigue and creep
9. Studies on creep of metals
10. Fatigue of alpha-beta brass
11. Theoretical studies on dislocation groups
12. Properties of vacuum treated steel
13. Recovery of nickel from low-grade ores
14. Electrowinning of nickel and copper using sulphide anodes
15. Notch sensitivity and mechanical strength
16. Electro-chemical behaviour of iron in organic acids
17. Corrosion of metal composites
18. Thermal properties of resin bonded moulding sands
19. Gating and resering of long and narrow freezing range alloys
20. Compacting characteristics of foundry sands
21. Solidification characteristics of long freezing range alloys
22. Trace elements in malleable iron
23. Weldability of dissimilar metals
24. Physical and mechanical properties of welded steels
25. Influence of strain rate on yield stress of metals
26. Press tools for cold extrusion
27. Overall efficiency in metal forming machine tools
28. Production of a gudgeon pin by cold extrusion

The activities of the Local Chapter of the Indian Institute of Metals continued as usual in the Department.

A special meeting on Die Casting Techniques of the I.I.F. Southern Regional Branch was organised with active collaboration and participation of the Metallurgy Department of the Institute. A special meeting was held in the department to discuss some technical problems of cast iron foundries. Some of the staff of the department and some of the senior staff of Ennore Foundries Ltd., one of the leading foundries in India participated. The discussion was preceded by two special lectures delivered by two staff members of the department on certain basic topics in foundry metallurgy.

Assistance in curriculum development and special lectures were given, as on previous occasions, to a few outside agencies.

PHYSICS

Teaching

The Department continued to impart instruction in general physics during the first five semesters for all the undergraduate students. The following elective courses were also offered for the pre-final and final year B.Tech Students.

1. Solid State Physics
2. Laser Physics and Electrical Transport
3. Reactor Physics
4. Technical Acoustics
5. High Vacuum Technology and Nuclear Physics and
6. Material Science

For M. Tech. Degree Course in Engineering, the department offered instruction in

1. Material Science and Technology and
2. Measurements and Instrumentation

The curriculum for the two year M.Sc. course in Physics has been revised and updated. Instruction is offered in the following five special subjects:—

1. Semiconductor Physics
2. Microwave Physics and Resonance Spectroscopy
3. Electronics and Instrumentation

4. Structure and Texture of Solids and
5. Low Temperature Physics

The special subjects now offered form a two-semester course from this year.

Research

More equipment had been received during the year under West German Aid Programme :

1. Phillips PW 1100 X-ray generator with several cameras.
2. Moss bauer spectrometer.
3. Cary model 14 U.V. spectrophotometer.
4. Liquid helium and liquid nitrogen plants.
5. Dielectric test bridge assembly.
6. Several electronic measuring instruments.
7. Microwave generators and accessories for the 3 cm, 8 cm, 4 mm. and 2 mm. bands.
8. A large Leybold crystal growing unit with vacuum system.
9. A.φ. Switched 3=inch Ruby laser and a Helium-neon Laser.

These are being installed and where installation has been completed they are being used in the research work being conducted by the department. The areas of research include at present :

1. Electrical conduction in ionic crystals.
2. Electron spin resonance.
3. Colour centres.
4. Optical properties of solids, piezooptic and magneto optic studies.
5. Nuclear quadrupole resonance.
6. Semiconductors.
7. Lattice dynamics.
8. X-ray crystallography.

CENTRAL LIBRARY

Consolidation rather than innovation was the keynote of library activities for the year. Reading halls and Reprographic section have been airconditioned. The number of readers and their stay in the library have considerably increased since then. Plans are afoot to increase the space in the building by adding two more tiers for stacks of books and one floor for reading halls.

The main statistics of various Library activities are given as follows :

I Membership :	3944	
II Circulation :		
1. No. of Readers visited		65,897
2. No. of volumes issued		41,137
III Inter-Library Loan :		
Borrowed for Institute members		61
Lent out from Institute's Library		44
IV Acquisition :		
1. Books and Bound volumes of periodicals added		6,168
2. Pamphlets & Reports, etc.		5,203
3. Microfilm & Microfiche		156
4. Total accessions up-to-date		98,029
V Current Periodicals : 1285		
By subscription		936
By Exchange/Gratis		260
Added during the year		89
VI Reprography Section :		
Microfilms made	725 feet	
Photocopies supplied	3,220 pages	
VII Bindery : (7309 volumes)		
No. of journals & Books bound and embossed for the Library		5,338
No. of journals and books repaired		504
Other Department's work		1,467

Reprographic & Translation Services

The Library rendered reprographic services and translation of technical literature for the benefit of faculty members from within its resources as well as from outside agencies. The Library of Technical University, Berlin had supplied most of the Xerox copies of literature asked for and our thanks are due to them.

