INDIAN INSTITUTE OF TECHNOLOGY

MADRAS

Annual Report

1973-74

FIFTEENTH ANNUAL REPORT

1973—74

INDIAN INSTITUTE OF TECHNOLOGY MADRAS

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VISITOR : THE PRESIDENT OF INDIA

The Council of the Indian Institutes of Technology

Chairman :

Union Minister for Education and Social Welfare,
Government of India, New Delhi.

Members :

Sri A. N. Haksar, Chairman,
Board of Governors, I.I.T., Kharagpur.

Dr. H. N. Sethna, Chairman,
Board of Governors, I.I.T., Bombay.

Sri K. T. Chandy, Chairman,
Board of Governors, I.I.T., Madras.

Dr. S. Hussain Zahir, Chairman,
Board of Governors, I.I.T., Kanpur.

Dr. B. D. Nag Chaudhuri, Chairman,
Board of Governors, I.I.T., Delhi.

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

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University Grants Commission, New Delhi.

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Prof. S. K. Bose, Director,
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I.I.T., Bombay.

Dr. K. A. V. Pandalai, Director,
I.I.T., Madras.

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

Dr. N. M. Swani, Director,
I.I.T., Delhi.

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

Representatives of the Central Government :

Sri. I. D. Sahi,
Secretary, Ministry of Education & Social Welfare, Govt. of India,
New Delhi.

Sri. S. D. Nargolwala,
Financial Adviser,
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.

Sri U. N. Mahida,
Member, Rajya Sabha,
401, Vithalbhai Patel House,
New Delhi.

Representative of the All-India Council for Technical Education :

Prof. S. Chakravarthy,
Member, Planning Commission,
New Delhi.

Nominees of the Visitor :

Prof. G. Tripathi,
Vice-Chancellor,
Lucknow University,
Lucknow.

Shri R. P. Billimoria,
Director,
Hindustan Steel Ltd.,
Ranchi.

Shri G. K. Chandiramani,
Director,
Dorabji Tata Trust,
Bombay.

Shri M. M. Suri,
B. 14, Greater Kailash,
New Delhi.

Sri S. K. Mukherjee,
Director, Fertiliser Corporation of India,
F—44, NDSE Pt. I,
New Delhi.

Secretary :

Sri S. Vedantham,
Deputy Educational Adviser (Tech.),
Ministry of Education & Social Welfare,
New Delhi.

The Board of Governors

Chairman :

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

Nominees of the State Government :

Shri K. S. Balial
Director of Technical Education,
Government of Karnataka,
Bangalore.

Sri T. R. Doss,
Vice Chancellor,
J.N. Technological University,
Hyderabad.

Dr. S. Vasudevan,
Director of Technical Education,
Government of Kerala,
Trivandrum.

Dr. V. C. Kulandaiswamy,
Director of Technical Education,
Government of Tamilnadu,
Madras-25.

Nominees of the Council :

Dr. A. S. Adke,
Ex. Vice-Chancellor,
Karnatak University,
Dharwar.

Dr. H. V. K. Udupa,
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. K. A. V. Pandalai,
Indian Institute of Technology, Madras.

Nominees of the Senate

Dr. S. D. Nigam,
Head of the Department of Mathematics,
I.I.T., Madras.

Dr. Ing. D. Urbach
Associate Professor,
Department of Mechanical Engineering,
I.I.T., Madras.

Secretary :

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

The Finance Committee

Chairman :

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

Members :

Sri S. Vedantham,
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.

Sri T. R. Doss,
Vice Chancellor,
J.N. Tech. University, Hyderabad.

Dr. V. C. Kulandaiswamy,
Director of Technical Education,
Government of Tamilnadu,
Madras-25.

Dr. K. A. V. Pandalai,
Director, I.I.T., Madras.

Secretary :

Sri C. V. Sethunathan (Registrar).

The Buildings and Works Committee

Chairman :

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

Members :

Dr. K. A. V. Pandalai,
Director, I.I.T., Madras.

Sri M. G. Joseph,
Superintending Engineer,
C. P. W. D., Madras.

Dr. D. J. Victor,
Professor in charge of Engg. Unit.,
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 five times during the year. The following were the members :

Chairman :

Prof. S. Sampath
(till 30-9-73)
Dr. K.A.V. Pandalai
(from 1-10-73)

Members :

Dr. M.K. Achuthan
Dr. R.S. Alwar
Dr. V. Anantaraman
Dr. G. Aravamudan
Sri K. Balaraman
Dr. H. Bandow
Dr. D.K. Banerjee
Dr. P. Besslich
(till 12—4—74)
Dr. T.K. Bose
Dr. E. Brinks
Dr. N.V. Chandrasekharaswamy
Mr. H.J. Ebert
Dr. D.N. Ghista
Dr. T. Gopichand
Dr. F. Guntert
(from 8-8-73)
Dr. M.C. Gupta
Prof. R.K. Gupta
Dr. D. Johnson Victor
Dr. V.M. Krishna Sastri
(from 12-11-73)
Dr. J.C. Kuriacose
Dr. H.N. Mahabala
Dr. P.T. Manoharan
Dr. B.S. Murthy
Dr. V.G.K. Murti
Prof. R.G. Narayanamurthi
Sri V.S. Nazir Ahmed (Librarian)
Dr. S. D. Nigam
Dr. D. Prithviraj (from 12-11-73)
Dr. H.C. Radhakrishna (from 12-11-73)
Dr. N.R. Rajappa (from 12-11-73)
Dr. K.P. Rajappan
Dr. E. G. Ramachandran
Dr. S. Ramani
Dr. C. Ramasastry
Dr. B. Ramaswamy
Dr. B.V. A. Rao
Dr. G.V.N. Rayudu (from 12-11-73)
Prof. S. Sampath (*Dy.Director*)
Dr. K.S. Sankaran
Dr. M.V.C. Sastri
Dr.M. Satyanarayana (from 12-11-73)
Dr. V. Seshadri
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
Dr. M.S. Valiathan (from 23-10-73)
Dr. Y.B.G. Varma (from 12-11-73)
Dr. P.C. Varghese
Dr. R. Vasudevan
Dr. P. Venkata Rao
Dr. V.C. Venkatesh
Dr. D. Venkateswarlu
Dr. M. Venugopal
Dr. P.S. Virk

