FOURTEENTH ANNUAL REPORT
1972-73

INDIAN INSTITUTE OF TECHNOLOGY MADRAS

CONTENTS

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Ministry of Finance, Govt. of India,
New Delhi.

Prof. M. G. K. Menon,
Secretary, Dept. of Electronics, Govt. of India,
New Delhi.

Representatives of Parliament :

Sri Bhaoo Sahaib Dhamankar, M.P.,
113, Vithalbhai Patel House,
New Delhi.

Sri Sarjoo Pandey, M.P.,
201, North Avenue,
New Delhi.

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Member, Rajya Sabha,
401, Vithalbhai Patel House,
New Delhi.

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Member, Planning Commission,
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Lucknow University,
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Hindustan Steel Ltd.,
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Director,
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Sri S. K. Mukherjee,
Director, Fertilisers Corporation of India,
F—44, NDSE Pt. I,
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Ministry of Education & Social Welfare,
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Sri T. R. Doss,
Director of Technical Education,
Government of Andhra Pradesh,
Hyderabad.

Sri K. M. Ali,
Engineer,
Zuhara Manzil
Kaudiyar,
Trivandrum-3.

Sri P. Sivalingam,
Director of Technical Education,
Government of Tamilnadu,
Madras.

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Karnatak University,
Dharwar.

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Director,
Central Electrochemical Research Institute,
Karaikudi.

Sri B. K. Khanna,
Managing Director,
Fertilizers & Chemicals Travancore Ltd.,
Udyogmandal P.O.,
(Via) Alwaye.

Sri A. S. Rao,
Managing Director,
Electronics Corporation of India Ltd.,
Hyderabad-40.

Director:

Dr. A. Ramachandran/Prof. S. Sampath,
Indian Institute of Technology, Madras.

Nominees of the Senate :

Prof. R. K. Gupta,
Dean of Students' Affairs & Professor,
Department of Humanities & Social Sciences.
Indian Institute of Technology, Madras.

Dr. P. Besslich,
Professor,
Department of Electrical Engineering,
Indian Institute of Technology, Madras.

Secretary:

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

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Sri K. T. Chandy,
Chairman, Kerala State Industrial Development Corporation Ltd.,
P. B. No. 105, Trivandrum.

Members:

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Deputy Educational Adviser,
Ministry of Education & Social Welfare,
Govt. of India,
New Delhi.

Sri S. Venkataraman,
Financial Adviser,
Ministry of Finance, Govt. of India,
New Delhi.

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

Sri P. Sivalingam,
Director of Technical Education,
Government of Tamilnadu,
Madras-25.

Dr. A. Ramachandran/Prof. S. Sampath,
Director, I.I.T., Madras.

Secretary:

Sri C. V. Sethunathan (Registrar).

The Buildings and Works Committee

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Sri K. T. Chandy.
Chairman,
Kerala State Industrial Development Corporation Ltd.,
P. B. No. 105, Trivandrum.

Members:

Dr. A. Ramachandran/Prof. S. Sampath,
Director, I.I.T., Madras.

Sri M.G. Joseph,
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 D. Ambrose,
Chief Engineer (Buildings)
P. W. D., Madras.

Sri K. Ganesan,
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) till 11-5-73
Prof. S. Sampath (from 11-5-73)

Members:

Dr. M. K. Achuthan
Dr. R. S. Alwar
Dr. V. Anantaraman
Dr. G. Aravamudan
Dr. H. Bandow (from 4-1-1973)
Dr. M. Bantel (till April 1973)
Dr. P. Besslich
Dr. T. K. Bose
Dr. E. Brinks (from 5-5-1973)
Dr. N. V. Chandrasekharaswamy
Dr. N. Dharma Rao (3-7-72 to 16-12-72)
Dr. D. Marx (till April 1973)
Mr. H. J. Ebert
Dr. D. N. Ghista
Dr. T. Gopichand
Dr. B. Gowrishankar (from 3-7-1972)
Dr. M. C. Gupta
Prof. R. K. Gupta
Prof. (Mrs.) Ingrid Davids (till Apl. 73)
Dr. Jens—Ulrich Davids (till Apl. 73)
Dr. D. Johnson Victor (from 1-10-72)
Dr. J. C. Kuriacose
Shri S. S. Mani (Workshop Superintendent)
Dr. P. T. Manoharan
Dr. G. Mennig (till April 1973)
Dr. B. S. Murthy
Dr. V. G. K. Murti
Prof. R. G. Narayanamurthi
Dr. Y. Narayana Rao (till 30-6-1972)

Shri V. S. Nazir Ahmed
(Librarian)

Dr. S. D. Nigam

Dr. K. A. V. Pandalai

Dr. C. N. Pillai

Dr. K. P. Rajappan

Dr. E. G. Ramachandran

Dr. C. Ramasastry

Dr. B. V. A. Rao

Dr. D. V. Reddy

Prof. S. Sampath (Dy. Director)

Dr. K. S. Sankaran

Dr. M. V. C. Sastri

Dr. M. Satyanarayana
(till 30-9-1972)

Dr. M. R. Seshadri till July 1972)

Dr. V. Sethuraman

Dr. A. K. Sreekanth

Dr. R. Srinivasan

Dr. S. K. Srinivasan

Dr. V. Srinivasan

Dr. K. Srinivasaraghavan

Dr. N. R. Subramanian

Dr. D. Urbach (from 4-1-1973)

Dr. P. C. Varghese

Dr. R. Vasudevan

Dr. P. Venkata Rao

Dr. V. C. Venkatesh

Dr. D. Venkateswarlu

Dr. M. Venugopal

Nominees of the Chairman, Board of Governors:

Dr. P. L. Bhatnagar,
Union Public Service Commission,
Delhi.

Dr. G. S. Laddha,
Director, A. C. College of Technology,
MADRAS-25.

Prof. T. Balakrishnan Nayar,
"Chitra", Kilpauk Garden Road,
Madras-10.

Secretary:

Shri C. V. Sethunathan (Registrar)

Report by the Director

Fourteenth Annual Report (1972-73) of the Indian Institute of Technology, Madras.

I. The Institute has completed fourteen years of useful service to the Nation in the cause of technical education as one of the Higher Institutes of Technology. The Institute has already become a major Centre for consultation by a number of industries as well as public sector/autonomous organisations. The Institute has created a separate cell for Industrial Consultancy Work with a Senior Professor in charge of the Centre as Dean of Industrial Liaison.

The Computer, IBM 370/155 System — the largest system in India — which had been ordered is arriving. Installation and commissioning of the same is expected to be over early in the coming academic year. This will be another milestone in the history of the Institute. Thanks to the extensive aid from the Federal Republic of Germany, the Institute has grown from strength to strength and today it can claim to be one of the foremost Higher Technical Institutions in the Country.

The Institute will be concentrating on the following Programmes in the future:

Intensification of work relating to Industrial Consultancy.

Setting up of an Engineering Experimentation and Design Centre.

Setting up of a Centre for Educational Research and Methods in Engineering.

Field enhancement of the Electronic Data Processing Facilities at the Institute's Computer Centre.

Setting up of a Regional Centre for sophisticated Instrumentation Techniques.

Projects in inter-disciplinary areas of national importance:

Bio-Medical Engineering

Desalination

Environmental Pollution Studies and Control

Ocean Engineering

Materials Research

Energy Studies

Information Storage and Retrieval service in selected areas of Technology.

New Educational/Research Programmes :

Naval Architecture

Coastal Engineering

Transportation Technology

Food Processing Techniques

Television Engineering

II. Student population and Academic Programmes :

The ratio between the post-graduate and under-graduate students improved on the target ratio of 1:2 in 1970-71 itself. The years 1971-72 and 1972-73 showed a further improvement to 1:1.4 and 1:1.33 respectively. In 1973-74, the last year of the Fourth Five Year Plan, this ratio has become 1:1.3. The ratio may stabilise around 1:1 during fifth Plan period, as recommended by the Reviewing Committee.

The statement below indicates the position in this regard for the five years of the fourth Five Year Plan.

Student Population
(Includes part-time registration also)

1969-70	1970-71	1971-72	1972-73	1973-74	1974-75 (anticipated)
Under-Graduates 1281	1172	1235	1246	1276	1274
Post-Graduates 398 } 643 Research Scholars 245 }	414 } 740 326 }	502 } 863 361 }	520 } 939 419 }	529 } 986 457 }	579 } 1019 440 }
Total 1924	1912	2098	2185	2262	2293
Ratio: PG: UG: 1 : 2	1 : 1·6	1 : 1·4	1 : 1·33	1 : 1·3	1 : 1·1

III. (a) Sponsored Research Schemes/Projects :

The Institute has currently a number of sponsored Research Schemes/Projects financed by organisations like Council of Scientific & Industrial Research, Ministry of Defence, Department of Atomic Energy, Space

Science and Technology Centre, Research and Development Organisation for Electrical Industry etc. Departmentwise details are given below :

(i) *Department of Aeronautical Engineering* :

(a) *CSIR Scheme* : (Silver Jubilee Award to Dr. K. A. V. Pandalai, Professor & Head of the Dept. of Aeronautical Engineering) Composite Structures with specific reference to Fibre reinforced Plastic Structures.

(b) *Space Science and Technology Centre Schemes* :

(1) Design and Development of an Air Heater.

(2) Design and Development of Hypersonic Wind Tunnel.

(c) *Ministry of Defence Scheme* :

(1) Analytical experimental and Design studies in fibre reinforced plastic structures.

(2) Aerodynamics of Generalised Missile type configuration at supersonic speed.

(3) Design and Fabrication of supersonic wing calculator using analogue net work.

(4) Development of computer programme for evaluation of aerodynamic characteristics of Swept Wing aircraft.

(ii) *Department of Applied Mechanics* :

(a) *C.S.I.R. Schemes* :

(1) Design and Development of a low speed strain-rate controlled Universal testing machine.

(b) *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.

(iii) *Department of Chemistry* :

(a) *C.S.I.R. Schemes* :

(1) Mechanistic studies catalysed substitution of aromatic compounds.

(2) Nucleophilic substitution reactions of Halogeneothers.

(3) Solid State Chemistry of complex oxides of some transition metals.

(4) Electronics and molecular structural investigations of transition metal complexes by optical and magnetic measurements.

(b) *Department of Atomic Energy Scheme* :

Electronic structural investigations of transition metal ions and their complexes.

(c) *PL* - 480 *Schemes* :

(1) Use of Platinum metal complexes as catalysts in homogenous hydrogenation.

(2) Study of transition metal oxides with special reference to their catalytic properties.

(3) High pressure Catalytic Transfer reaction.

(d) *National Science Academy Scheme* :

Studies on molecular rearrangements.

(iv) *Department of Chemical Engineering* :

(a) *C.S.I.R. Scheme* :

Investigation on promotion of dropwise condensation of steams.

(b) *Space Science & Technology Centre* :

Development, testing and production of insulation material for DPS-4.

(v) *Department of Civil Engineering*:

(a) *C.S.I.R. Scheme*:

Experimental studies on behaviour of raft foundation.

(b) *Central Board of Irrigation & Power Scheme*:

(1) Studies on the fluctuating pressures on stilling basin.

(2) Scour due to swirling jets.

(vi) *Department of Electrical Engineering*:

(a) *Department of Atomic Energy Scheme*:

Design and construction of a demonstration digital computer.

(b) *Research & Development Organisation for Electrical Industry Scheme*:

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

(vii) *Department of Mechanical Engineering*:

(a) *C.S.I.R. Scheme*:

Effect of turbulence on the performance of turbine blades in cascades with special reference to the separation Zone on blade surface suction.

(b) *Research & Development Organisation for Electrical Industry Scheme*:

Heat transfer studies in large electrical machines.

(c) *Ministry of Defence Scheme*:

Aerial Camera Project.

(viii) *Department of Physics*

(a) *Ministry of Defence Scheme* :

Fabrication of Microwave test bench.

(b) *Department of Atomic Energy Scheme* :

Surface wave propagation in Crystals.

(b) Centre for Systems and Devices

The Centre sponsored by the Ministry of Defence, has among its objects, the following: (i) futuristic investigation and research/development activities; (ii) offering long-term and short-term courses in selected areas/topics to Defence Officers and R and D personnel. Research/development activities are being pursued in the areas of Signal Processing Techniques, Semiconductor Devices and Control and Guidance Systems. Six major projects, two in each of the above areas, are now in progress. Three short-termcourses have been conducted and three are scheduled for the year 1973-74. A two-year M.Tech Degree course on Control and Guidance Systems is being started in July, 1973. The Laboratory building for the Centre is nearing completion. Residential accommodation for the staff of the Centre and deputed trainee Officers has been completed.

IV. Assistance to Industry :

The dialogue between local Industries, Government Departments/Organisations and Public Sector undertakings, etc. and the Institute in regard to Design and Development, Consultancy and Testing facilities has shown marked improvement over the years. Several long term and short term industrial projects have also been taken up for investigation.