Publications

As part of a programme of effective utilization of library resources of the Institute, it has been planned to bring out a Cumulative Catalogue of Books available in the Central Library into fifteen parts. Seven parts have already been produced for distribution. Similarly, Union Catalogue of Periodical Holdings available in the Libraries of IITs and Indian Institute of Science has been compiled by the Central Library at Madras on behalf of all the participating libraries. It is being printed and would be released soon. The necessary equipment for quick Information Transfer like reprographic facilities and telex communication have also been acquired and commissioned.

ANNEXURE B

ADMISSIONS TO THE COURSES OF STUDY

(for the 1970-71 Session)

The number of students admitted to the various under-graduate and post-graduate courses for the 1970-71 session is given below :

Courses	No. Admitted
B.Tech	250
M.Tech.	175
D. I. I. T.	7
M.Sc.	51

Registration for Research Work :

	Full-time	Part-time
M.S.	16	2
Ph.D.	48	6

STUDENT POPULATION OF THE INSTITUTE (1970-71 Session) :

(As at 30-6-1971)

For the academic session 1970-71, the strength of the students in the different courses and research scholars was as follows :

Course/programme	Full-time	Part-time
B.Tech.	1172	—
M.Tech.	293	21
D. I. I. T.	5	—
M.Sc.	91	4
M.S.	42	13
Ph.D.	122	14
Post Doctoral Fellows.	4	—
	<u>1729</u>	<u>183</u>

The above figure includes 51 students from abroad.

ANNEXURE C

SEVENTH CONVOCATION OF THE INSTITUTE

29th August, 1970

The Seventh Convocation of the Institute was held at 5-00 p.m. on Saturday, the 29th August, 1970 in the Open Air Theatre of the Institute. Dr. Y. Nayudamma, representing the Chairman of the Board of Governors of the Institute, presided over the Convocation. Shri V. V. Giri, the President of India and Visitor of the Institute, was the Chief Speaker. Mr. Gunter Diehl, the Ambassador of the Federal Republic of Germany in India also attended.

The Director conferred the Degrees and Diplomas on 214 candidates, who attended the Convocation and *in absentia* on 346 candidates who could not be present. The Numbers of the graduates in the various categories are given below :

	<i>In person</i>	<i>In absentia</i>	<i>Total</i>
Ph.D. Degree			
Chemical	1	2	3
Chemistry	1	2	3
Civil Engineering	2	—	2
Electrical Engineering	1	—	1
Mechanical Engineering	2	—	2
Mathematics	4	—	4
Physics	4	1	5
M.Sc. Degree			
Chemistry	9	9	18
Mathematics	9	1	10
Physics	4	11	15
M. Tech. Degree			
Aeronautical Engineering	4	6	10
Chemical Engineering	12	7	19
Civil Engineering	12	8	20
Electrical Engineering	14	9	23
Engineering Mechanics	4	3	7
Mechanical Engineering	25	16	41
Metallurgy	3	2	5
B.Tech. Degree			
Aeronautical Engineering	4	15	19
Chemical Engineering	20	27	47
Civil Engineering	22	48	70
Electrical Engineering	14	79	93
Mechanical Engineering	26	60	86
Metallurgy	11	19	30
D. I. I. I.			
Chemical Engineering Practice	4	5	9
Industrial Engineering	2	16	18

After the conferment of Degrees/Diplomas, the Chief Speaker distributed the prizes to prize winners (list annexed).

The graduates of the year who were present took the pledge, led by Shri Monishi Mohan Sanyal, winner of the Governor's Prize.

After Dr. Nayudamma's introductory speech, the President, Shri V. V. Giri delivered the Convocation Address.

LIST OF PRIZE WINNERS

Prizes awarded at the Seventh Convocation of the Institute held on
29th August, 1970.