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. Balakrishna Nayar,
'Chitra', Kilpauk Garden Road, (till 23-8-73)
Madras-10.

Dr. K.K. Pillai, (from 26-4-74)
Director,
Institute of Traditional Cultures,
University Buildings,
Madras-5.

Secretary :

Sri C.V. Sethunathan (Registrar).

Report by the Director

Fifteenth Annual Report (1973-74)

I. On July 31, 1974 the Institute completed fifteen years of useful service to the Nation in the cause of Technical Education as one of the Higher Institutes of Technology. The institute has grown into a residential Campus, catering to the needs of over 2100 students–under graduate, post-graduate and Research scholars in Science and Technology. It has got well-designed buildings for class rooms and Seminars, laboratories and work-shops, Halls of Residence for all its students, a Sports stadium besides playing fields and living quarters with modern civic amenities, for about 500 members of its staff. The Institute has become a major Centre for consultation by a number of industries as well as public Sector/autonomous Organisations.

During the year under report, the Institute received the Computer IBM 370/155 System as West German Gift–the largest system in India–and the same has been installed. The installation of the Computer marked another milestone in the history of the Institute. The Institute gratefully acknowledges the extensive aid received from West Germany, and the Institute is eagerly awaiting the fourth Indo-German agreement to be entered into in the near future.

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
De-salination
Environmental Pollution Studies and Control
Ocean Engineering
Materials Research
Composite Materials

Information storage and Retrieval service in selected areas of Technology.

New Educational/Research Programmes :

Food Processing Techniques
Television Engineering
Energy Studies

University Partnerships between I I T Madras and Technical Universities in West Germany, under the Fourth Indo-German Agreement.

II. Student population & Academic Programme :

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 is expected to stabilise around 1:1 during the Fifth Plan Period, as recommended by the Reviewing Committee.

The Statement below indicates the position in this regard.

	Student population (includes part-time registration also)					
	1973—74		1974—75		1975—76 (*anticipated*)	
Undergraduates		1276		1278		1276
Post-graduates	529		528		534	
Research scholars :	457	986	379	907	443	1007
Part time				127		127
Total		2262		2312		2410
Ratio PG:UG		1:1.3		1:1.24		1:1.12

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. Department-wise 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 Structure with specific reference to Fibre reinforced Plastic Structures.

B. *Space Science & Technology Centre Schemes :* 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 a supersonic wing calculator using analogue net work
4. Development of computer programme for evaluation of aerodynamic characteristics of Swept Wing aircraft
5. Design and Development of rarefied gas dynamics facility
6. Design and Development of Ramjet Engine

(ii) **Department of Applied Mechanics :**

A. *CSIR Scheme :*

Design and Development of a low speed strain rate controlled universal testing machine

B. *Space Science and Technology Centre Scheme :*

Angular motion simulator for Satellites Design, Development and Testing.

(iii) **Department of Chemistry :**

A. *CSIR Scheme :*

1. Mechanistic studies catalysed substitution of aromatic compounds
2. Nucleophilic substitution reactions of Halogeneoethers
3. Solid State Chemistry of complex oxides of some transition metals
4. Mechanistic studies on the oxidation of olefins on oxide catalysts

B. *Department of Atomic Energy Scheme :*

Molecular and EPR studies of 'Biological' studies

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

4. Heat and Light activation of oxide catalysts (NSF, USA)

D. *Indian National Science Academy Scheme :*

1. Studies on molecular rearrangements
2. Studies on Infra red band intensities and molecular structures

(iv) Department of Chemical Engineering :

Space Science & Technology Centre Schemes :

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

(v) Department of Civil Engineering :

A. *CSIR SCHEME :*

Studies on water hammer and Surge tanks
Surge studies in Kundah project

B. *CENTRAL Board of Irrigation and Power Schemes :*

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

(vii) Department of Mechanical Engineering :

A. *CSIR Scheme :*

Effect of turbulance on the performance of turbine blades in cascades with special reference to the separation zone onblade surface suction

B. *Research and Development Organisation for Electrical Industry Scheme :*

Heat transfer studies in large electrical machines

C. *Ministry of Defence Scheme :*

1. Aerial Camera Project
2. High speed compressor and turbine investigations
3. High speed cascade tests
4. Development of Gas supported bearings

D. *PL 480 Scheme :*

Control of exhaust emission from diesel vehicles.

E. *S.S.T.C. Scheme :*

Fabrication of achromas & Prism

(viii) Department of Physics :

A. *C.S.I.R. Schemes :*

1. Development of information storage devices
2. Development of crystals for the study of some properties of materials at low temperature
3. Pseudopotential calculation of the equation of state and an harmonic properties of metals
4. Surface state of semi-conductors in high and ultra high vacuum.