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

Sl. No.	*Name of Department*	*Nature of Project*	*Name of Organisation*
(1)	(2)	(3)	(4)
1.	Applied Mechanics	Structural Analysis of the Solid Propellent Grain DPS-4.	S.S.T.C., Trivandrum.
2.		Three-dimensional Photo-elastic analysis of the Starter Roller Clutch Drive.	M/s. Lucas—TVS Ltd., Madras.
3.		Design of Pressure Vessel.	M/s. Alhborn Ltd., Hildesheim, West Germany.
4.	Chemical Engg.	Manufacture of Furfural.	M/s. Southern Agrifurane Industries Ltd., Madras-86.
5.		Distillation of chlorosiline mixtures.	S.S.T.C., Trivandrum.

Sl. No.	Name of Department	Nature of Project	Name of Organisation
(1)	(2)	(3)	(4)
6.		Conducting of trial runs with tubular reactor with notionless mixing elements.	M/s. A. E. Maskati and Co.
7.		Design of special dies for film blowing operators.	Polyene Industries, Madras.
8.	Civil Engg.	Studies on cooling water system for Ennore Thermal Scheme.	Tamil Nadu Electricity Board, Madras.
9.		Utilisation studies of oil and ore berths of Madras Harbour.	Madras Port Trust, Madras.
10.		Determination of optimum length of outer arm break-water.	-do-
11.		Field investigations and analysis of the field tests and recommendation for spring constants.	Department of Atomic Energy, Government of India, Kalpakkam.
12.		Evaluation of spring constants, internal damping ratios for Neoprene pads — Design, analysis and recommendations.	-do-

Sl. No.	Name of Department	Nature of Project	Name of Organisation
(1)	(2)	(3)	(4)
13.		Design of balancing tank at Kadambuliyur ridge.	P.W.D.—Veeranam Project Sub-Division. Tamil Nadu.
14.		Checking of stresses in portal of 3-ton wharf crane.	M/s. Southern Structurals Ltd.
15.		Investigations for concrete properties.	Madras Aromic power Project, Kalpakkam.
16.		Advice on concrete mixtures.	M/s. Ranga Structurals Ltd.
17.	Electrical Engg.	Design Work.	M/s. Technocrats Combines (P) Ltd.
		-do-	M/s. Hygrodyn (P) Ltd., Madras.
18.	Mechanical Engg.	Design of condensers fo the Airconditioning systems of Fishing Trawlers.	M/s. Indo-Icelandic Fisheries (P) Ltd.
19.	Mechanical Engg.	Determination of conductivity of the celcrete samples.	Tamil Nadu Housing Board, Cellular Concrete Plant.
20.		Investigations on the steam engine at Nellikuppam Factory.	M/s. EID-Parry Ltd.

Sl. No.	*Name of Department*	*Nature of Project*	*Name of Organisation*
(1)	(2)	(3)	(4)
21.		Determination of thermal conductivity of of fibre glass.	M/s. K. C. P. Ltd., Madras.
22.		Aerodynamic Testing on a 30 mW steam turbine exhaust casing model and studies on the steam turbine nozzle blades.	M/s. Heavy Electricals Ltd., Bhopal.
23.		Bulb intensity measuring device — development of.	International Instruments, Bangalore.
24.		Development of Computer programme for optimum design of dual-tandem type gearing.	M/s. K. C. P. Ltd., Madras.
25.		Designing and drawing a wire drawing machine.	M/s. Swiss Welded Mesh Co., Madras.
26.		Design of mechanical salt harvester.	Mr. M. G. Venkatesh, Madras-17.
27.	Metallurgy	Investigation on Copper powder.	Hindustan Photo Films, Madras.
28.		Inclusion rating.	India Pistons Ltd., Madras.
29.		Report on heat treatment.	Indian Detonators Ltd., Hyderabad.

V. Report on activities of Quality Improvement Programme, Ministry of Education, 1972-73.

The activities organised under Q. I. P. at the Indian Institute of Technology, Madras during 1972-73 are the following:

1. M. Tech. Degree Courses.
2. Doctoral Programmes.
3. Short-term in-service courses.
4. Curriculum Development in Mechanical Engineering.
5. Curriculum Development in Chemical Engineering.

1. *M. Tech. Degree Course* :

Twenty engineering college teachers from Kerala. Andhra Pradesh, Mysore and Gujarat were admitted to the M. Tech. course. They were admitted to the Departments of Applied Mechanics, Chemical Engineering. Civil Engineering, Electrical Engineering, Industrial Engineering and Mechanical Engineering. In addition, two sequential summer school participants were admitted direct to M.Tech. II year.

2. *Doctoral Programme :*

Eighteen engineering college teachers from Andhra Pradesh, Mysore, Kerala and Tamil Nadu were admitted to this course. They were admitted to the Departments of Applied Mechanics, Civil Engineering, Electrical Engineering, Mathematics Mechanical Engineering and Aeronautical Engineering.

3. *Short-term-in-service courses* (*Tabulated below*) :

Sl. No.	*Title of course*	*Duration of course*	*Number of participants*
(1)	(2)	(3)	(4)
1.	Modern Control Theory and Practice	4 weeks.	15
2.	Experimental Methods in Structural Mechanics	3 weeks.	26
3.	Catalysts and Reactors	2 weeks.	25
4.	Gas Dynamics	3 weeks.	28
5.	Workshop in-Teaching Methods	2 weeks.	24
6.	Advances in Building Technology	3 weeks.	23

Sl. No.	*Title of course*	*Duration of course*	*Number of participants*
(1)	(2)	(3)	(4)
7.	Bridge Engineering	3 weeks.	29
8.	Corrosion Engineering	2 weeks.	26
9.	Hydrodynamics and Application to Hydraulic Engineering	4 weeks.	17
10.	Chemistry in Engineering Curriculum	2 weeks.	32
11.	Solid State Science and Technology	3 weeks.	23
12.	Economics and Industrial Management in Engineering	7 weeks.	23
13.	Teaching Technology	2 weeks.	42

4. *Chemical Engineering Curriculum Development Centre* :

The programme of work carried out by the Centre during the period under review is as follows :

(i) *First Degree Course in Chemical Engineering* : *Objectives and Curriculum* :

This report was based on the views expressed by senior chemical engineers in industry and research, heads of department of chemical engineering in Indian Universities and Council Members of the Indian Institute of Chemical Engineers and on the reports of professional chemical engineering societies of U.S.A., U. K. and Germany. It was approved at the meeting of the Curriculum Committee held on February 19, 1972 with members from industries and universities. The report was published in July, 1972 and copies were made available to faculty members of all chemical engineering departments in India.

(ii) *Survey of Chemical Engineering Education and Practice in India:*

The following aspects of chemical engineering education and profession in our country were surveyed by a questionnaire sent to over 2000 professional chemical engineers:

1. Practical training of students industry.
2. Professional career.
3. Frequency of usage of subjects taught.
4. Continuing education of chemical engineers.

5. Job satisfaction of chemical engineers.
6. Views regarding recent chemical engineering graduates.
7. Suggestions for the improvement of chemical engineering education.

The results of the survey are under publication.

(iii) *Study Groups of Chemical Engineering Subjects*:

The following study groups appointed to consider the syllabi and practicals in chemical engineering subjects have finalised their recommendations:

1. Fluid Mechanics.
2. Heat transfer.
3. Mass transfer.
4. Mechanical Operations.
5. Transport phenomena.
6. Chemical process principles.
7. Chemical engineering thermodynamics.
8. Chemical reaction engineering.
9. Chemical technology.
10. Materials.
11. Equipment and plant design.
12. Chemical engineering economics (including systems engineering and operations research).
13. Process control (including computers).

The consolidated report of the study group is ready for publication.

(iv) *Inplant Training of Chemical Engineering Students*:

The Expert Committee with members from industries and Chemical engineering institutions has finalised the report on "Inplant Training of Chemical Engineering Students" at its meeting on March 31, 1973. The report includes objectives of inplant training summaries of replies to questionnaires and guidelines to educational institutions, industries and to students. The report is now under publication.

(v) *Seminar on Materials of Construction* :

The lectures for this seminar were delivered by experts from Esso Standard Refining Company of India Ltd., Bombay. Twenty-five faculty members from engineering colleges participated in the Seminar. The subjects covered in the seminar are: Design Philosophy, Materials for Pressure Vessels, Materials for Storage Tanks, Materials for Furnaces at Elevated temperatures. Materials for Pumps and Compressors, Materials for Coolers and Condensers, Materials for Cooling Water Distribution facilities, External Coatings for Underground and Marine Exposure, Materials for Low Temperature Services, Materials for Sulphuric Acid Service, Materials for Piping and Valves, Materials for Bolts, Studs and Nuts, Materials for Gaskets, Introduction to Associations, Local Development Activities, Testing of Metals, Onstream Inspection Methods, Cost Considerations.

(vi) *Seminar on Modern Approaches to Design* :

The main theme of this seminar held in November, 1972 was to acquaint the participants with the use of computer orientation and systems engineering approach in functional design, project and process planning and project engineering. The lectures were delivered by Dr. D. C. Freshwater (Loughborough University of Technology, U.K.), Sir Frederick Warner (Cremer and Warner, U.K.) and Dr. S. N. Sharma (Ledgement Laboratory, U.S.A.).

(vii) *Seminar on "Frontiers of Chemical Engineering"* :

In this seminar held in December, 1972, recent developments in chemical engineering were reviewed by Dr. Jiri Dohnal (Czechoslovakia), Dr. H. Sawistovski (U.K.), Dr. Hamann (West Germany), Dr. I.MeC. Stewart, Dr. Glastonbury and Dr. J. B. Agnew (Australia), Dr. G. Narasimhan and Dr. M. M. Sharma.

(viii) *Seminar on "Processing of High Polymer Products"*:

This seminar was conducted in two parts — Lectures of Part I (dealing with Thermodynamics, Extrusion, Calendering, Injection Moulding and Compression Moulding) were delivered by the faculty members of the Department of Chemical Engineering. The lectures in Part II were delivered by Prof. Dr. Ing. G. Schenkel (West Germany) on the following topics:

1. Thermodynamics, Heat Generation and Heat Transfer in the Extrusion Technique.
2. Theory of Similarity (model theory) of the Extruders.
3. Qualitative Theory of the Extruders.

4. New Concepts for the Autogenous Control of the Mass Temperature in Extrusion Operation.
5. Experimental Investigation on the model of Vent Extruder.
6. Theory of Extruder Screws with Leroy-Torpedo.
7. Magnitude of the Influence of the additional sizing die (calibration) for the extruded plastic tubes.

There were 96 participants from Universities and industries.

(ix) *Seminar on "Syllabi and Practicals in Chemical Engineering Subjects"*:

A seminar on "Syllabi and Practicals in Chemical Engineering Subjects" was held on 24th, 25th and 26th May, 1973. The seminar was inaugurated by Mr. J. P. Kapur, President, Indian Institute of Chemical Engineers. The Chairmen for the technical sessions were Dr. P. S. Mene, Vice-Chancellor, Nagpur University, and Mr. R. V. Ramani, Managing Director, Mettur Chemicals and Industries Corporation Ltd. Madras. 41 participants from educational institutions offering chemical engineering, took part in the Seminar.

The thirty papers presented at the Seminar included consideration of the following:

1. Objectives of teaching and the course-content of different chemical engineering subjects.
2. Objectives and the content of the laboratory courses.
3. Methodology of instruction of the subjects.
4. Choice and use of instructional models and teaching.
5. Assessment of students in different types of subjects:
   (a) Lecture-based, (b) lecture and tutorial-based and (c) lecture, tutorial and laboratory-based subjects.
6. Assessment of students in laboratory and design-based subjects.
7. Design and fabrication of equipments for chemical engineering practicals.
8. Specific features of the programmes in the department of the respective institutions.

(x) *Reports of the Centre*:

(a) *Papers presented at the Seminar and brought out as reports*:

1. Materials of Construction.
2. Modern Approaches to Design.
3. Frontiers of Chemical Engineering.
4. Syllabi and Practicals in Chemical Engineering subjects.
5. Processing of High Polymer Products.

(b) *Selective Bibliographies*:

1. Selective Bibliography of literature on Chemical Engineering subjects.
2. Selective bibliography on Cost estimation.

The reports of the Centre were sent to all chemical engineering departments in India.

5. *Curriculum Development Centre in Mechanical Engineering* :

Earlier reports submitted to the Ministry of Education have indicated the programme of work of this Centre, the conceptual framework relating to curriculum development, the involvement of faculty members from sister institutions and preparation of material useful to teachers and students.

During the year under review, every effort was made to continue and intensify the work already taken up. The following study groups met to discuss and to bring about a consensus of opinion concerning curricular outline and course contents. It is noteworthy to mention here, that whenever a group of senior faculty members from several engineering colleges meet to discuss the contents of a particular course, the members find the occasion extremely useful and relevant to throw light on some very important aspects of engineering education and this has led to free exchange of ideas. The Director of the Institute has always been kind enough to take part in the meetings and to initiate the discussions.

Study Group Meeting		*Date*
Mechanical Engineering Laboratories	...	11- 8-1972
Turbomachines, Power Plants and I. C. Engines	...	13-10-1972
Industrial Management and Economics	...	20-11-1972
Electives	...	9- 3-1973

The proceedings of the group meetings have been documented and brought out in the form of booklets. These booklets are being sent out to all the engineering colleges in the country.