President's Prize

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

Shri Sachindra Kumar Jain (3-year B.Tech. Mechanical Engineering)

Governor's Prize

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

Shri Monishi Mohan Sanyal (5-year B.Tech. Mechanical Engineering)

Institute Special Merit Prize

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

Shri T. T. Jagannathan (5-year B. Tech. Mechanical Engineering)

Merit Prizes

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

M. Sc. Degree Course

Shri V. Amarnath	:	Chemistry
Kumari S. S. Lakshmi	:	Mathematics
Kumari Meera Chandrapal	:	Physics

M. Tech. Degree Course

Shri K. S. Venkataramani	:	Aeronautical Engineering
Shri G. V. Suryakumar	:	Civil Engineering
Shri K. Rami Reddy	:	Engineering Mechanics
Shri H. K. Viswanatha Rao	:	Mechanical Engineering
Shri K. Jagannadham	:	Metallurgy

5-Year B. Tech. Degree Course

Shri S. P. Viswanathan	:	Aeronautical Engineering
Shri Shanmuk Sharma	:	Chemical Engineering
Shri C. Sankar Kumar	:	Civil Engineering
Shri D. Sankaranarayanan	:	Metallurgy

3-Year B. Tech. Degree Course

Shri S. Raghavan	:	Chemical Engineering
Shri R. Perumalswamy	:	Civil Engineering
Shri S. Kannan	:	Electrical Engineering
Shri Sachindra Kumar Jain	:	Mechanical Engineering

D. I. I. T. (Industrial Engineering)

Shri G. Nadimuthu

Siemens Prizes

(Presented by M/s. Siemens Engineering & Manufacturing Company of India Limited to the students with the best academic record in Electrical Engineering (Power) of the M.Tech. and 5-year B.Tech. Degree Course)

M.Tech. Degree Course

Shri S. Srinivasan

5-year B.Tech. Degree Course

Shri Allen Mascarenhas

Philips India Prize

(Presented by M/s. Philips India Limited to the student with the best academic record in Electrical Engineering (Electronics) of the 5-year B.Tech. Degree Course)

Shri Jayant S. Kirtane

Banco Foundation Prize

(Presented by M/s. Banco Foundation, Baroda to the student with the best academic record in Mechanical Engineering of the B.Tech. Degree Course)

Shri T. T. Jagannathan

Prof. B. Sengupto Prize

(Presented by Dr. A. L. Mudaliar, First Chairman of the Board of Governors to the student with the best academic record passing the M.Tech. Degree Course)

M.Tech. Degree Course
(*Chemical Engineering*)

Shri T. N. Kannan

ANNEXURE D

NUMBER QUALIFIED FOR THE DEGREES/DIPLOMAS
AT THE END OF 1970-71

Degree	NUMBER			Total
	I Class with distinction	I Class	II Class	
B.Tech.	5	167	58	230
M.Sc.	2	34	13	49
M.S.	—	—	—	6
M.Tech.	4	115	10	129
D. I. I. T. (Chemical Engineering Practice)	—	4	—	4
Ph.D.				
Chemistry	4			
Mathematics	3			
Physics	2			
Chemical Engineering	3			
Civil Engineering	4			
Engineering Mechanics	2			
Mechanical Engineering	1			
				19
				Total
				437

ANNEXURE E

PATTERN OF GRADUATION

(1964—71)

The number of candidates who were awarded Degrees/Diplomas at the first seven convocations and the number awarded at the Eighth Convocation (held on 31st July, 1971) are as follows :

Degree	Awarded at the first Seven Convocations (1964-70)	Awarded at the Eighth Convocation (1971)	Total
B.Tech.	1627	230	1857
M.Sc.	164	49	213
M.Tech	349	129	478
D.I.I.T.	70	4	74
M.S.	—	6	6
Ph.D.	64	19	83
Grand Total :	<u>2274</u>	<u>437</u>	<u>2711</u>

ANNEXURE F

STUDENTS' PLACEMENT SECTION

This section has been successfully serving as a liaison between the graduating students and the potential employers.

The accompanying statement shows the placement position of the graduates of the Institute.

During the year under review, this section was contacted by 85 Companies/ Establishments of both public and private sectors. Representatives of as many as 22 Organisations visited the Campus and interviewed the students.

An increasing number of applications from the students of the B.Tech degree courses, for practical training during the summer and winter vacations was handled by the Section during the year.

**Statement showing Placement Position of Graduates
(Position as on 31st August, 1971)**

Year	Total Passed out	Further Studies In India Abroad	Employed Abroad	Employed in India Private Public Sector	Position not known	Remarks
1964	107	12 21	7	31 35	1	
1965	161	16 36	17	41 49	2	
1966	265	26 47	15	83 86	7	*1
1967	323	50 47	9	79 91	46	*1
1968	388	66 59	10	88 99	64	*2
1969	470	80 56	—	96 102	136	
1970	560	90 89	1	99 99	182	
Total	2274	340 355	59	517 561	**438	*4

** Every effort is made in collecting information about graduates whose position has been reported as 'Not known'

* Deceased.