B. *Ministry of Defence Scheme :*

Fabrication of microwave test bench

C. *Department of Atomic Energy Scheme :*

Surface wave propagation in Crystals

III (b) CENTRE FOR SYSTEMS AND DEVICES

This Research and Training Centre (CSD) under Department of Electrical Engineering is sponsored by the Ministry of Defence. While being financed through the Radar and Communications Project Office, the technical activities of the Centre are supervised by the Scientific Advisor to the Defence Minister through a planning unit for Research and Training and Evaluation Committee. The Centre started functioning by the end of 1971. During the year under review, the new CSD building was completed and occupied and the staff strength was brought up to about 50, equally divided among specialists and supporting staff. Projects have been clearly delineated and the work has progressed in all the three areas of activity namely, Signal Processing Techniques, Semiconductor Devices and Control and Guidance systems. Over twelve reports were submitted by the Centre during the year, covering the various project activities. Three short term courses were run during the year 1973–74, besides the M.Tech. course in Control and Guidance for deputed defence Officers.

III (c) Regional Sophisticated Instrumentation Centre (RSIC)

This Centre has been sponsored at the Institute by the Department of Science & Technology, Government of India. It has been built, to start with, with the present instruments and equipments of the special Instruments Laboratory of the Department of Chemistry in the Institute as the nucleus. The estimated budget for five years is of the order of Rupees One crore. The main functions of the RSIC will be, services to Research Scientists, Science laboratories, Research Institutions and Industries for research purposes on specific requisitions, services of instruments and equipments, provide technical guidance with respect to taking of data, measurements, etc. as well as analysis and interpretation of data and training suitable technical personnel in the maintenance of Sophisticated Instruments/Equipments. Work has already been started in the Centre and it is hoped that the same will be acclerated in the coming year.

IV. Assistance to Industry :

a. The dialogue between local Industries, Govt. Departments/Organisations and Public Sector undertakings, etc. and the Institute in regard to Design and Development, Consultancy and Testing facilities has shown marked improvements over the years. Several long term and short term industrial projects have also been taken up for investigation. During the year 602 consultancies were made with the various departments of the Institute as can be seen from the Statement below :

S. No.	Department	No. of. assignments
1.	Applied Mechanics	23
2.	Central Electronic Centre	32
3.	Central Workshops	17
4.	Chemical Engineering	29
5.	Chemistry	63
6.	Civil Engineering	115
7.	Electrical Engineering	140
8.	Mechanical Engineering	93
9.	Metallurgy	89
10.	Physics	1
	Total	602

b. The following are the Projects that are continued in the year under report.

Name of the Project	Name of the sponsoring Agency
Department of Aeronautical Engg.	
Pebble Bed Air Heater.	ISRO
Department of Applied Mechanics :	
1. Stress analysis of tube mill.	KCP Limited, Madras.
2. Optimisation of stockbridge dampers.	Crompton Engg. Co. Ltd., Madras.
3. Stress analysis of PCI UNIT.	Dunlop India, Madras.
4. Stress analysis of sugar mill stand.	KCP Limited, Vuyyuru.
5. Design and manufacture of a hydraulic shaker.	India Radiators, Madras.
6. Design and Manufacture of a hydraulic shaker.	Institute for Aviation Medicine, Bangalore.
7. Testing and analysis of phase busducts.	Crompton Engg. Co., Madras.
8. Design and manufacture of a wirespool unwinding machine	Bharat Dynamics Limited, Hyderabad.

Department of Chemical Engineering :

1. Granulation of fertilizer:	Madras Fertilizers Ltd.
2. Development of structural adhesives for brake shoe lining.	Brakes India Limited, Madras.
3. Development of Inhibitor for end projections of solid propellent charge.	D.R.D.L., Hyderabad.

Department of Chemistry :

1. Disposal of Chromium Mud from the mud from the bichromate plant.	Messrs. Binny Limited, Madras.

Department of Civil Engineering :

1. Use of Torsteel in prestressed concrete sleepers.	TOR-ISTEG Steel Corp.
2. Torsion in road bridge decks.	Govt. of Tamil Nadu, Highways Department.
3. Mathematical modelling of quifers.	Neyveli Lignite Corporation.
4. Electrical Analogue simultion studies for spacing of tube wells.	Neyveli Lignite Corporation.
5. Educational Programme- Naval Architecture Degree Course.	Cochin Shipyard Limited.
6. Tests on Towed Bodies.	N.P.O.L., Cochin.
7. Subsoil Investigation and recommendation of foundations.	Commander Works Engineers, Madras.
8. Subsoil investigation and recommendation of foundations.	Tamil Nadu State Housing Board, Madras.
9. Soil sampling and testing for various industries.	Industries in and around Madras.

Department of Electrical Engg. :

1. System studies on Tamil Nadu Electricity Board.	Tamil Nadu Electricity Board.
2. Computer Programme development for Tata consulting engineers.	Tata Consulting Engineers, Bombay.
3. Thristor controlling for wire spool unwinding projects.	Bharat Dynamics Limited.,

Department of Humanities & Social Sciences :

Computer aided design.	Messrs. Hackbridge Hewittic Easun Limited.