Monographs :

Preparation of monographs on mechanical engineering subjects is continuing. During the year under review, the following monographs have been published. These monographs have evolked much response from teachers.

Utilization of Solar Energy
Problems in Thermodynamics
Principles of Mechanical Design
Handbook of Mechanical Design.

The following monographs are under preparation :

Tribology.
Units and Conversion Factors.
Laboratory Manual.
Metrology.
Mechanical Handling Equipment.

I. S. T. E. Convention :

The Coordinator participated in the ISTE Convention held at Bombay, presented a report on the CDC activities and presented a paper on Laboratory Practice to the participants of the Course on Teaching Methods. Material prepared by the Centre was displayed at the convention.

Course on Teaching Technology :

The Indian Institute of Technology organized a course on teaching technology for the benefit of QIP Scholars and other faculty members. The Coordinator gave a seminar-type lecture on Curriculum Design and Development.

List of materials published :

A. (1) *Proceedings of Study Group Meetings* (booklets):

1. Turbomachines, Power Plants and I. C. Engines.
2. Production Engineering.
3. Mechanical Engineering Laboratories.

(2) *To be sent shortly* :

1. Material Science.
2. Industrial Management and Economics.
3. Electives.
4. Mathematics.

B. *Monographs* :

1. Utilisation of Solar Energy.
2. Problems in Thermodynamics.
3. Principles of Engineering Design.
4. Hand book of Mechanical Design (Vol. I).

To be sent shortly :

1. Units and Conversion Factors.
2. Tribology.
3. Handbook of Mechanical Design (Vol. II).

VI. Continuing Education Programmes for practising Engineers :

The Institute on its own conducted the following Programmes :

1. Short course on Soil Mechanics for the Metropolitan Transport Project.
2. Intensive course on welding technology and testing.
3. Sand testing course.

VII. Awards and Distinctions :

The Institute had the privilege of six of the members of the Institute from the Department of Mechanical Engineering being awarded during the year 1972-73 a sum of Rs. 1,500/- jointly by the Invention Promotion Board, for their invention 'Smoke Meter'.

VIII. Third Indo-German Agreement :

The Third Indo-German Agreement was signed on the 26th of November, 1971 for the further development of the Institute and for the consolidation of the facilities already established by West German collaboration. The Government of the Federal Republic of Germany has already made available the foreign exchange cost in respect of the purchase of the Computer System (1.9 million DM). Rs. 10 million from the West German Food aid funds has also been made available.

The year under report is the second year of the currency of the Third Indo-German Agreement. Details of the aid received from Germany during the year are given under 'Basic Information' which follow.

IX. Convocation :

The Institute has held ten Convocations so far. At the tenth Convocation held on 11th August, 1973 in which Shri M. S. Pathak, Member of the Planning Commission was the Chief Speaker, 491 students took their degrees and diplomas as detailed below :

Degree	*Branches*	*Number*	
Ph. D.	Chemistry	6	
	Mathematics	8	
	Physics	7	
	Aero. Engg.	3	
	Chemical Engg.	2	
	Civil Engg.	3	
	Electrical Engg.	4	
	Humanities & Social Science	2	
	Mechanical Engg.	3	
	Metallurgy	4	
		———	42
M. S.	Aero. Engg.	1	
	Chemical Engg.	3	
	Civil Engg.	1	
	Mechanical Engg.	3	
	Metallurgy	1	
		———	9
M. Sc.	Chemistry	19	
	Mathematics	12	
	Physics	16	
		———	47

Degree	*Branches*	*Number*	
M.Tech.	Aero. Engg.	8	
	Chemical Engg.	27	
	Civil Engg.	12	
	Electrical Engg.	33	
	Engineering Mechanics	6	
	Industrial Management	11	
	Industrial Engg.	13	
	Mechanical Engg.	54	
	Metallurgy	18	
			182
B.Tech.	Aero. Engg.	14	
	Chemical Engg.	44	
	Civil Engg.	13	
	Electrical Engg.	58	
	Mechanical Engg.	58	
	Metallurgy	22	
			209
D. I. I. T.	Technical Analytical Chemistry	2	
			2
		Total	491

X. Research work and Allied Activities :

The promotion of Research work has been one of the major endeavours of all the Departments of the Institute, as in the past. 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 report, 42 scholars qualified for the Ph.D. bringing the total number of recipients to 154 over the last 9 years.

XI. Library :

Since the inception of the I.I.T. at Madras, the Central Library has received in all 7269 volumes of German Scientific and technical books 114 titles of current German periodicals and their back volumes and a complete set of DIN Standards, updated as and when revised. In addition, several reference books and Xerox copies of article literature in English have been received from time to time. It is estimated that the value of the literature received so far is about 670 thousand Marks and that of reprographic and other equipment is of about 100 thousand Marks.

The other statistics of the Library are as follows :

Total no. of books	83,721 vols.
Total no. of pamphlets	40,161 ,,
Total no. of microfilms	900
Total no. of periodicals	1,390 titles

XII. Progress under Construction :

The following works were completed :—

1. Laser Communication Laboratory in Electrical Sciences Block
2. High Polymer Engineering Laboratory in Humanities and Sciences Block
3. Applied Chemistry Block
4. Computer Centre
5. Staff Residential Quarters — 30 flats
6. Married Officer's Accommodation — 24 flats
7. Gas Dynamics Laboratory.

The following works are under progress :

1. Centre for Systems and Devices
2. Staff Residential Quarters — 24 flats

XIII. Staff :

During the year, two Associate Professors were assigned to the Institute from West Germany under the Indo-German Agreement.

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

1. Professors — 4
2. Associate Professor — 1

During the year, 3 Visiting Professors, 1 Visiting Asst. Professor, 17 Professors, 3 Associate Professors, 28 Associate Professors, 21 Lecturers, 7 Associate Lecturers, 1 Senior Scientific Officer Gr.I, 1 Design Engineer, 13 Senior Technical Assistants and 10 Technical Assistants were appointed. These include the appointment of 3 Technical Assistants as Senior Technical Assistants, 3 Senior Technical Assistants as Associate Lecturers, 2 Senior Technical Assistants as Lecturers, 1 Associate Lecturer as Design Engineer, 11 Associate Lecturers as Lecturers, 17 Lecturers as Asst. Professors and 3 Assistant Professors as Associate Professors, 1 Asst. Professor as Professor and 15 Associate Professors as Professors.

2 Visiting Professors, 5 Associate Lecturers, 2 Senior Technical Assistants and 2 Technical Assistants resigned.

XIV. Budget Proposals:

(i) Approved Budget and the expenditure for the year 1972-73 :

Approved Budget (Net) 1972-73	Rs. 212.00 lakhs
Amount allotted by the Ministry	Rs. 215.88 lakhs
Actual expenditure 1972-73 (Net)	Rs. 220.88 lakhs

(ii) Budget proposals for Revised Estimates 1973-74 and Budget Estimates 1974-75. (Figures in lakhs of rupees)

	Actuals for 1972–73	Budget* for 1973–74	Revised Estimates 1973–74 (as recommended by Finance Committee and allocated)	Budget Estimates 1974–75 (as recommended by Finance Committee)
	Rs.	Rs.	Rs.	Rs.
Recurring	171·14	177·28	193·36	201·78
Non-recurring				
Buildings	43·68	30·00	26·75	83·61
Equipments and others	27·46	24·65	37·40	
Total	242·28	231·93	257·51	285·39
Less Income	21·40	16·10	17·57	17·16
Net	220·88	215·83	239·94	268·23
Notional provision				
(i) Equipment	56·46	50·00	65·00	75·00
(ii) Partial adjustment for Computer from West Germany (German Food Aid Funds)	—	85·00	100·00 (approx)	

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

XV. Scheduled Caste and Scheduled Tribe students admitted to the first year class of the B.Tech. Degree Course in 1973-74

The Institute proposes to initiate certain special efforts for the benefit of the students belonging to the Scheduled Castes/Scheduled Tribes, to be admitted to the B.Tech. Degree Course during the coming academic session. These will include the organisation of a special four-week orientation programme, to help in raising the background knowledge of these students in English, Mathematics, Physics and Chemistry, organisation of special tutorial classes and the nomination of a Faculty-member as Adviser to these students.

A more detailed report on these activities will be included in the next year's Report.

ANNEXURE 'A'

AERONAUTICAL ENGINEERING

The Department continues to offer courses leading towards B.Tech/ M.Tech degrees as well as M.S./Ph.D. by research. In the case of M.Tech/ M.S./Ph.D. students, specialisation is possible in any one of the following areas (i.e.) Aerodynamics/Gas Dynamics/Rockets and Missiles and Structural Mechanics.

Development Activities

Aerodynamics/Gas Dynamics Laboratory :

1. *Design and Development of an Aircooler for an Intermittant Hypersonic Wind-Tunnel* : A model aircooler with rod bundles in cross flow was fabricated. The performance of the cooler was experimentally determined at different operating conditions and compared with estimated values. Results showed that actual temperature at any point in the cooler was less than the estimated value while actual pressure drop was more than estimated. This study was undertaken in connection with the development of an aircooler for the hypersonic wind tunnel of Vikram Sarabhai Space Centre, Trivandrum.

2. *Calibration of a Free Jet Tunnel* : A supersonic wind tunnel with a free jet diameter of 60 mm. and variable free jet length was fabricated. The tunnel is provided with an air ejector to vary the test chamber pressure, downstream of the test section. Mach number distribution along the axis of and across the free jet was determined. Effect of ejector flow rate on the tunnel performance was also studied. Calibration work could not be completed because of restriction on consumption of electric power.

3. *Transonic Windtunnel*: As a result of the tests carried out, the constant area duct and the diffuser have been redesigned for getting better performance.

4. *Aero-car model*: As a B. Tech. project, a 1/10th scale aerocar model has been fabricated and tested on ground. With better wheels it is expected to get airborne.

Rockets and Missiles Laboratory :

A new division known as 'Rockets and Missiles' has been formed and work is progressing to set up a laboratory.

Structural Mechanics Laboratory :

1. *Electrical analogy of Mohr's Circle* : Electrical analog to find out the principal values and their directions of stresses, strains or moments of inertia of plane problems by an experimental procedure.

2. *Laboratory Development Work* : Experimental set-ups for Electrical Analogy and Buckling of frame structures are under progress.

3. The feasibility of substituting the existing metal structures of some of the defence equipment by fibre glass is being studied.

Short-term Courses and Seminars

1. A three week winter School on 'Gasdynamics' was held in December 1972 by the Department of Aeronautical Engineering under the Quality Improvement Programme. The participation of this Winter School was restricted to Engineering College teachers.

2. Under the auspices of the R and D group in Solid Mechanics of this Institute, a three day seminar on 'Role of Computers in Structural Analysis, Design and Optimisation' was held from December 11 to 13, 1972 at this Institute. The objective of this seminar was to highlight the role of computers (digital, analog and/or hybrid) and computer programmes in the solution of problems of structural analysis, design and Optimisation. The participants were drawn from various organisations such as H.A.L., V. S. S. C., I. I. Sc., I. I. Ts., etc.

3. A series of 6 lectures were given by the staff members of Engineering Training Division, Air India, Bombay on Boeing 707-747 airplanes and their various systems, from 29th January, 1973 to 3rd February, 1973. Lectures were given with special Audio-Visual aids.

4. Twenty Design Trainees from Hindustan Aeronautics Ltd., came to the department and were given lectures in various subjects during the year. Besides the departmental staff took part also in giving special lectures to the Management Trainees from Hindustan Aeronautics Limited.

APPLIED MECHANICS

The 4th batch of M. Tech. students in Engineering Mechanics graduated in 1972 and the 5th batch will be graduating at the Convocation to be held in August 1973. The first batch of students in the M. Tech. programme for Mechanical Engineering with Machine Dynamics option will be graduating in the ensuing Convocation in August 1973. During 1972-73, the Department had 24 Ph. D. Scholars including those under the Quality Improvement Programme. The Department also had 7 M.S. Scholars. The Department continues its research activities and also its industrial liaison work.

Research Work

Solid Mechanics :

Structural Vibrations of Bridges — Some investigation in the field of Structural Optimization — Application of Finite Element Technique to Limit Analysis of Slabs — Dynamic Response of Curved Bridges — Nonlinear Analysis of Sandwich Structures — Some Studies in Nonlinear Problems in Elasticity — Energy Search — Three-dimensional Photoelastic and Finite Element Analysis of the Thick-walled Conical Shells — Viscoelastic Analysis of Adhesive Joints — Viscoelastic Analysis of Solid Propellant Grain — Nonlinear Analysis of Circular Cylindrical Shell — Application of Finite—Element Method in Elasto-plasticity—Shells with Cut-outs—Three-dimensional Stress Analysis of Certain Biomechanical Problems — Vibration and Buckling of Plates — Free Vibration and Buckling of Helically Wound Conical Shells — Transient Response of Structures under Thermal and Mechanical Loads — Buckling of Helically Wound Multi-layered Circular Cylindrical Shells — Development of a Method for the Experimental Determination of Elastic Compliances of Composites — Stress Analysis of Nose-Cone Type Structures — Impulsive Loading of Plates and Shells — Static and Dynamic Response of Filament Wound Structures — Analysis of Hyperbolic Paraboloidal Shell — Large Deflection of Skew Plates — Vibration and Dynamics of Shells — Analysis of plates and shells by Numerical Methods — Creep Buckling of (1) Columns under Distributed and Concentrated Loads and (2) Noncircular Rings subjected to Normal Load — Application of Finite-element Method in Elasto-elasticity and Vibration of Continuous Circular Plate Systems (Isotropic and Orthotropic) — Buckling and Vibration of Elastically Coupled Circular N-plate System — Buckling and Vibration of Orthotropic Circular — Complete and Annular Plates — Nonlinear Vibration of Rectangular and Circular Plates — Yield Criteria for Orthotropic Plates — Prediction of Criteria for the On-set of Machine Tool Chatter Using Analogue and Theoretical Methods — Buckling and Vibration of Anisotropic Conical Shells.