ANNEXURE G

INSTITUTE GYMKHANA

The year under review was a hectic one that with the preparations for the Inter-I.I.T. Meet and the other programmes.

After the Gymkhana elections were over at the beginning of the year, the elected representatives took upon themselves the uphill task of making the Inter I.I.T. Meet a memorable one. Not only did student participation in all events increase, this participation was also imbued with a sense of mission. While the primary concern of all officials and members was to play good hosts to the other IIT ians, they also set for themselves the noble task of making Madras IIT, the Champions. Intensive coaching by experts was given to all athletes and sportsmen right from the beginning of the year. These efforts paid rich dividends. The inter-IIT went off smoothly and I.I.T. Madras annexed the Championship this year.

As usual the students made frequent forays into outside pastures and often came back with coveted prizes and trophies in debates, cultural events, sports and allied Fields.

The Gymkhana was kept on its toes throughout the year. While the Inter-hostel competition in sports and cultural events occupied the Gymkhana on the domestic scene, inter-collegiate sports and other events in Madras and elsewhere extended its activities outside the campus.

The Institute Day marked the end of the Gymkhana's activities for the year. Dr. D. Jagannatha Reddy, Vice-Chancellor, Sri Venkateswara University graced this occasion with his presence.

The Institute Gymkhana is truly an institution of the students, by the students and for the students. The winning of the Inter-IIT trophy this year spoke eloquently for its growth in stature.

Ardent student participation in all its activities, which increase from year to year, testify to the students growing pride in their Gymkhana.

The Gymkhana will of course not rest on past laurels. Its basic aim will always be to cater to the needs of the students so that they can out into the world as all-round personalities.

ANNEXURE H

NATIONAL CADET CORPS

(A) No. 4 Tamilnadu Air Squadron (Tech.) N.C.C.

This unit has completed six years in this Institute. In the sixth year a total of 156 cadets (including four III & IV B.Tech Cadets) received training. At the end of the training, NCC 'B' and 'C' certificates were awarded to 24 and 11 cadets respectively on passing the examinations.

The Annual Training Camp this year was held at Bangalore during November/December 1970 for 12 days. 68 cadets attended the camp. Apart from the normal camp activities, the cadets were taken on instructional visits to Air Force and Industrial establishments. They were also provided air experience in a service air-craft. A sight-seeing tour was also successfully arranged for them. The Deputy Director of the Institute visited the camp and spent a day with the campers on 1-12-1970.

150 cadets of this unit and No. 2 (TN) Composite (Tech) Coy NCC (IIT) presented a Guard of Honour to the President of India on his visit to the Institute for the Seventh Convocation.

Promise Parade and Republic Day Parade were held jointly by the two NCC units. The Director of the Institute took the salute on both the occasions.

4 cadets of this unit participated in the Inter-Unit Shooting Competition. One cadet attended the All-India Nau-Sainik Camp at Cochin and one cadet was attached to a regular Air Force establishment for a period of four weeks.

(B) No. 2 Tamilnadu Comp. (Tech) Coy. N.C.C.

Though the training is confined to the first and second year students only, volunteers from the third, fourth and fifth year students were also taken on the rolls, During the year 160 cadets were on the rolls of this unit.

Training was imparted to cadets according to the prescribed syllabus. The first year training is generally oriented to Infantry training consisting of drill, weapon training, map reading, field-craft ; etc. The second year training is oriented to technical subjects of the corps to which the cadets are allotted. During the training year we had two batches consisting of Engineers and Signals. The technical training included organisation employment and handling of equipment used in those corps.

Special ceremonial parades were held jointly with the Air Wing cadets on the occasions of Convocation, NCC Promise Day and Republic Day.

At this combined annual training camp for Army and Air Wing cadets conducted at Bangalore during November/December 1970, the cadets did their annual firing with .22 and .303 rifles. Visits to Bharat Earth Movers, Madras Engineers Group, Mysore, Chamundeswari temple, Brindavan, Visveswaraya Museum and ITI were conducted. Signal/Engineer equipment demonstrations were arranged at the camp. The aims of the Annual Camp namely, building up of character, inculcating the sense of discipline and self reliance, *esprit de corps* and fostering of the corporate way of living were fully achieved.

14 cadets qualified for the NCC 'B' certificate.

4 cadets were sent for attachment to regular army units at Secunderabad, for the period from 17th May to 6th June, 1971.