Department of Mechanical Engineering :

1.	Deep gole drilling machine- design and Development.	BEST & CO., Madras.
2.	Special purpose vertical boring machine–design and development	Best & Co., Madras.
3.	Instrument Dynamometer.	International Instruments, Bangalore.
4.	Fabrication of beam splitters and beam diving prism.	Indian Institute of Science, Bangalore.
5.	Design of IR optical system.	Defence Research and Development Lab., Hyderabad.
6.	Designing of a Master Slave manipulator.	M. Krishnaswamy & Co.,
7.	Check the Design of the cross head of the hydraulic press & suggest suitable modifications.	Rane Brake Linings Ltd.,
8.	Checking the drawings and suggesting modifications in designing a spiral mandrill die.	Polyene Film Industries (P) Ltd.,
9.	Designing of hydraulic cylinders for below moulding machine.	Poly Container Industries.
10.	Automation of a centrifugal machine.	K. C. P. Limited.
11.	Designing of mechanical salt harvester.	Maruthi Consultants (P) Ltd.,
12.	Designing of a wire drawing machine other workshop works such as testing fabrication etc.	Swiss Welded Mesh Co., Private Limited.

C. The following are the Projects taken up during the year.

S.No.	Name of the Sponsoring authority.	Title of the Projects.	Dept. undertaking the Project.
1.	Aeronautics, R & D Board, Ministry of Defence, New Delhi.	Design and development of rarefied gas dynamics facility	Aeronautical Engineering.
2.	Aeronautics, R & D Board, Ministry of Defence, New Delhi.	Design and Development of Ramjet Engine.	Aeronautical Engineering.
3.	Defence Research & Development Laboratory, Hyderabad.	Development of inhibitor for end burning solid propellant charge.	Chemical Engineering.

S.No.	Name of the Sponsoring authority	Title of the Projects	Dept. undertaking the Project
4.	Aeronautics R & D Board, Ministry of Defence, New Delhi.	High speed compressor and turbine investigations.	Mechanical Engineering.
5.	Aeronautics R & D Board, Ministry of Defence, New Delhi.	High speed cascade tests.	Mechanical Engineering.
6.	Aeronautics R & D Board, Ministry of Defence, New Delhi.	Development of Gas Supported bearings.	Mechanical Engineering.

D. The following are the Projects for which proposals have been sent for financial support during the year under report.

Name of the Project. (1)	*Name of the Sponsoring Agency* (2)
Department of Aeronautical Engineering.	
1. Dynamic Derivatives of Highspeed Missile configurations.	Aeronautics R & D Board (Ministry of Defence).
2. Flutter Analysis of Panels in Supersonic flow	Aeronautics R & D Board (Ministry of Defence)
3. Heat Transfer studies in High Temperature Range.	Aeronautics R & D Board (Ministry of Defence).
4. High Temperature Gas Dynamics	C.S.I.R.
5. Aircraft Gasturbines Blades Heat Transfer.	Aeronautics R & D Board, (Ministry of Defence).
6. Effect of Hand blowing on Boundary layers.	—do—
Department of Applied Mechanics.	
1. Acoustic transmissibility of SLV-3 Rockets.	SSTC Trivandrum.
2. Development of Angular Motion Simulator (II phase)	SSTC Trivandrum.
Department of Chemical Engineering	
1. R & D Centre for Plastics Processing.	NCST.

2. Industrial Research Centre in Particle Technology.	NCST.
3. Compaction studies of Agglomorates from a blend of blue dust coke breeze and limestone fines.	NCST (Sub-Committee on coal & lignite).
4. Separation of Particulates from fluid systems.	National Science Foundation, U.S.A.
5. Testing of cartridge type of filters for separation of solids of about 50 microns size from liquids.	Engineers India Limited.
6. Fluidised Bed Roasting of sulphide ores.	C.S.I.R.
7. Pneumatic Oryers.	NCST (Panel on the Chemical Industry.)
8. Pipeline Transportation of Coal in Fluid Medium.	NCST (Sub-Committee on Coal and Lignite).

Department of Chemistry.

1. Synthesis and reactions of functionalised Striazines and other triazines studies in molecular rearrangements in triazines.	Ministry of Defence, Government of India.
2. Synthesis of Biologically active Heterocycles and Mechanistic studies on the mass spectral fragmentation of the few typical heterocycles (heterocycles of Pesticidal and anti-tumor activity.)	Indian National Science Academy
3. Catalysed reactions involving photochemical stimulation	C.S.I.R.

Department of Civil Engineering.

1. Design & Testing of Trawlers.	Steelfab Ltd., Madras.
2. Ocean Engineering Centre.	N.C.S.T.
3. Centre for Transportation studies.	N.C.S.T.

Department of Electrical Engineering.

1. Remote air pollution detectors using lasers.	Electronics Commission.
2. Laser Radar	
3. Low Threshold voltage M O S Transistor Development.	
4. Development of high frequency high power transistors.	

5.	Development of charge-coupled semiconductor devices.	Electronics Commission.
6.	MOS IC Development.	
7.	Development of Microwave communication links.	
8.	Low Cost AM/FM receiver development.	
9.	Development of low noise parametric amplifiers.	
10.	Development of microstrip and stripline components in the 1–18 CHz.	
11.	Equipments for television testing and monitoring.	
12.	Aircraft antenna development for military applications.	HAL, Hyderabad.
13.	Investigation on eddy current coupling.	C.S.I.R.
14.	Battery powerd vehicles	Min. of Defence R & D Organisation. Ahmednagar.
15.	Diode testing equipment stage I.	NGEF Limited, Bangalore.

Department of Mechanical Engineering.