Machine Dynamics :

(Mechanisms, Vibrations, Acoustics and Tribology):

Vibrational Analysis of Swept Back Aircraft Wings with Attached Engine Masses — Rotor Instabilities in Gas Lubricated Bearings — Static and Dynamic Stress Analysis of Cylindrical Shells with Cutouts — Static and Dynamic Behaviour of Machine Structures — Reduction of Vibration in Structures by Applied Damping Treatment — Rotor Instabilities in MHD Bearings — Instabilities in Rheodynamic (Grease) Lubricated Bearings — Acoustic Response of Structures and Noise Studies — On Synthesis of Two Degree Freedom Mechanisms — Development of a Torsional Vibration Exciter and Study of Dynamic Torsion Problems of Non-circular Shafts — Some Problems Connected with Shock Studies — Performance Characteristics of Indigenous Acoustic Materials and Design of Acoustic Horns — Critical Speed and Rotor Instabilities in Oil Lubricated Journal Bearings — Design and Development of an Electro-hydraulic Valve for the Hydraulic Vibration Machine — Some Problems on Riding Comfort of Road Vehicles (Theoretical and Analog Methods) — Computer Oriented Design of Machine Tool Structures — Scale Model Studies in Random Vibrations of Structures — Dynamics of Radial Drilling Machine — Structural Response to Random Acoustic Excitation — Correlation Studies of Cavitation, Noise and Vibration in Centrifugal Pump — Some Studies of the Static and Dynamic Behaviour of Hydrostatic Thrust Bearings — Damping of Flexural Vibrations in Sandwich Plates with Viscoelastic Core — Dynamic Behaviour of Corrugated Annular Disks — Response of Structures to Random Acoustic Excitation.

Fluid Mechanics :

Experimental Investigation of an incompressible three-dimensional wall jet — Experimental Investigation of Three-dimensional Turbulent Bodies at Angles of Attack — Experimental Investigation of the Properties Nacelles in case of Rear-mounted Engines — Investigation of the incompressible flow in Nozzles — Experimental Investigations of Optimum Axisymmetric Diffusers — Effect of contraction ratio and screens in nozzles — Potential flow Past Axisymmetric Bodies — Investigation of three-dimensional Boundary Layer Development on Yawed Wings — Wind Force Measurements on the Model of Auditorium for Sri Venkateswara University — Liquid Sheet Formation in Swirl Spray Atomisers — Axi-symmetric Bodies at Angles of Attack — Experimental Investigation of the Properties of Three-Dimensional Wall Jets — Experimental Investigations on the Efficiencies of Stepped Diffusers — Investigation of Annular Aerofoils at Angles of Attack — Etude Des Effects D' interaction et de Decollement Tri-dimensionnel de La Couche Limite en regime laminaire supersonique.

Biomedical Engineering :

Development of Cardiac Diagnostic indices — Intuitional Practice: Its effect on the practitioner's mental and physiological states and its possible use as a therapy — Guidelines for plastic surgery procedures based on structural analysis — Analysis and design of prosthetic occluding type and leaflet aortic valves — Design Analysis of Syme Prosthesis — Preferential minimizations of noise level in factories with several identical machine units — Absolute methods of labelling technics for blood group identification — Rehabilitation of the claw-finger in leprosy patients — Determination of the suspension parameters of a tractor for human comfort — Radial flow activated carbon kidney — Determination of pulse wave velocities — Hydraulically controlled arm prosthesis — Determination of optimal denture shape and size — Brain trauma under rotational force fields — Therapeutic devices for circulatory and neuro disorders — Development of tri-leaflet heart valve — Development of light-weight, hi-strength syme prosthesis — Functional electrical stimulation of extremities — Ultrasonic measurement of blood flow and elastic properties of cardiovascular tissues — An optimum intefrated urban-rural health care delivery setup — Blood flow, slip and viscometry — Development of the theory of blood flow.

Design and Development

Solid Mechanics :

1. Apparatus for the measurement of transient strains and impact forces on structures.
2. Design and Fabrication of Wohler Fatigue Testing Machine for Laboratory instruction.
3. Development of demonstration models for illustrating Moire method of strain analysis.
4. Design of a holographic test bed.
5. Design of a test rig for holographic stress analysis of circular plates and cantilever and simply supported beams.

Machine Dynamics :

1. Torsional Vibration Exciter
2. Conical and Catenoidal Acoustic Horns
3. Air Bearing Testing Machine
4. Analogue Model for Riding Comfort Studies
5. Hydrostatic Bearing Test Rig with Orifice Control

CHEMICAL ENGINEERING

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

Teaching and Research

The number of students on rolls during 1972 - 73 and number graduated are given below :

	No. on rolls	*No. graduated*
B. Tech.	148*	44
M. Tech.	57**	27
M. S.	8	3
Ph. D.	13	2

* last three years

** first and second year

The B. Tech. and M. Tech. degree courses were reviewed with a view tc optimise the number of courses offered by the Department to ensure intensive teaching, consequent tutorial system for assimilation, dovetailing the inputs of courses offered by other departments and overall objective oriented sequencing.

New research programmes started in each of the five sections is given below :

1.	Transfer Operations	Structured packed beds, Development of Collegen Membranes, Ion Exchange separation of radio isotopes
2.	Reaction Engineering	Photochemical flow reactor, On-line mixing reactor
3.	Process Control	Development of fast models
4.	Particle Technology	Electrostatic mineral separation
5.	High Polymer Engg.	Autogenous extrusion

The Department has submitted three proposals to NCST for funding Advanced Center in Particle Technology, Center for High Polymer Processing and Development of pneumatic dryers.

The Curriculum Development Center has invited specialists from chemical and related industries, to prepare a manual on Chemical Technology. This is scheduled for completion during the next academic year. The Center has also brought out a booklet on inplant training.

The Department has organised Seminars on "Processing of High Polymer Products", "Frontiers of Chemical Engineering", "New Approaches in Design" and Short Term Courses on "Catalysts and Reactors" and "Corrosion Engineering".

Industrial Liaison

A total of 11 projects are handled for the industry out of which 6 projects are major. The three projects handled for development of high temperature insulation for rocket motors (for SSTC), Distillation of chlorosilane mixtures (for SSTC), Furfural (Agro Industries) involved development and testing of major equipment and faculty involvement and advice on design.

General

A total of 17 papers were published and 19 under processing. Applications have been filed for 6 patents.

CHEMISTRY

Besides teaching under-graduate and Post-Graduate courses in Chemistry for students of Engineering disciplines (B.Tech. and M.Tech. Degrees) a new course, D.I.I.T. in Technical Analytical Chemistry was introduced from the Academic Year 1972-73. During the year under review nineteen Post-Graduate students of this Department qualified for the M.Sc. degree, two students for the D.I.I.T. and six for the Ph.D. degree.

Research Programmes

The year under review witnessed a further stepping up of research activity of the Department. Fifty two full time Research Scholars and eight 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, organic reaction mechanisms, coordination chemistry, solid state chemistry and analytical chemistry. Thirty-five research papers were published by the faculty members in scientific journals in India and abroad twenty six had

been accepted for publication and twenty-eight were presented at Seminars and Conferences. Prof. M. V. C. Sastri and Prof. J. C. Kuriacose participated in the V International Congress on Catalysis held at Palm Beach, Florida, U.S.A., in August, 1972.

Under Quality Improvement Programme, faculty members of the Department participated in the conduction of two week Winter School on Catalysts and Reactors organised by the Chemical Engineering Department of this Institute. A Summer School on Chemistry in Engineering Curriculum was also organized by the Department under the Quality Improvement Programme.

The Department has also rendered increased assistance by way of analytical and consultancy services to a number of Industrial Organisations, Government Departments and Educational Institutions in the region.

CIVIL ENGINEERING

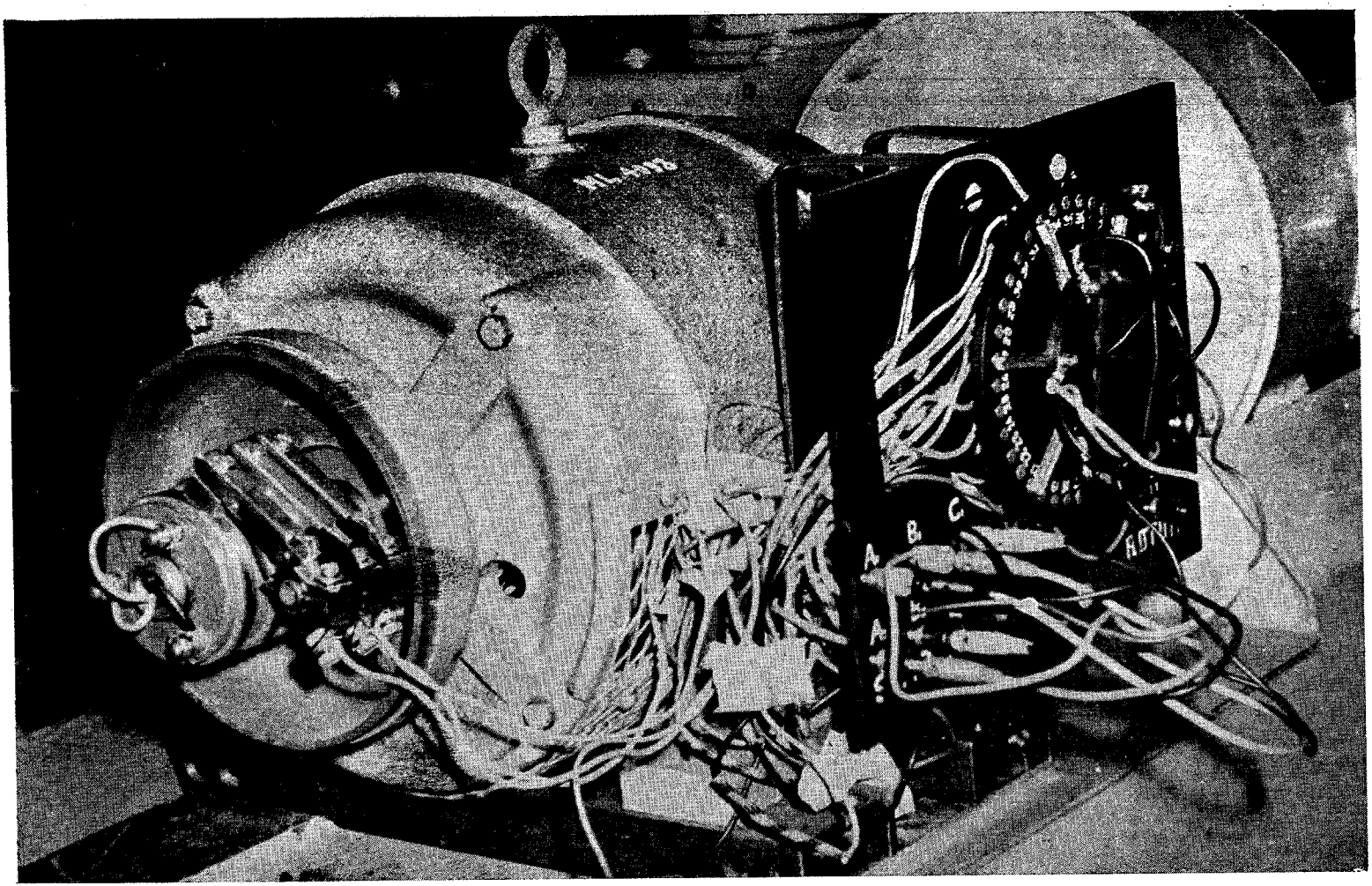
During the year, the Department continued to offer courses in B.Tech. and M.Tech in Civil Engineering and research courses in M.S. and Ph.D. in various branrhes of Civil Engineering. In addition, one-year post-graduate diploma courses leading to D.I.I.T. (Building Technology) has also been offered. 13 students of the Department qualified for B.Tech. and 12 for M.Tech in the three branches namely Hydraulic Engineering, Soil Mechanics and Structural Engineering. 3 candidates were awarded Ph.D. degree, and one candidate was awarded M S. degree. In addition, 28 scholars are working for Ph.D. (including part-time). The curriculum for 2-year B.Tech degree course in Naval Architecture is finalised for graduate engineers and the course starts from August 1973.

Curriculum for one-year post-graduate diploma course in Civil Engineering leading to D.I.I.T. (Coastal Engineering) has been finalised. The course is expected to commence in January, 1974.