ANNEXURE I

INSTITUTE HOSPITAL

The Hospital had attended to 45,163 patients as out-patients during the year showing an increase of 18,166 patients over the figure for the previous year (1969-70).

The break-up is as follows :

Men	:	18,065
Students	:	7,032
Women and Children	:	20,066
Surgical	:	1,777
Medical	:	43,386

Recently attempts have been made to admit patients in the Hospital and most of these were cases of infectious diseases like Chicken-pox affecting the students, staff and their families and mess servants. Only two cases had to be sent out to the Infectious Diseases Hospital at Tondiarpet due to doubtful diagnosis and severity. There were 4 cases of P.T., 2 among Chowkidars, one, a staff member and another a student. The first two were treated in the Hospital and had since reported fit for duty. The staff member and the student had treatment at the V.H.S. and subsequently at their residence. Both had reported back for duty and were being followed up.

Surgical Cases

These cases were mostly minor like abscess and cysts and were attended to. There were 42 cases of fracture all treated with plaster of paris immobilisation. Since 11-1-1971 operations had been undertaken under general anaesthesia as an Anaesthetist on an Honorary basis has been appointed.

An additional staff nurse and an Ayah have also joined duty.

Most of the operations (vide details below) were minor like incision of abscess, removal of ingrowing toe nails, excision of cysts, dental extractions and suturing of wounds. A few cases of reduction of fractures and application of P. O. P. were done. It is expected that in course of time operations including appendicectomy can be undertaken in the Hospital.

Details of cases :

(i) Incisions	—	211
(ii) Foreign Body removal	—	35
(iii) Piles Injection	—	171
(iv) Dental Extraction	—	31
(v) Suturing of wounds	—	61
(vi) Plaster of paris application for fracture	—	42

Details of Anaesthesia :

General	—	28
Local	—	700

Midwifery and Gynaecological work

Normal deliveries are now conducted in the Hospital and such cases were attended to besides 6 abortions. Minor Gynaecological operations, D and C etc. and family planning loop insertions were also done.

Immunisation Programme

At the beginning of the academic year it was proposed that all new entrants would be immunised against Small Pox and Tetanus, but the response from the students was poor. But a good number of the staff and their families had availed of this facility. Routine triple antigen injection were given to children.

(i) Vaccination	—	1894
(ii) Triple Antigen Injection	—	103
(iii) Tetanus Toxoid	—	1274
(iv) Polio (oral)	—	51
(v) Inoculations—T. A. B.	—	306
Cholera	—	1325

There were 13 cases of venereal infection among the workers.