1.	Development of alternative fuels for IC Engines.	In collaboration with a German Technical University, probably T.U. Munchen.
2.	Use of Gobar Gas to run IC Engines.	Tamil Nadu Dairy Development Corporation.
3.	Stress Analysis in Production Processes – Development applications of a special technique.	C.S.I.R., New Delhi.
4.	Set Point Programmer.	Toshniwal Limited, Madras.
5.	Stabilized Knee.	Artificial Limb Centre, Poona
6.	Printing Mechanism for teleprinters.	Electronics Commission of India/ Hindustan Teleprinters.
7.	Automatic Weighing machine.	Technolab Instrument Co., Madras.
8.	Centre for Heat Transfer Research in Electronics.	C.S.I.R. New Delhi.
9.	Porous cyclirdrical Solar heater	C.S.I.R., New Delhi.
10.	Thermal Design of Heat exchangers.	BARC, Bombay.
11.	Thermal Design and Research studies in large deaerators used in power plants.	Bharat Heavy Elec., Hyderabad.

12.	Centre for Research in Processing Preservation & Transportation of Food.	C.S.I.R., New Delhi.
13.	Centre for research, Design and Development in Cryogenic engineering.	Department of Science and Technology,

Department of Metallurgy.

1.	Fabrication of flash butt welding machine	C.S.I.R.
2.	Fabrication of friction welding machine	C.S.I.R.
3.	Fabrication of cold pressure welding unit.	C.S.I.R.
4.	Weldability studies (in collaboration with TISCO.,	N.C.S.T.
5.	Influence of additives on the scabbing : tendency of synthetic moulding sends.	C.S.I.R.
6.	Development of break down agents for sodium silicate – carbon dioxide bonded sands.	C.S.I.R.
7.	Development of insulating sleeves for use in the foundries.	C.S.I.R.
8.	Development of a process of indigenous manufacture of Ni-Mg alloy for SGI production	Messrs. Spheroidal Castings Limited, Thiruneermalai, Madras-44.

Computer Centre.

1.	Development of COPOL Complier for TDC 16.	Electronic Corporation of India, Hyderabad.

e. *Patents :*

The Institute had applied for 16 patents so far. Seven patents have already been obtained in the name of the Institute. Three processes were sold for commercial exploitation. During the year under report, two patents were obtained and nine applications for patents were sent.

V. Report on activities of Q.I.P., Ministry of Education:

I. *Serving Teachers Programme :*

1. M.Tech. course

a)	Admission to I year M.Tech.	19
b)	Admission to II year M.Tech.	4
		23

2.	Ph.D. Admission in 1973–74	14
3.	Total number of QIP scholars admitted for 1973-74 (These are from the four southern states and from M.P., West Bengal and Assam)	37
4.	Total number of QIP scholars on rolls as in June 1974	91

II. *Short term In-service courses :*

	Title of course	Duration of course	No. of participants
1.	Modern Concepts in the study of Power Systems	1½ weeks	30
2.	Teaching Technology	2 weeks	68
3.	Laser and its applications	2½ weeks	27
4.	Welding Technology	3 weeks	29
5.	Advanced Mechanism Engg.	2 weeks	30
6.	Computer Engg. & applications	4 weeks	33
7.	English in Engineering Curriculum	2 weeks	24
8.	Hydroturbomachines	4 weeks	10
9.	Model Analysis of Structures	3 weeks	17
10.	Quality Control and standardisation	2 weeks	26

III. *Curriculum Development Centre in Chemical Engineering :*

The Centre brought out the following publications which were supplied to all the Chemical Engineering Departments in India. Free copies of these were also supplied on request to faculty members and students of Chemical Engineering and Chemical engineers in Industry.

1. *Syllabi and practicals in chemical engineering subjects :*

Collection of 40 papers presented at the seminar on 'Syllabi and practicals in chemical engineering subjects.'

2. *Selective articles on chemical engineering subjects and teaching :*

This is a compilation of 27 recent papers on teaching of chemical engineering subjects to undergraduate students.

3. *Course content of chemical engineering subjects for the first degree course :*

This is based on the recommendation of 13 study groups in chemical engineering subjects and is an extension of the earlier report 'First degree course in chemical engineering: Objectives and curriculum'

4. *Implant training of chemical engineering students :*

This is the report of an Expert Committee which considered in depth the various aspects of practical shop training for chemical engineering students, on the basis of replies received to questionnaire. It high-lights

the importance and methodology of practical training and line to educational institutions, industries and students.

The Centre published in June 73 'SI Units in Chemi and Technology, by K.D. Chandrasekharan and D. Venka 185 mm; 190 pages inclusive of 150 tables). As most countri are expected to follow SI Units and as several chemical engi cations are changing over to SI Units, the publication is time tion to Library and De Luxe editions, a popular edition is out for the benefit of students.

V. Curriculum Development Centre in Mechanical Engineering :

The Curriculum Development Centre in Mechanical Engg. organised four study group meetings (Mathematics, Physics, Chemistry and English) to discuss the curricula and the course content of the respective subjects for mechanical engineering undergraduate programme. Invited faculty members from several engineering colleges participated in these discussions. The centre is continually interacting with sister institutions in matters relating to curricular reformation, continuing education and faculty improvement. The centre has published the following curriculum booklets during this period.

1. Material Science
2. Electives
3. Industrial Management and Economics
4. Production Engineering and Workshop Technology
5. Chemistry

Another important work is the preparation of monographs, which are intended to enrich and supplement conventional teaching. They have been found useful to both staff and students. The following monographs have been published :

1. Handbook of Mechanical Design, Volume I
2. Units and conversion factors
3. An introduction of Tribology, Volumes I and II
4. Machine Dynamics, Volume I
5. Mechanical Measurements

It should be mentioned here that the preparation of these monographs, which are akin to text books, has taken considerable effort and time. Preparation of material, editing, and examining it from the point of view of its usefulness to the teacher and the taught have been carefully planned and executed. Monographs covering other areas in the mechanical engineering discipline are under preparation.