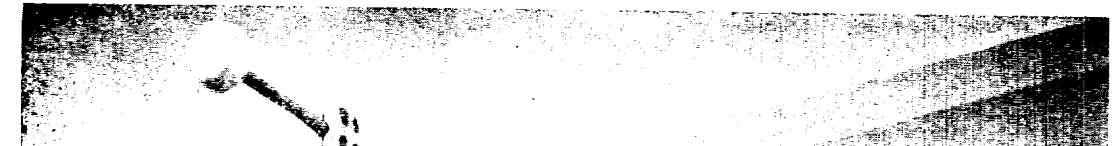
The Department conducted 2 short duration courses during the Summer, in which teaching staff from various institutions participated.

Research Work

Research activity in the Department maintained its growth in variety and volume. During the year, 60 research programmes which include faculty research, M.Tech, M.S. and Ph.D. programmes were on hand. 2 Research programmes, sponsored by C.B.I P. are underway.



A New Method of Impedanec Control of Induction Motor Speed
—Electrical Engineering Department



Visible Corona Test Set-up
Electrical Engineering Department

In the year under review, over 22 technical papers and discussions were published in important technical journals in India and abroad, while 19 more were accepted for publication later. The faculty members and research scholars either submitted or presented 13 papers at technical conferences/symposia held in India and abroad.

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

ELECTRICAL ENGINEERING

During the year under review 58 students of the Department qualified for the B. Tech., degree and 33 students for the M. Tech., degree. Four candidates were awarded the Ph.D. degree bringing the total number of Ph.D. degrees awarded to 16.

Research Work

Research activity in the Department had continued to maintain its growth in variety and volume. During the year, 53 research papers from the Department were published in leading technical journals in India and abroad, while 28 more were accepted for publication. The faculty members of the Department also presented 34 papers at technical conferences in India and abroad.

Important Projects

The report for the Project on "Fast response excitation controller for alternators" was submitted to the C.S.I.R. in complete form. Work on the project on the development of a Demonstration Digital Computer, sponsored by the Department of Atomic Energy, was continued in the Digital Techniques Laboratory. The project is now in its last phase of completion.

The completed prototype of a smooth variable speed thyristor-controlled drive for three phase induction motor is despatched to the R.D.O.E.I., Bhopal, the sponsors of the project. The feasibility report for a project on "High Speed unwinder drives" has been approved to M/s. Bharat Dynamics Ltd., Hyderabad and work on the project is on. In addition, the different ffaboratories in the Department accepted and completed testing works from a number of industrial organisations.

Centre for Systems & Devices

The Centre sponsored by the Ministry of Defence, has among its objects, the followig : (i) futuristic investigation and research/development activities ; (ii) Offering long term and short-term courses in selected areas/ topics to Defence Officers and R and D personnel. Research/development activities are being pursued in the areas of Signal Processing Techniques, Semi Conductor Devices and Control and Guidance Systems. Six major R and D projects, two in each of the above areas are now in progress. Three short-term courses have been conducted and three scheduled for the year 1973-74. A two-year M.Tech. course on Control and Guidance Systems has been started in July 1973. The Laboratory building for the Centre is nearing completion. Residential accommodation for the Centre staff and deputed trainee officers have also been completed.

Statistics pertaining to the Department

S.No :	*Subject* :			*Total No* :
1.	Degrees awarded :			
	B.Tech :			563
	M.Tech :			180
	Ph.D.			16
2.	Publication :			
	Indian Journals	58	{	275
	Foreign Journals :	217	{	
3.	Patents taken			2
4.	Books written			1

HUMANITIES AND SOCIAL SCIENCES

During the year under review, research work covered various fields like Economics, Economic History, and Industrial Engineering. Two members of the staff were awarded the Ph.D. degree.

The Department organised as a part of the Q.I.P.. a Summer school for teachers in Engineering Colleges on Economics and Industrial Management .

18 Research papers were published or presented at various conferences.

During the year the Department was able to improve its liaison with industry to a considerable extent. Senior faculty members conducted Management Development Programmes and Executive Department Programmes for some of the leading Industrial houses and Public sector industries under the auspices of various professional bodies.

The post graduate students were deputed to various industries for their project work.

MATHEMATICS

The Department continued teaching Mathematics to the B.Tech., M.Tech., M.S. and Ph.D. courses of the Institute.

The faculty members actively engaged themselves in research work in the following fields :

(i) Fluid Mechanics, (ii) Solid Mechanics, (iii) Stochastic Processes, (iv) Differential Equations, (v) Graph Theory, (vi) Operations Research, (vii) Quantum Mechanics and Fields, (viii) Numerical Analysis, (ix) Theory of Functions, (x) Mathematical Biology and Bio-engineering and (xi) Mathematical Physics.

A good number of research papers were published during this year. Eight research scholars qualified for the Ph.D. degree having completed all the requirements for the degree.

The Department continued its collaboration in teaching and research programmes with the other Departments of the Institute as well as a few institutions outside this Institute.

Members of the Department participated in a number of Conferences and Symposia held in India and abroad. The Department faculty participated in a Summer School programme in Operations Research arranged jointly by IIT Madras and IIM Ahmedabad.

The " Journal of Mathematical and Physical Sciences " entered into its sixth year of publication.

Professor S. K. Srinivasan has completed a monograph on " Stochastic Point Processes and Their Applications ". The monograph is being published by Charles Griffin and Co., England during the course of the year 1973.

The UGC book writing programme by Professor S. K. Srinivasan and Shri K. M. Mehata on Stochastic Processes has reached the final stage. The manuscript is expected to be ready by September, 1973.

MECHANICAL ENGINEERING

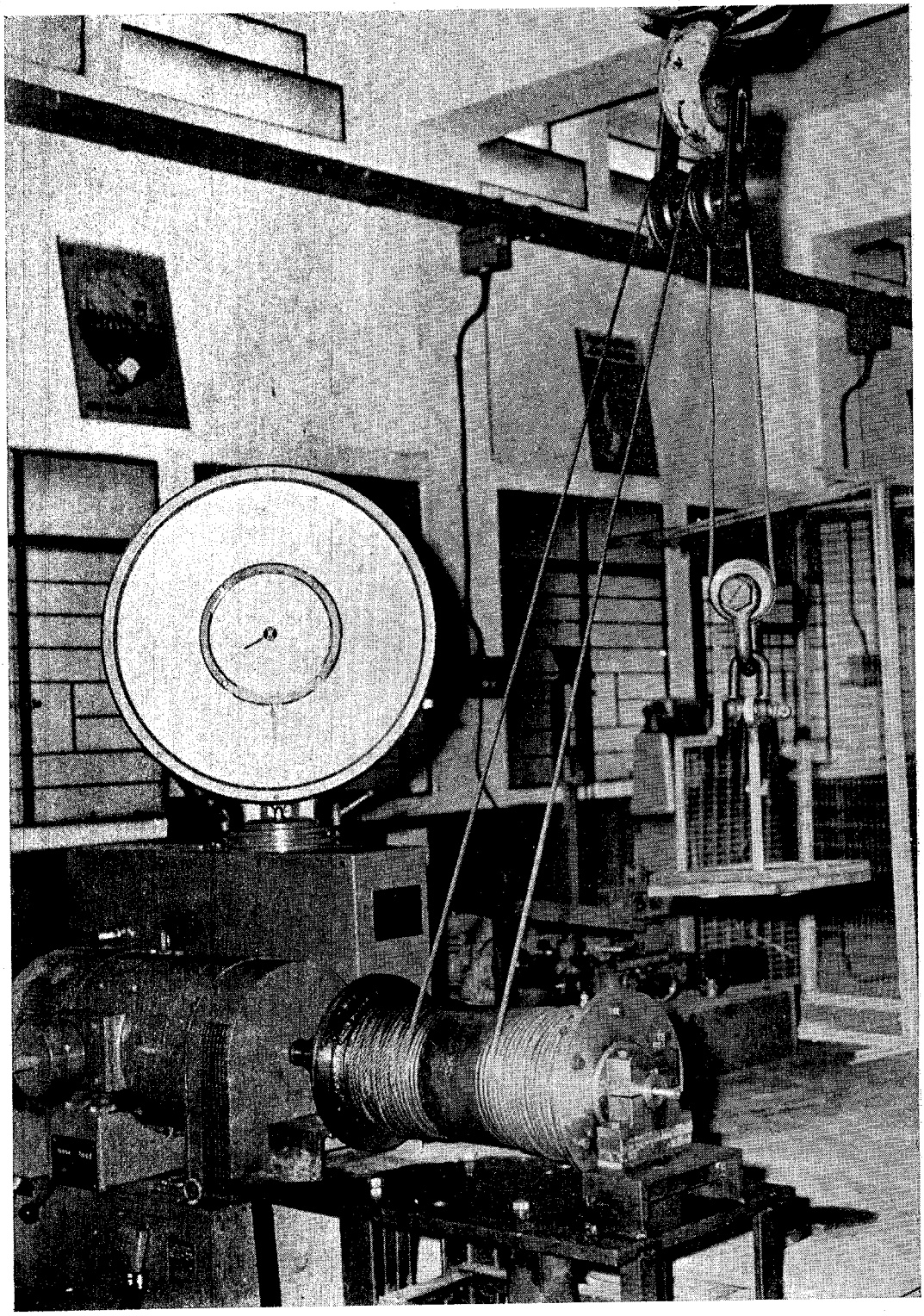
The Department effectively executed its major task of imparting instructions to the students of B.Tech. and Post-graduate sections, introducing fresh curriculum, promoting the research and developmental activities sponsored by outside agencies in addition to their own. The Department engaged in its endeavour of organising quality improvement programme and continuing educational activities. It is gratifying to note that the ratio of post-graduate to under-graduate degree award is a little more than one.

Curriculum to specialise in the area of Refrigeration and Air-conditioning in the Master's degree level was introduced during the year. Eleven candidates for Ph.D. and two for M.S. have registered during this year. Twenty-two of the faculty members are continuing their research programmes for higher degrees. Fifty-one papers have been published/presented in journals/conferences all over the world. The Invention Promotions Board, Government of India has awarded for two of the Research Inventions completed during this year. The Department has also taken a Patent for one other invention.

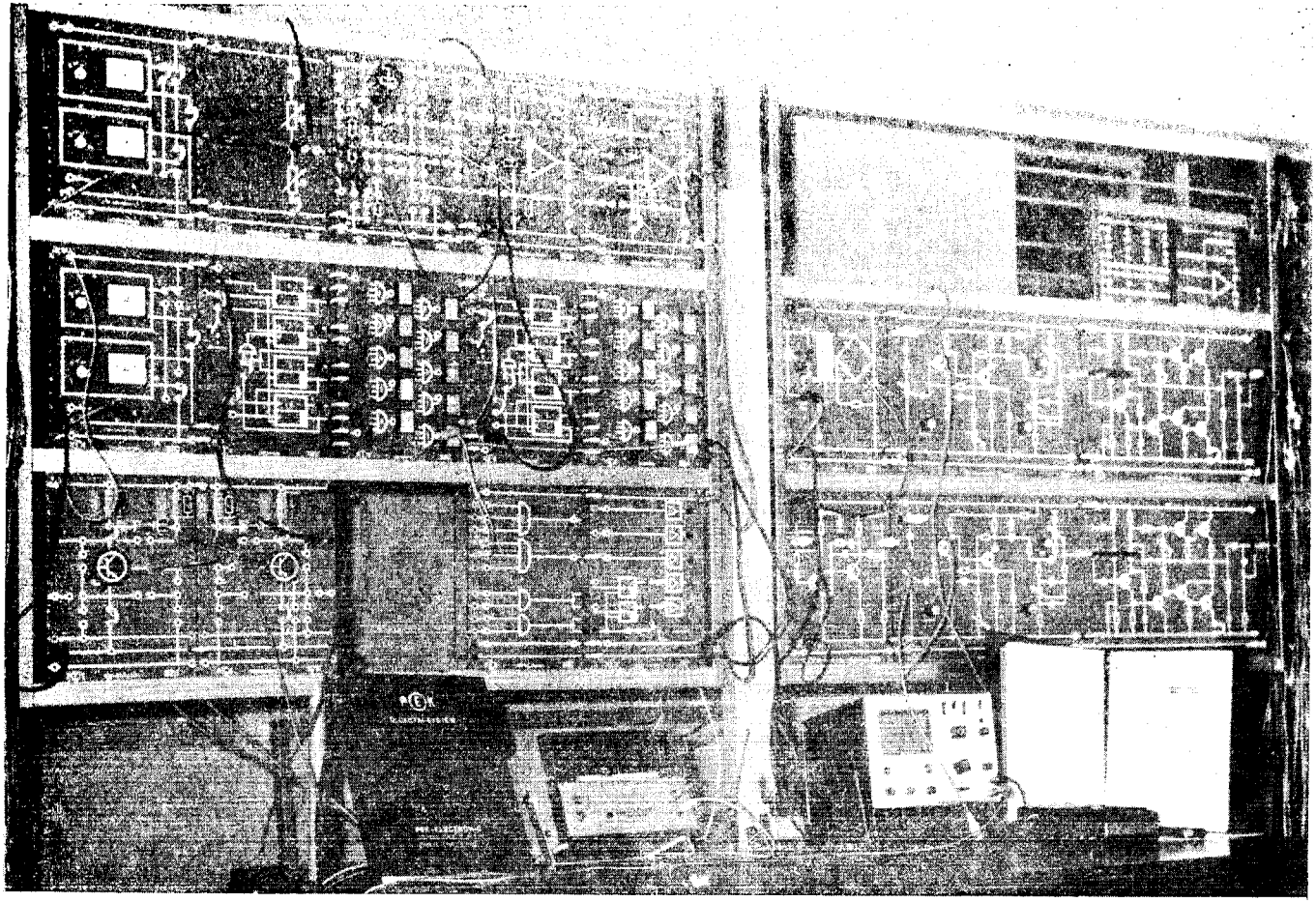
Research Work and Other Activities

The research and development activities include Combustion Engineering, Fine Technics, Heat Transfer and Thermal Power Engineering, Hydroturbomachines, Internal Combustion Engines, Machine Elements, Machine Tools, Mechanical Handling, Metrology, Production Engineering and Refrigeration and Air-conditioning. The Department is also active with inter-departmental research activities such as Fluid Mechanics, Air and Water Pollution, Desalination and Solar Energy Utilisation.