G. C. 6, Bubo 4, S. S. 3—50% of these having accepted ex osure.

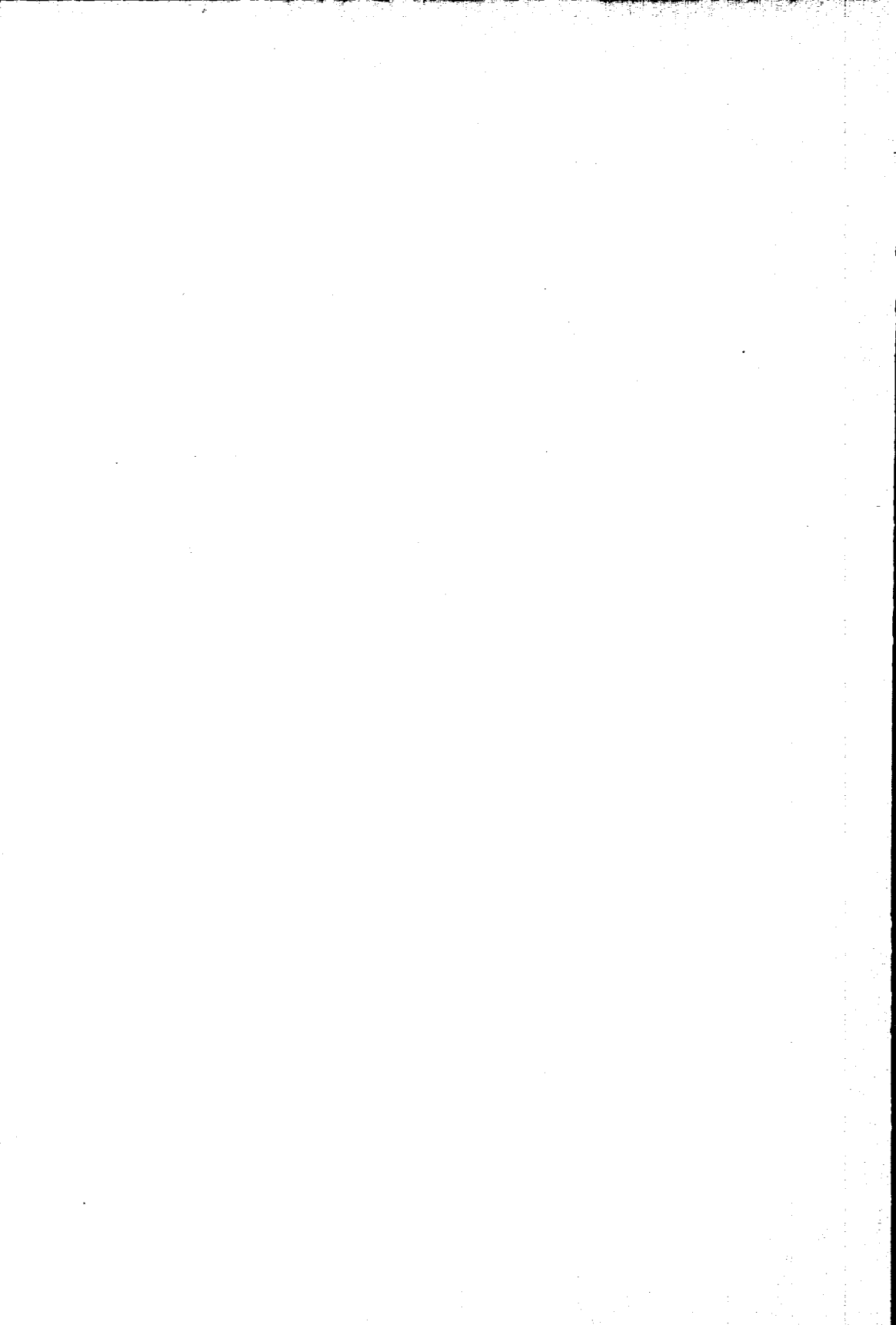
Building and equipment

Modification to the Operation theatre was effected giving more working space for the staff. Equipment in the form of Steriliser (Medium size), Boyle's Anaesthetic apparatus and a suction apparatus were purchased, apart from routine equipment for the theatre.

Transport facilities

An ambulance has been provided for the use of patients (staff and students).

In addition to the staff and students of the Institute, the Hospital also attended to the Summer School participants of the various departments, the staff and students of the Vanavani School and the Central School, Hostel mess servants, staff of the Central Supplies of the Hostels, Staff of the Co-operative Canteen, Knick-Knack Restaurant, State Bank of India and the Post-Office.



Administration

Director	Dr. A. Ramachandran
Deputy Director	Prof. S. Sampath
Registrar	Sri C. V. Sethunathan
Asst. Registrar (Acad.)	Sri T. S. Rajagopalan
Asst. Registrar (Admn.)	Sri K. Sampath Kumaran
Audit Officer	Sri R. Venkataraman
Stores Officer	Sri S. Pattabhiraman
Accounts Officer	Sri A. V. Karunakaran Nambiar
Executive Engineer	Sri C. S. Subramaniam
Hony : Consulting Physician	Dr. P. M. Palani
Medical Officers	Dr. G. Atmaram Rao
	Dr. (Smt.) Shanta Krishnamurthi
Security Officer	Sri T. N. Venkataraman
Officer Commanding, 2 (Tamil Nadu) Comp. (Tech.)	Lt. Col. R. Narasimhan
Eng./EME/Sig. Coy N.C.C. Officer Commanding, 4 (Tamil Nadu) Air Sqn. Tech. Coy. N.C.C.	Flt. Lt. S. Ganesh Prasad

HEADS OF DEPARTMENTS

Aeronautical Engineering	Dr. K. A. V. Pandalai
Applied Mechanics	Dr. D. V. Reddy
Chemical Engineering	Dr. D. Venkateswarlu
Civil Engineering	Dr. P. C. Varghese
Electrical Engineering	Dr. P. Venkata Rao
Mechanical Engineering	Prof. R. G. Narayanamurthi
Metallurgy	Dr. E. G. Ramachandran
Chemistry	Dr. M. V. C. Sastri
Mathematics	Dr. S. D. Nigam
Physics	Dr. C. Ramasastry
Humanities & Social Sciences	Prof. R. K. Gupta
Librarian	Sri V. S. Nazir Ahmed