VI. Continuing Education Programmes for practising Engineers :

The Institute conducted on its own the following Programmes :

1. 'Two Weeks' Winter School in Advanced Instrumentation Techniques in Shock, Vibration & Noise

2. 'Two days' Seminar on Computer Appreciation for Top Management.
3. 'Two Weeks' intensive course on Thyrister Control
4. 'Three Weeks' course on Electrical Noise in Devices & Electric magnetic interference
5. 'Four weeks' course in Microwave Semiconductor device jointly by the Institute & College of Engg. Guindy.
6. Winter school on Modern Concepts in the study of Power System.
7. Three weeks course pm digital signal processing
8. Three Weeks course on Control & Guidance of Rockets and Satellites.
9. A training course (six days) for Instrument Technicians from various industries
10. Winter school in Mechanical Design for four weeks.
11. A certificate course on Tool Design
12. Advanced course in Production Engg.
13. Short term course on Recent Sand Practice

The following Seminars were held :

1. 4th Fluid Mechanics and Fluid Power Conference.
2. Computer Techniques in Production Engg. Design and Research
3. Unconventional Mechining Techniques
4. 18th Congress of the Indian Society of Theoretical and Applied Mechanics.

VII. Indo-German Agreement : Under three successive Agreements signed in 1959, 1966 and 1971, between the Govts. of the Federal Republic of Germany and India, the Institute has received, and continues to receive technical equipment for its laboratories and workshops, books and reprographic equipment for its Library and special appratus for its centralised facilities such as the Special Instruments Laboratory and the Electronic Instruments Servicing and Development Unit. The Agreements provide for the assignment to the Institute of German Professors and Technical staff in various specialities and the award of scholarships, both long term and short-term for the Institute's Indian Faculty Members to visit technical Institutions in Germany. Under the Third Agreement, a modern Computer System IBM 370/155 has been commissioned since August 1973.

The Computer Centre caters to the computation needs not only of the Institute but also of all educational Institutions, research and development Centres and industrial establishments in the region. Thus, the Institute can be regarded as a shining example of the Indo-German partnership in Scientific and Technological progress. It also uniquely symbolises the new international relationships based on friendly understanding and co-operation.

The Institute is anxiously awaiting the signing of the fourth Agreement between the two countries valid for the period of four years commencing

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The Institute is anxiously awaiting the signing of the fourth Agreement between the two countries valid for the period of four years commencing

from 1-12-74. The following are the highlights of the forthcoming Indo-German Agreement :

i) Assignment of 10 German Experts for teaching and research for short periods

ii) 16 Fellowships for Indian Faculty in West Germany for short periods

iii) 16 joint Indo-German Research Projects of national importance of relevance to India.

iv) Gift of spare parts for West German equipment already supplied for a total value of about Rs. 38 lakhs

v) Assignment of an Adviser for a two year period in connection with the applied R & D efforts relating to Industrial Consultancy Work at the Institute

vi) Strengthening the educational programme at under graduate and post-graduate levels in the field of television engineering.

vii) Extension of the assignment of the German Liaison Officer and German Expert in the Central Workshops upto the end of November, 1975.

viii) Spill over West German Gift equipment anticipated Rs. 15 lakhs approximately.

VIII. Convocation :

The Institute has held Eleven Convocations so far. At the Eleventh Convocation held on 9th September 1974, in which Srimathi Indira Gandhi, Prime Minister of India delivered the Convocation address. 551 students took their degrees and diplomas as detailed below :

Degree	*Batches*	*Number*	
Ph.D.		45	45
M.S.	Aeronautical Engineering	10	
	Engineering Mechanics	1	
	Chemical Engineering	2	
	Civil Engineering	1	
	Electrical Engineering	1	
	Humanities & Social Sciences	1	
	Mechanical Engineering	5	
	Metallurgy	5	
			26
M.Tech.	Aeronautical Engineering..	8	
	Engineering Mechanics	4	
	Chemical Engineering	24	
	Civil Engineering	10	
	Electrical Engineering	35	
	Industrial Engineering	16	
	Industrial Management	16	
	Mechanical Engineering	59	
	Metallurgy	10	
			182

M.Sc.	Chemistry	13	
	Mathematics	13	
	Physics	13	
			39
D.I.I.T.	Aeronautical Engineering	17	
	Technical Analytical Chemistry	3	
	Building Technology	3	
			23
B.Tech.	Aeronautical Engineering	15	
	Chemical Engineering	49	
	Civil Engineering	10	
	Electrical Engineering	71	
	Mechanical Engineering	62	
	Metallurgy	29	
			236
			551

IX. Research work & 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 Ph.D. Degree. During the year under report 45 scholars qualified for the Ph.D. bringing the total number of recipients to 199 over the last 10 years.

X. Library :

The Central Library continued to get scientific books, periodicals and xerox/microfilms of technical literature from Technical University Library., Berlin under the Indo-German Collaboration programme. The value of such literature was Rs. 80,000/- during the year making thus a total German investment of D.M. 1,00,000 on reprographic equipment and DM 7,00,000 in literature which is being planned for conversion into a Centre for German Science Information.

The other statistics of the Library are as follows :

Total no. of books	87208	vols.
Total no. of Pamphlets	44599	vols.
Total no. of microfilms	989	
Total no. of periodicals	1351	titles.

XI. Progress under construction :

The following works were completed :

1. Married Officers Hostel
2. Residential quarters-24 flats-
3. Construction of first floor over Hostels (Rest block for Mess staff)

The following works are under progress.