A seminar on 'Numerical Control of Machine Tools' in collaboration with Madras Productivity Council was organised. Under the auspices of



Experimental Set-up For Efficiency of a Compound Epicyclic Gear Box
—Mechanical Engineering Department



Set-up for Training in Electronic Circuitry
--Central Electronics Centre

the Andhra Pradesh Productivity Council a short term course on 'Production Engineering' was conducted for Hindustan Aeronautics Ltd., Bangalore. The Department gave a two week course with the assistance of NPC on 'Metrology and Gauging' at the Madras Productivity Council. A summer school for university teachers in 'Laboratory Techniques and Experimental Methods' was organised by the Department.

The following sponsored projects are in progress in addition to the several other research projects.

1. Development of strain rate controlled testing machine (CSIR).
2. Intensity of turbulence on the performance of turbine blade cascase (CSIR).
3. Investigation on crank-shaft vibration and development of vibration dampers for I.C. Engines (CSIR).
4. A study of the factors affecting Benzopyrene concentration in the diesel exhaust (NCS, USA).
5. Heat Transfer Studies in Large Electrical Machines (RDOEI).
6. Performance characteristics of gas bearings (Defence Research Establishment).

The Department continues to maintain liaison with many industries and organisations including a few of them being K.C.P. Ltd., Best & Co., SSTC, Trivandrum, E.I.D. Parry & Co., Kirloskar, I.L.O.-Rallis India, Indo Icelandic Fisheries Private Ltd., Kristcart Ltd. and contribute in the Design and Development of processes and machines like Drilling Machine, Inline Propeller Pumps etc.

CENTRAL WORKSHOP

1. *Work orders completed during* 1972-73: 1,640 Nos.

2. *Outstanding jobs done during* 1972-73 (Departmental):

Sl. No.	Description of job	Department/Laboratory
1.	Core stick device assembly	Fine Technics Laboratory
2.	Parts of Pneumatic pick up heads	Production Engg. Laboratory
3.	Fabrication of contraction cone and settling chamber	Aeronautical Engg. Department
4.	Fabrication of Rotating Device	Fine Technics Laboratory
5.	Fabrication of Crushing Machine	—do—
6.	Fabrication of parts for Semi Automatic Slide projector	—do—
7.	Fabrication of Measuring set up of RCR feed back Oscillator	—do—
8.	Fabrication and assembly of Pressure chamber	I. C. E. Laboratory
9.	Fabrication of Ring Aerofoil set up	Applied Mechanics Department
10.	Fabrication and assembly of 35-mm Camera Shutter model	Fine Technics Laboratory
11.	Optical convex and concave tools	—do—
12.	Fabrication and assembly of Probe traversing mechanism	Turbo Machines Laboratory
13.	Fabrication of parts for Area Measuring Machine	Fine Technics Laboratory
14.	Fabrication of Bevel Gear	I. C. E. Laboratory
15.	Fabrication and assembly of Mirror mount	Fine Technics Laboratory
16.	Fabrication of Signal conditioning unit. Holographic interferometer and Diameter measuring device.	—do—
17.	Fabrication of Sampling valve	I. C. E. Laboratory
18.	Techograph assembly	Fine Technics Laboratory
19.	Bulb intensity measuring device	—do—

METALLURGY

The research activities of the Department maintained a steady progress. The total number of candidates working for research degrees during the year under review was as follows:

Ph.D. 17 (4 full-time, 1 under quality improvement programme and 12 part-time)

M.S. 13 (10 full-time, 2 part-time and 1 part-time—External)

During the period under review, 2 Ph.D. and 1 M.S. theses have been submitted.

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

(1) Effect of surface coatings on fatigue properties of steels.

(2) Studies on powder metallurgy.

(3) Application of Mossabauer effect to some problems in Materials Science.

(4) Stabilisation of austenite.

(5) Behaviour of pile-ups of screw dislocations in 2-phase fields.

(6) Grain boundary migration studies in metals.

(7) Studies on the shape-memory effect in metals and alloys.

(8) Propagation and attenuation of ultrasonic waves in metallic materials.

(9) Permanent magnet alloys.

(10) Transformations in 25% Cu-75% Zn alloy.

(11) Effect of anodising on the fatigue properties of aluminium.

(12) Fatigue hardening and fatigue softening.

(13) X-ray studies of the nature of the cold worked state in metals and alloys.

(14) Effect of metal/non-metal coatings on the fatigue properties of steels.

(15) Feasibility studies on the production of rare earth cobalt compounds for use in permanent magnets.

(16) Shape memory effect in Cu-Mn-Si and Ni-Al systems.

(17) Low cycle fatigue.

(18) Pre-straining and fatigue crack propagation.

(19) Cumulative damage in creep.

(20) High temperature relaxation problems.

(21) Fracture and general yielding.

(22) Impact fatigue.

(23) Some aspects of contact fatigue.

(24) Stress relaxation studies.

(25) Design and fabrication of a fatigue testing machine.

(26) Cumulative damage in fatigue.

(27) Creep under intermittent loading.

(28) Vacuum melting of stainless steel.

(29) Effect of aluminium on Cr-Ni-Mo steels.

(30) Pelletising characteristics of Bhadravati and Salem Ore

(31) Melting practice of light zinc brasses and high manganese alloys.

(32) Techniques for manufacture of graphite electrodes.

(33) Development of a copper chromium alloy.

(34) Melting of Cu-Si-Al alloy for S.S.T.C. Thumba.

(35) Development of a method of making carbon electrodes and crucibles indigenously.

(36) Codeposition of nickel and other elements by electrolytic techniques.

(37) Flotation of silicate minerals of nickel and extraction of nickel from the silicate ores.

(38) Bacterial leaching — intensive literature survey.

(39) Organic addition agents in metal finishing.

(40) Recovery of zinc from galvanising plant ashes.

(41) Risering of long freezing range alloys.

(42) Feeding characteristics of narrow and long freezing range alloys.

(43) Compaction characteristics and physical properties of moulding sand.

(44) Surface finish of shell moulded steel castings.

(45) Studies on waxes.

(46) Production of quality finned cylinder barrel cast iron castings by shell moulding process.

(47) Optimum chill dimension for LM 4 alloy.

(48) Studies on heat extraction around corners in castings.

(49) Studies on acoustic emission.

(50) Studies on soundness of aluminium alloys.

(51) Studies on soundness of aluminium alloys.

(52) Solidification of copper and its alloys in metal moulds and thermal behaviour of metal moulds.

(53) Design and development of moulding sand mullers.

(54) Design and development of core sand mixers.

(55) Development of test procedures for assessing the quality of bentonites.

(56) Study of failure of cast iron balls used in cement ball mills.

(57) Development of fluxes for submerged arc welding.

(58) Measurement of delta-ferrite in austenitic steel weld metal.

(59) Welding characteristics of heat treatable aluminium alloys.

(60) Combined Extrusion.

(61) Investigations on flaw turning.

(62) Investigations on various aspects in coining.

(63) Some aspects of rubber pad forming.

(64) Direct plotting of true stress-true strain curves.

(65) Combined forward and backward extrusion.

(66) Die-less explosive forming of metals.

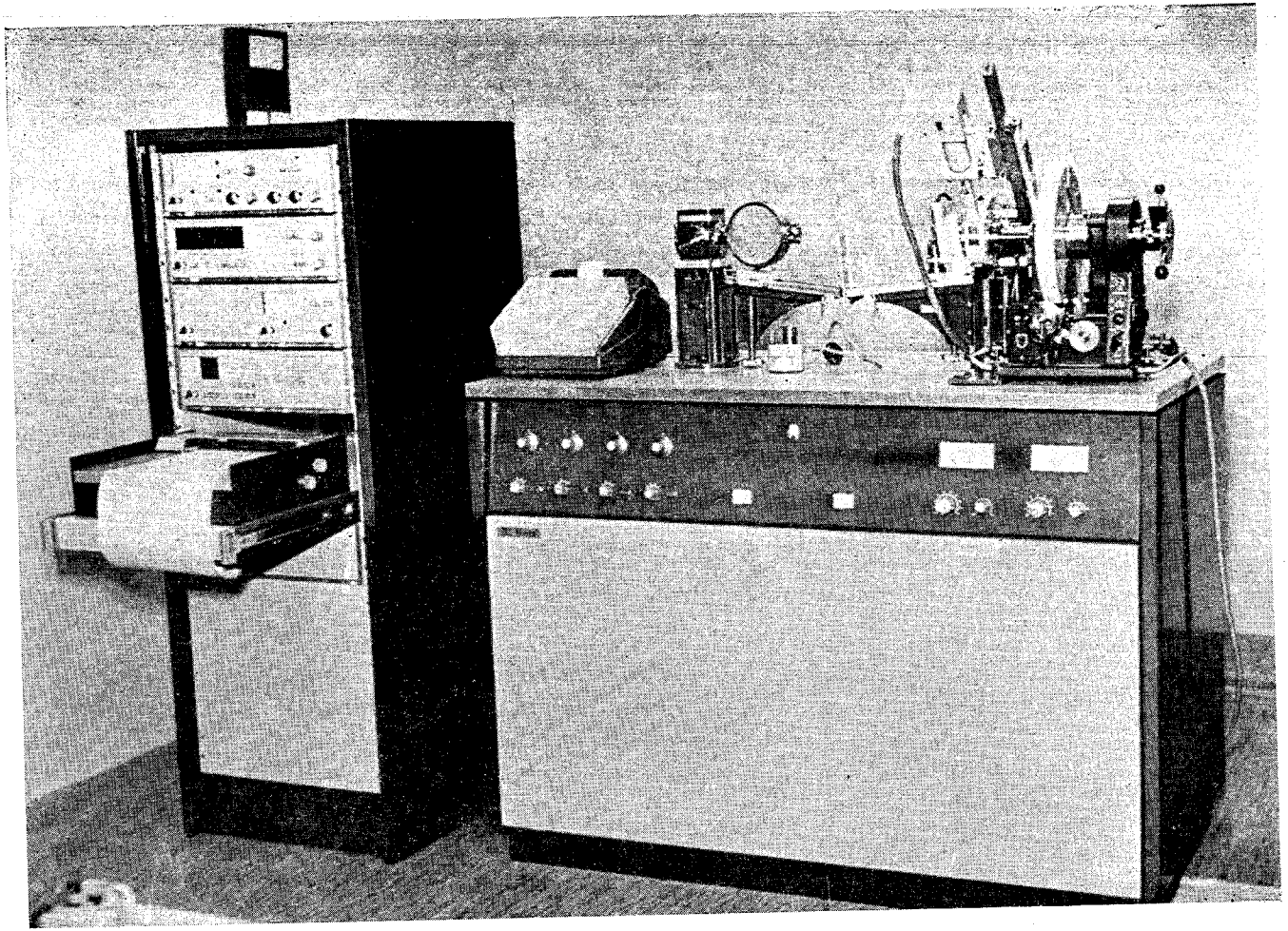
(67) Tool set-up for square deep drawing process.

(68) Some aspects of hot flow turning.