1. Centre for systems and devices
2. Staff residential quarters–12 flats–

XII. Staff : During the year one Professor joined the Institute "under the Indo-Foreign Cultural Exchange Programme".

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

1.	Professor	—	1
2.	Foreman	—	1

During the year, Director, 2 Visiting Professors, 1 Visiting Assistant Professor, 6 Professors, 1 Chief Design Engineer, 4 Associate Professors, 23 Assistant Professors, 1 Manager' Systems, 1 System Engineer, 43 Lecturers, 2 Assistant Registrars, 2 Programmers Grade I, 2 Programmers Grade. II, 1 Design Engineer, 2 Scientific Officers Gr. I, 1 Scientific Officer Gr. II, 6 Associate Loectures, 9 Senior Technical Assistants and 1 Technical Assistant were appointed. (including promotions as given below)

These include internal promotions of : 5 Technical Assistants as Senior Technical Assistants, 5 Senior Technical Assistants as Associate Lecturers, 1 Senior Technical Assistant as Design Engineer, 13 Senior Technical Assistants as Lecturers, 1 Foreman as Scientific Officer Gr. II, 16 Associate Lecturers as Lecturers, 1 Scientific Officer Gr. II as Scientific Officer Gr. I, 1 Lecturer as Scientific Officer Gr. I, 20 Lecturers as Assistant Professors, 3 Assistant Professors as Associate Professors, 1 Assistant Professor as Chief Design Engineer, 6 Assistant Professors as Professors, 1 Professor as Director, 2 Superintendents as Assistant Registrars.

1 Professor, 1 Assistant Professor, 4 Lecturers, 6 Associate Lecturers, 2 Senior Technical Assistants and 1 Technical Assistant resigned.

1 Visiting Professor and 2 Visiting Assistant Professors left the Institute after their assignment.

XIII. Budget Proposals :

(i) Approved Budget and the expenditure for the year 1973–74 :

Approved Budget (Net) 1973–74	Rs. 244.90 lakhs.
Amount allotted by the Ministry	Rs. 251.90 lakhs.
Actual expenditure 1973–74 (Net)	**Rs. 243.54 lakhs.**

(ii) Budget proposals for Revised Estimates 1974–75 and Budget Estimates 1975–76 :

(Figures in lakhs of rupees)

	Actuals for 1973-74	Budget* for 1974-75	Revised Estimates 1974-75 (as recommended by Finance Committee and approved by Board	Budget Estimates 1975-76 (as recommended by Finance Committee and approved by Board
	Rs.	Rs.	Rs.	Rs.
Recurring	200.37	201.78	285.88	290.41
Non-Recurring				
Buildings	26.48	19.54	114.00	96.53
Equipments and others	37.33	17.20		
Total	264.18	238.52	399.88	386.94
Less Income	20.64	17.16	18.77	19.86
Net	243.54	221.36	381.11	367.08
Notional Provision				
(i) Equipment	82.31	75.00	61.25	26.00
(ii) Partial adjustment for Computer from West Germany (German Food Aid Funds)	134.54	...	...	...

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

XIV. Concessions and Special efforts taken for Scheduled Castes/Tribes candidates :

Candidates for the B.Tech. Degree Course belonging to the Scheduled Castes/Tribes are offered the following concessions :

i. 15% of the seats for Scheduled Caste and 5% for Scheduled Tribe candidates are reserved at each Institute.

ii. The upper age limit is relaxable upto 5 years.

iii. They are exempted from payment of Tution fee. More concessions are being announced from 1974-75 academic yeer.

To the S.C./S.T. Students admitted to the courses of study I.I.T. Madras has already nominated a Faculty member (who belongs to the S.T.) as Adviser. The Institute has also set up a special Committee, with the Deputy Director as Chairman, the Chairman of the Joint Entrance Examination Committee, the Adviser to the S.C./S.T. students, the Adviser to the Foreign Students, the Dean of Students and Senior faculty members of the Departments of Humanities and Social Sciences, Mathematics, Physics, Chemistry and Mechanical Engineering as members, in order to consider and make recommendations from time to time on all matters concerning the academic affairs and related programmes of the S.C./S.T. students.

On the eve of the academic session 1973-74 the S.C./S.T. students numbering 34, admitted to the B.Tech. Course, were given an orientation programme of three weeks duration in order to acquaint them with the pro gramme of study and given the general preparatory background in the following 4 subjects of the curriculum for the First year of B.Tech programme

1. English
2. Mathematics
3. Physics
4. Chemistry

Four faculty members in the four subjects named above were nominated to keep a close watch of the performance of these students. A special programme of study is drawn up during the first year to cater to the needs and requirements and to give them individualised and personal attention which they are in need of.

At the end of the first semester of study 50% of the students out of this 34 qualified to proceed to the second semester in accordance with the rules and regulations of the Institute. The remaining 17 students who were found to be deficient in three or more subjects were given a special programme of study during the second semester in order to enable them to repeat the subjects of the first semester. A very special effort is being made to bring the level of these students to that of the regular students.

At the end of this special programme, only three students out of 34 were found not to have benefited by this special training and are being advised to repeat the first year commencing in July 1974. For the remaining 14 students a special summer programme has been organised and currently in progress to enable them to complete the subjects pertaining to the second semester of the first year of study. It is likely that most of them will complete the programme satisfactorily and will become eligible to proceed to the second year of the course.

The Special Committee mentioned above has reviewed the progress made so far and view that in future programme right from the beginning of the first year, the students in the S.C./S.T. category should be given special attention an integrated programme of work lasting a whole year (a period of $10\frac{1}{2}$ months with a two weeks break in between). It is the belief of the Committee that the special attention for $10\frac{1}{2}$ months instead

of the usual 9 months, will enable the faculty members participating in the effort to produce better results than hither to.