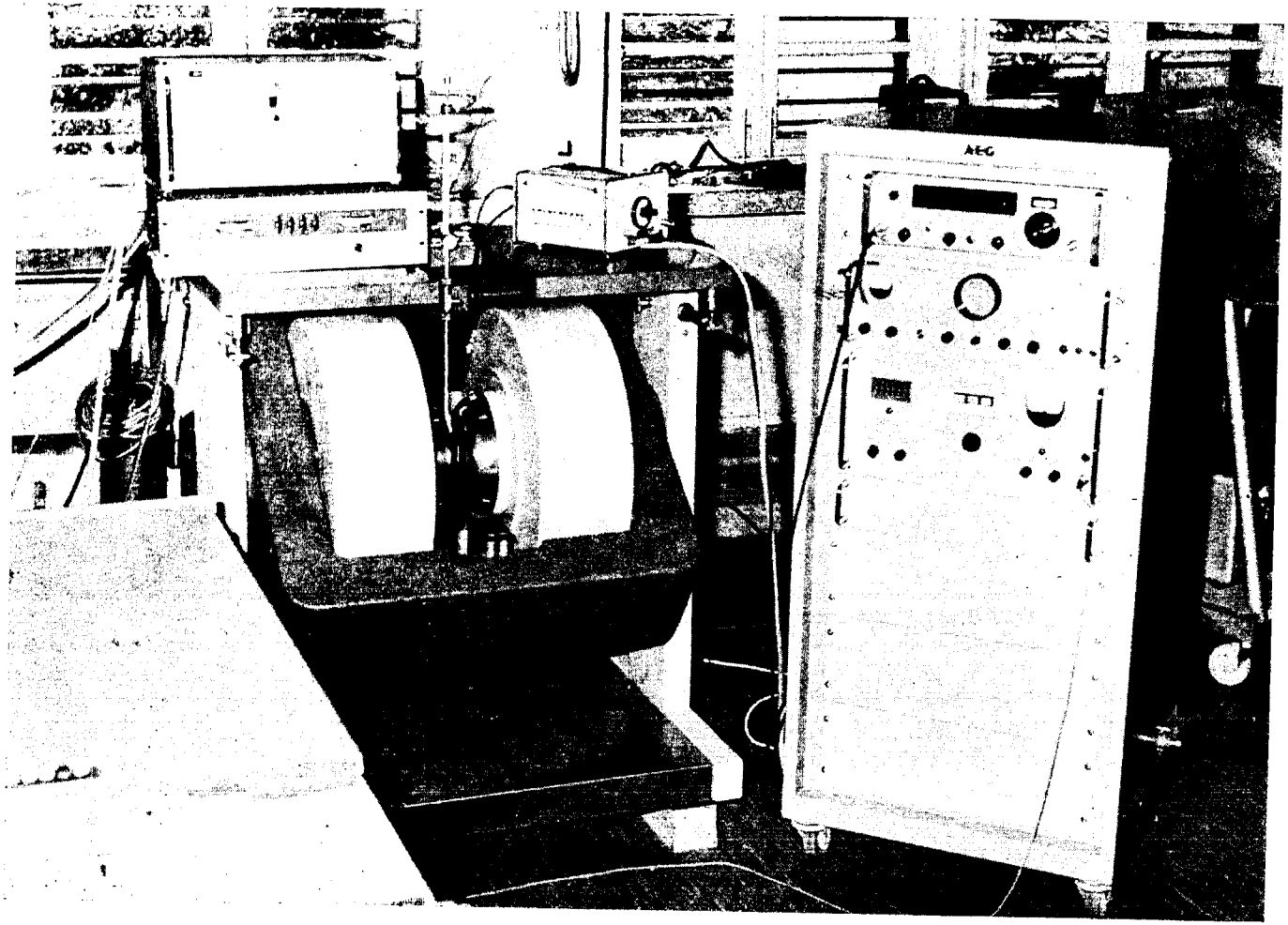
The Department continued to maintain close links with industries and carried out work in the fields of chemical analysis of metals and alloys, mechanical testing, metallography, non-destructive testing, etc.,

Two intensive courses one on "Welding Technology and Testing" and the other on "Sand Testing" were organised by the Department for participants from industry. Assistance to curriculum development and special lectures were given to outside agencies and colleges.

As in previous years, the local chapter of the Indian Institute of Metals functioned from the Department and organised a number of technical meetings as well as a special technical programme for the National Metallurgists Day.



Powder Diffractometer Mounted on the Philips Mikro 1140 Unit — Central XRD Laboratory
—Metallurgy Department



AEG ESR Spectrometer with Magnetic Field Monitoring NMR Unit
—Physics Department

PHYSICS

The activities of the Department divide themselves as usual into two parts, viz. teaching and research.

In addition to the courses in Physics taught to the B.Tech. and M.Sc. students we co-operate with other Departments in conducting special courses for their students. Since bioengineering has swum into fashion we run, besides the old courses, a new one this year on bio-mechanics and bio-instrumentation.

The fond of German expertise in the Department remains more or less intact. Prof. Marx left us to return to W. Germany, and Dr. B. M. Sivaram returned to us after 16 months in W. Germany where he specialised in laser Physics.

After its many launching troubles the low-temperature laboratory is now on even keel, and the liquid Helium plant is now on stream again. It has therefore been possible to run the elective course in Cryogenic Physics from this year.

Research

The Research activities of the Department ran along the same lines as last year which saw an increase in the extent and scope of our work, thanks much to new equipment received as W. German aid. Theoretical studies were made in Lattice Dynamics and Ultrasonics in liquids. Many faceted experimental research were conducted in Crystal Growth, Lasers, Electron Spin and Nuclear Quadrupole Resonance in crystals, and the influence of point defects in crystals on their electrical and optical properties. Several schemes sponsored by various agencies like the I.N.S.A., D.A.E. and the C.S.I.R. are being supervised in our laboratories. The list of papers published by the members of the Department in the last academic year, and the fact that in Tenth Convocation in August 1973 seven students of the Department received the Ph.D. degree, bear, we hope, ample testimony to the work of the Department.

The following are the students who were awarded the Ph.D. degree at this year's Convocation: B.O. Sharma, A.M. Khargupikar, K.P. Pande, B.S.V.S.R. Acharyulu, K.R. Narasimhamurthy, R.B. Tripathi, and C.S.N. Murthy.

CENTRAL LIBRARY

General

With the crossing of 100 thousand volumes accessioned to the Library last year, the library building had reached its full capacity provided in the three-tiered block for library stacks. So also the seating arrangement provided for 120 readers is far below the actual requirement or the norms recommended by UGC for a total student population of 2,000. As such a cut in building programme has posed serious problems to the readers' services and proper maintenance of the library stacks.

During the period under review the book grant has remained the same as for the previous year except for certain marginal adjustment for the inexorable increase in book prices and periodical subscriptions.

A Book Bank with a small collection of text books continued to operate and loaned out the limited number of books for semester long periods. Efforts to augment funds for purchase of additional text books did not prove successful in attracting any significant donations although such contributions were got cleared as tax-free concessionals from the Income Tax authorities.

Documentation & Reprographic Service

There has been a steady increase in effective utilization of documentation services by the faculty and other research workers. The service was supported by reprographic rendering of the required literature. The addition of Korestat copying machine has helped in attending promptly to the evergrowing demand for reprographic service particularly after the release of the Union Catalogues of Periodicals and Serials available in all the IITs & IISc. In fact the Reprographic Unit is working in double shift to cope with the demand on the service.

Roster of Translators

The Roster of Translators was further updated with particular emphasis on subject specialization and started its own Translation series with a view to exchange them with other translation centres of the world on reciprocal basis.

Computer Liaison work

The Library continued to liaise between the Institute's faculty and the Computer Centre of Madras University in securing computer facility and

rendered assistance in sorting out technical problems whenever confronted by the faculty or the research workers of the Institute.

Stock/Stack maintenance

In the course of routine stock verification cum stock rectification, some loss of books has been noticed but the most disturbing feature has been the mutilation of books and periodicals which is hard to condone in view of cheap photocopying services conveniently at hand.

The administrative set up of the library was regrouped on sectional pattern and the library manual revised to stream-line certain procedures to achieve greater efficiency. It has resulted in expansion of readers' services without any significant addition to the staff.

Supply of literature under Indo-German Program

The Director of the Library, Technical University, Berlin continued to arrange for prompt supply of literature required by our faculty and the research workers. Over 100 current periodicals in German were received for the twelfth year in succession apart from Xerox copies of microfilms of University Theses or article literature by air which have proved immensely useful for our research activities.

Statistics of the Main Library activities are as follows :

Membership :

	1971/72	1972/73
(1) Institute members (staff & students)	4,389	4,719
(2) Outside members:		
Individual	17	23
Corporate	12	22
(3) Consultation Permits	120	162

Opening hours :

Week days 9 am — 10.30 pm
Sundays & Holidays 9 am — 4.00 pm

Circulation :

(1) No. of readers visited	71,843	1,09,808
(2) No. of volumes issued	81,221	83,108

		1971/72	1972/73
(3) No. of reservations for books attended		7,121	12,002
(4) Amount of overdue and other charges realised	Rs.	11,694	16,380

Inter-Library Loan :

Borrowed for Institute members	183	450
Lent out from Institute Library	48	310

Acquisition :

Books and bound volumes of periodicals	5,147	5,642
Pamphlets and Reports	7,942	5,818
Microfilms and Microfiches	143	333
Total intake during the year	13,232	11,793
Total Accessions up-to-date	1,10,246	1,19,005

Current Periodicals :

By subscription	1,117	1,100
By exchange or gift	350	320
Total	1,467	1,420

Reprographic Section :

Microfilms made	strips 253	13,913 Frames
Photocopies made	pages 7,562	12,383 pages
Xerox copies made		2,514 pages

Bindery :

No. of Journals and books bound for library	5,847	4,028
No. of Journals and books repaired	521	145
Other Departments work	810	2,511

ANNEXURE 'B'

ADMISSION TO THE COURSES OF STUDY

(for the 1972-73 session)

The number of students admitted to the undergraduate and post-graduate courses for the 1972-73 session is given below :

Courses	*No. admitted*
B. Tech.	273
M. Tech.	232
D.I.I.T.	4
M.Sc.	60
M.S.	24
Ph. D.	48 + 17

STUDENT POPULATION AT THE INSTITUTE (1972-73 SESSION)

For the academic session 1972-73 the strength of students in the different courses was as follows :

Course/Programme	*Full-time*	*Part-time*
B. Tech.	1214	—
M. Tech.	396	1
D.I.I.T.	2	—
M.Sc.	98	2
M.S.	52	10
Ph. D.	196	136
Post-Doctoral fellow	1	—

The above figures include one foreign national

ANNEXURE 'C'

NINTH CONVOCATION OF THE INSTITUTE

26th August, 1972

The Ninth Convocation of the Institute was held at 5.00 P.M. on Saturday, the 26th August, 1972 in the Open Air Theatre of the Institute. In the absence of Shri K. T. Chandy, Chairman of the Board of Governors of the Institute, Dr. B L. Shantamallappa presided over the Convocation. Dr. Malcolm S. Adiseshaiah Retired Dy. Director General, UNESCO was the Chief Speaker.

The Director conferred the Degrees and Diplomas on 197 candidates, who attended the Convocation and in-absentia on 292 candidates who could not be present. The numbers of the graduates in the various categories are given below:

Ph.D. Degree	*In Person*	*In Absentia*	*Total*
Chemistry	2	—	2
Mathematics	3	—	3
Physics	1	1	2
Chemical Engg.	1	1	2
Civil Engg.	2	—	2
Electrical Engg.	6	1	7
Engg. Mechanics	1	—	1
Mechanical Engg.	8	—	**8**
Metallurgy	2	—	2
	26	3	29
M.S. Degree			
Aeronautical Engg.	2	1	3
Chemical Engg.	4	1	5
Civil Engg.	—	1	1
Engineering Mechanics	1	—	1
Mechanical Engg.	2	6	8
Metallurgy	2	1	3
	11	10	21

	In Person	*In Absentia*	*Total*
M.Sc. Degree			
Chemistry	5	12	17
Mathematics	4	8	12
Physics	5	11	16
	14	31	45
M.Tech. Degree			
Aeronautical Engg.	4	6	10
Chemical Engg.	6	8	14
Civil Engg.	16	14	30
Electrical Engg.	5	26	31
Engineering Mechanics	4	4	8
Industrial Engg.	3	5	8
Industrial Management	7	5	12
Mechanical Engg.	5	24	29
Metallurgy	5	6	11
	55	98	153
B.Tech. Degree			
Aeronautical Engg.	15	3	18
Chemical Engg.	13	16	29
Civil Engg.	19	19	38
Electrical Engg.	15	31	46
Mechanical Engg.	18	53	71
Metallurgy	11	22	33
	91	144	235
D.I.I.T.			
Building Technology	—	6	6
Grand Total	197	292	489

After the conferment of Degrees/Diplomas the Chief Speaker distributed the prizes to prize winners

The graduates of the year who were present took the pledge, led by Shri Nanda Kishore, K. winner of the President of India Prize.

After Dr. B. L. Shantamallappa's introductory speech, Dr. Malcolm S. Adiseshaiah delivered the Convocation Address.

LIST OF PRIZE WINNERS

Prizes awarded at the Ninth Convocation of the Institute held on 26th August, 1972.

PRESIDENT OF INDIA PRIZE

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

Shri Nanda Kishore, K. (Chemical Engineering—B.Tech.).

GOVERNOR'S PRIZE

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

Shri John Mathai (Metallurgy — B.Tech.)

MERIT PRIZES

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

M.Sc. Degree Course

Sri Dinesh Nettar (Chemistry)

Kum. K. Hemalatha Priyakumari (Mathematics)

Sri Venkatesh Prasad, A. (Physics)

M.Tech. Degree Course

Sri S. Ramakrishnan (Aeronautical Engineering)

Sri Madhavan Nambiar, M. R. (Civil Engineering)

Sri G. V. Sankaran (Engineering Mechanics)

Sri S. R. Varadarajan (Industrial Engineering)

Sri Mohammed M. Hussain (Industrial Management)

Sri V. Ramesh (Mechanical Engineering)

Sri N. K. Murali (Metallurgy)

B.Tech. Degree Course

Sri Ranjan, G. V. (Aeronautical Engineering)

Sri Nanda Kishore, K. (Chemical Engineering)

Sri R. Sukumar (Civil Engineering)

Sri Venkata Narasimha Rao Bangaru (Metallurgy)

SIEMENS PRIZES

(Presented by M/S Siemens Engineering and Manufacturing Compa of India Limited to the students with the best academic record in Electrical Engineering of the M.Tech. and B. Tech Degree Courses) (Power)

M.Tech. Degree Course

Sri T. V. Ramabadran

B.Tech. Degree Course

Sri Viswanathan, N.

PHILIPS INDIA PRIZE

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

Sri Bhuvaneswar, G. S.

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).

Sri Ram, R.

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 in his first appearance, the prize being awarded in alternate years to the student in Mechanical Engineering and Chemical Engineering)

M.Tech. Degree Course

Sri S. Alwan Chemical Engineering

ANNEXURE 'D'

NUMBER QUALIFIED FOR THE DEGREES/DIPLOMAS AT THE END OF 1972-73

Degree	Number			
	I Class with distinction	I Class	II Class	Total
B.Tech.	12	165	32	209
M.Sc.	3	36	8	47
M.S.	—	—	—	9
M.Tech.	8	160	14	182
D.I.I.T.	—	2	—	2

Ph.D.

Chemistry	6	
Mathematics	8	
Physics	7	
Aeronautical Engineering	3	
Chemical Engineering	2	
Civil Engineering	3	
Electrical Engineering	4	
Humanities and Social Sciences	2	
Mechanical Engineering	3	
Metallurgy	4	42
	Total ...	491

ANNEXURE 'E'

PATTERN OF GRADUATION
(1964-73)

The number of candidates who were awarded Degrees/Diplomas at the first nine Convocations and the number awarded at the Tenth Convocation (held on 11th August 1973) are as follows:

Degree	Awarded at the first Nine Convocation (1964–72)	Awarded at the Tenth Convocation (1973)	Total
B.Tech.	2092	209	2301
M.Sc.	258	47	305
M.Tech.	631	182	813
D.I.I.T.	80	2	82
M. S.	27	9	36
Ph.D.	112	42	154
Grand Total ...	3200	491	3691

ANNEXURE 'F'

PLACEMENT OFFICE

This Office has been successfully serving as a liason between the graduating students and potential employers. The accompanying statement shows the latest placement position of the graduates and post-graduates of the Institute.

During the year 1972-73, this office was contacted by 119 companies/ establishments from both the public and private sectors. In addition representatives from 45 organisations visited the campus and interviewed students for selection.

The Placement Office continues to keep in touch with as many industries and other organisations as may require technically qualified personnel and furnishes them with information as to the courses offered with specialisations in the various branches, to enable them to have a detailed view of the potential talent available from among the graduates of the Institute.

This office has also been handling increasing number of applications from students of the B. Tech. & M. Tech. degree courses for practical training during summer and winter vacations which, while enabling the students to acquire practical experience, also serves to help the industries in making use of their services and assessing their potential.

The Placement Office also looks after the work pertaining to the Alumni Association of the Institute and in addition handles the work relating to the office of the Foreign Students' Adviser.

PLACEMENT OFFICE

INDIAN INSTITUTE OF TECHNOLOGY, MADRAS

Consolidated statement showing the placement position of students belonging to 1964 — 1972 Batches.

Year	Total passed out (graduates and post-graduates)	Engaged in further studies		Employed Abroad	Employed in India		Position not known	Remarks
		In India	Abroad		Private Sector	Public Sector		
1964	107	1	13	12	49	32		
1965	161	—	19	35	46	61		
1966	265	5	28	31	65	135		1*
1967	323	8	45	17	104	148		1*
1968	388	13	46	35	152	140		2*
1969	470	15	49	14	129	177	86	
1970	560	35	112	20	160	155	78	
1971	437	89	35	15	95	105	98	
1972	489	93	25	8	181	162	20	
	3200	259	372	187	981	1115	282 **	4 *

* Deceased.

** Continued efforts are made to collect particulars of students whose placement position has been indicated as 'Not known'.

ANNEXURE 'G'

INSTITUTE GYMKHANA

The year under review started, as usual, with preparations for participation in the Inter I.I.T. Sports Meet as well as Local and Inter-Collegiate Tournaments.

The Gymkhana elections saw the emergence of a dedicated committee of student representatives. They spared no efforts in shaping new sports, athletic and other teams so that the Institute would retain the inter I. I. T. Trophy. Intensive coaching was given to the various teams by experts from outside. The performance of our teams at the Inter I. I. T. Meet at Kharagpur was very remarkable and we won the Inter I. I. T. Championship with a convincing margin to retain the Trophy for the third year in succession.

An exhibition of photographs and paintings and Science Fair were the highlights of the Cultural Week organised by the Institute Gymkhana. In the sports field, mention must be made of the selection of Sri Narendra Kumar, our Star Athlete, for the preselection camp held at Patiala for the Universiad to be held at Moscow.

All these activities were in addition to the usual inter-hostel tourna ments on the domestic front and outside events like the Bertram, A.M. Jain College, and Y.M.C.A. tournaments outside, in Madras, City.

The annual Sport Day was celebrated in the presence of Shri P. Unnikrishnan on April 6th. The Institute Day was held on April 7th with Sri P. Eswaran as Chief Guest marking the end of Gymkhana activities for the year 1972-73.

The Instititute Gymkhana looks forward to another fruitful year of endeavour in both sports and cultural fields so that our members mav become useful members of the society.

ANNEXURE 'H'

NATIONAL CADET CORPS

(A) 2 (TN) COMP TECH COY NCC (IIT)

Though the training is obligatory for the first and second year students only, volunteers from the third year students were also taken on the rolls. During the year, 143 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 three batches consisting of EME, 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 NCC Promise Day on 18th August 1972. The Dy. Director of Institute took the salute on Promise day parade and administered the NCC pledge. A guard of honour was presented to Dr. Malcolm S. Adiseshaiah the Chief Guest of the Ninth Convocation held on 26th Aug. 72.

1 cadet qualified for NCC 'C' Certificate.

(B) No. 4 TAMIL NADU AIR SQN (TECH) N.C.C.

During this eighth year, the Unit has given training for 200 cadets. 29 cadets were awarded 'B' Certificates while 9 cadets were awarded 'C' Certificates on passing examinations.

Annual Training Camp was held during November/December, 1972 at Bangalore. 102 cadets attended the camp. Deputy Director, IIT visited the camp. Cadets were taken on instructional visits to Air Force and Industrial establishments and they were given Air experience in a Service Air-Craft.

50 cadets of this unit and No. 2 (TN) Composite (Tech) Coy NCC jointly presented a Guard of Honour to Dr. Malcolm S. Adiseshaiah, Dy. Director-General of UNESCO (Retd.) who delivered the IX Convocation address.

Promise Parade was held combined with Army wing. Deputy-Director, IIT took the salute and administered the promise.

NCC Officers and Cadets of this unit also attended the following centrally organised camps/Training:—

(i) Attachment Training with Air Force Station, Tambaram, Madras-46 ... 1 NCC Officer.

(ii) Attachment Training with Air Force Station, Chandigarh. ... 2 NCC Cadets.

(iii) All India Summer Training Camp, Kangan (Via) Srinagar. ... 1 NCC Cadet.

(iv) Vayu Sainik Camp 1973, Srinagar ... 8 NCC Cadets

ANNEXURE 'I'

INSTITUTE HOSPITAL

The Institute hospital has shown progressive growth in many spheres during the year 1972-73 under review.

Staff : In place of Dr: G. Atmaram Rao, M.S., Dr. D. Harirajan, MBBS., F.R.C.S., (Edin) FRCS (Glas) assumed charge as the Medical Officer-in-charge of I.I.T. Hospital during the month of March, 1973. Mr. Kasthuri Rangan was posted as Pharmacist in place of Mr. Rajamani who resigned in July, 1973.

Two trained Staff Nurses, M'ss. Saramma and Mrs. Rajalakshmi were appointed in the month of November, 1972 in the hospital; raising the total number of Staff Nurses to four to cater to the needs of the increased out-patients and in-patients.

Pharmacist Mr. G. Prabhudas was promoted as Pharmacist-cum-Storekeeper in the hospital.

Statistics

The hospital has attended to 57,353 patients during the year 1972-73. The break up as follow:—

Men	...	25,683
Female & Children	...	21,500
Students	...	10,170
Medical Cases	...	53 482
Surgical Cases	...	2,922
Gynaec & Obstetrics	...	949
Family Planning	...	350
Total Number of In-patients.		303
Jaundice	...	39
Chicken pox	...	9
Enteric	...	12
Malaria	...	2
Miscellaneous	...	241

Most of the in-patients were cases of Infective diseases like Chicken pox, Infective hepatitis and enteric fever.

Total number of Operations	...	572
Major — Hernia	...	5
Hydrocele	...	5
Appendictis	...	7
D & C	...	19
Minor Surgery	...	478

Rest of them were minor cases like Abscess and removal of cysts etc. There were 26 cases of fracture all treated with plaster of paris immobilisation.

Details of Anaesthesia :

1. General Anaesthesia: 94 cases.
2. Local: 209 cases.

Obstetric & Gynaecolical: Regular obstetrical check up of pregnant women were done. Blood grouping was also done and routine gynaecoligical examination was carried out.

In collabration with I.C.M.R. project from Cancer Institute, Madras Screeving of most of the Ladies are being done to rule out any early "Cancer of the cervixuterus".

The total number of Ante-Natal cases attended: 106

Gynaec	—	949
Deliveries	—	29

Family Planning advice is given to almost all the eligible mothers and fathers. Child Welfare clinic was started and a health record is maintained for the children. Each one is given a "Health card" where in, the rate of growth, weight and all the immunisations are entered.

Immunisation: Routine immunisation programme was undertaken this year also. It was very encouraging to note that not even a single

case of "Whooping Cough" in children was noticed in the Campus; There was no case of whooping cough in the Campus for the 3rd year in succession.

Immunisation work 2,598 :

Small Pox	...	733
Triple antigen	...	306
Polio — Oral	...	264
T.A.B.	...	1,206
Cholera	...	1,089

There are about 106 cases of Primary Complex in children who were investigated and treated. There is a considerable increase in number of cases of Primary Complex.

Buildings and Equipment : Operation theatre was provided with a regular Operation table, which is modren and convenient for anaesthesia for doing the operations, Labour was provided with administering "Vacuum extractor" for easy delivery of babies in II stage of Labours.

In addition to the staff and their families, students of the Institute, the hospital also attended to the participants summer schools of various Departments H.A.L. Trainees, Q.I. Programmes Students, and relatives of I.I.T. Staff members, the Staff and Students of Vanavani, Central Schools, Mess Staff of Hostels, State Bank of India, Post Office Staff members etc.

The following are the statistics of the Laboratory investigations.

Investigation Total	...	4,524
Urine Analysis	...	1,524
Motion	...	473
Blood	...	2,381
Miscellaneous	...	146

Administration

Director	Dr. A. Ramachandran/Prof. S. Sampath
Deputy Director	Prof. S. Sampath
Dean, Industrial Liaison	Prof. R. G. Narayanamurthi
Dean, Academic Affairs	Dr. P. Venkata Rao
Dean, Students	Prof. R. K. Gupta
Dean, Administration	Dr. K. A. V. Pandalai
Registrar	Sri C. V. Sethunathan
Dy. Registrar	Sri T. S. Rajagopalan
Audit Officer	Sri R. Venkataraman
Stores and Purchase Officer	Sri S. Pattabiraman
Finance and Accounts Officer	Sri A. V. Karunakaran Nambiar
Executive Engineer	Sri K. Ganesan
Hony. Consulting Physician	Dr. P. M. Palani
Medical Officers	Dr. D. Harirajan
	Dr. (Smt.) Shanta Krishnamurthi
	Dr. P. C. Soundara Rajan
Security Officer	Sri T. N. Venkataraman
Officer Commanding, 2 *(Tamil Nadu) Comp. (Tech.) Eng./EME/Sig. Coy. N.C.C.*	Maj. B. K. D. Gupta
Officer Commanding, 4 *(Tamil Nadu) Air Sqn. Tech. Coy. N.C.C.*	Flt. Lt. K. Ramakrishnan

Heads of the Departments

Aeronautical Engineering	Dr. N. R. Subramanian
Applied Mechanics	Dr. N. V. Chandrasekhara Swamy
Chemical Engineering	Dr. T. Gopichand
Civil Engineering	Dr. V. Sethuraman
Electrical Engineering	Dr. M. Venugopal
Mechanical Engineering	Dr. B. S. Murthy
Metallurgy	Dr. E. G. Ramachandran
Chemistry	Dr. M. V. C. Sastri
Mathematics	Dr. S. D. Nigam
Physics	Dr. C. Ramasastry
Humanities & Social Sciences	Dr. V. Anantaraman
Librarian	Sri V. S. Nazir Ahmed