It is hoped that a substantial number of students may then be able to join the regular semester in the second year. For the weak students who may pass in the all the subjects but only marginally in a few of them, the Committee proposes that even during the second year of study they should be treated as a special group and given special attention in order that at the end of the second year of study, most of them who would have attained the level to enable them to join the third year in the regular stream.

The above programme is designed to serve the interests of the S.C/S.T. students in three ways.

1. A number of SC/ST students admitted into the first year will, after a year of special attention, be able to join the regular stream at the commencement of the second year.

2. The relatively weak students will, after receiving two years of special attention, be injected into the regular semester at the commencement of the third year.

3. The poorest among those will have an opportunity to repeat either the first year or second year and will attain the level which will enable them to join the regular stream and complete the entire B.Tech. course by taking one more year than the usual five years.

The Committee is of the view that, by this process all the S.C./S.T. students admitted to the Institute despite their initially poor background for which they may not be responsible, will be able to complete the course satisfactorily.

The special Committee normally meets once a month to discuss the various problems relating to the welfare and programmes of the S.C/ S.T. students and periodically meets with the students themselves in order to get first hand idea of their difficulties and problems to keep on continually improving the methods of instruction and interaction between the concerned Faculty and the Students. The experience of the Committee during the last one year shows that initially the S.C./S.T. students come with a feeling of diffidence by the continual personal attention and care based on the special programme organised for them by the Institute, helps them immensely to improve quite rapidly their performance.

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/Structural Mechanics.

Development activities

Aerodynamics/Gas Dynamics Laboratory :

1. Developed a frequency counter using photoelectric effect to measure the frequency of flutter models.

2. *Development of an axisymmetric variable area ratio, convergent divergent nozzle :* Area ratio between throat and exit was varied by secondary injection at the throat. Effect of stagnation conditions of the main and secondary streams, angle of injection and other geometrical parameters of the nozzle on nozzle performance has been studied.

3. *Ignition and combustion of a high speed fuel-air mixture by means of a pilot flame :* Flame characteristics for different pilot and main equivalence ratios, main flow velocities etc., were experimentally determined from Schlieren and direct photographs of the flame. Indane was used for both pilot and main streams.

Structural Mechanics Laboratory :

1. *Mechanical analogue for Poisson's equation* : A finite difference mechanical analogue for solving Poisson's equations such as those in torsion problems has been constructed. The model is basically a mesh of equally tensioned strings loaded laterally. The applications of the set up are varied.

2. An electrical analogy set up has been constructed for the buckling analysis of columns with various end conditions.

3. *Unbonded strain Gauge :* For the measurement of torque an unbonded strain-gauge set up is constructed.

4. Design of a Polar winding machine for fabrication of closed cylindrical shell has been completed.

Rockets and Missiles Laboratory :

1. A static firing stand for spinning rockets is being developed.

Research activities

Aerodynamics/Gas Dynamics Laboratory :

A new technique is being developed to solve the problem of hard blowing into the unsteady Laminar Boundary Layers.

A computer programme was written based on the method of singularities to solve the potential flow past annular airfoils. The analytical results were compared with the Rheoelectric analogy tank results. The agreement was very encouraging.

The method of singularities based on AMO Smith's technique was applied to the potential flow problem of wings and wing body combinations and the programme was made operational.

Structural Mechanics Laboratory :

Electrical Analogy for torsion problems : An electrical analogue for solving torsion problems of various cross-sectional shapes such as circular, rectangular, triangular, etc., has been constructed using conducting paper.

Rockets and Missiles Laboratory :

1. Rapid de-pressurisation apparatus of solid propellants to investigate the characteristics of solid propellants under rapid depressurisation.

2. Solid propellant strand burner is being used for investigation of burning characteristics of solid propellants.

3. A computer program has been developed to compute friction coefficient and heat transfer coefficient on external flows over two-dimensional or axisymmetric bodies provided the inviscid flow conditions are given.

Seminars

The 26th Annual General Meeting was organised at I.I.T. Madras by some members of the Aeronautical Engineering Department in collaboration with Aeronautical Society of India. Four technical papers were presented at the 26th Annual General Meeting of the Aeronautical Society of India. The Department participated this year also in the H.A.L. Design (leading to D.I.I.T.Aero.) and Management Training Programmes. In the coming year a new diploma course in 'Aircraft Production' is proposed to be started.

APPLIED MECHANICS

The 5th batch of M.Tech. students in Engineering Mechanics graduated in 1973 and the 6th batch will be graduating at the Convocation to be held in September 1974. The first batch of students in the M.Tech. programme for Mechanical Engineering with Machine Dynamics option graduated in August 1973. During 1973-74 the Department had 30 Ph.D. scholars

including those under the Quality Improvement Programme. The Department also had 11 M.S. Scholars. The Department continues to maintain the tempo of its research activities and also its industrial liaison work.

Research Work

Solid Mechanics :

Structural Vibrations of Bridges — Dynamic Response of Curved Bridges — Nonlinear Analysis of Sandwich Structures — 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 — Transient Response of Structures under Thermal and Mechanical Loads — Buckling of Helically Wound Multi-layered Circular Cylindrical Shells — 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—Application of Finite Element Methods for the Design of High Speed Grinding Wheels — Bending Buckling and rupture of noncircular rings under creep conditions using numerical methods — Nonlinear Vibrations of Plates and Shells (Geometric and material nonlinearity) in vacuum and acoustic medium — Nonlinear Vibrations of multilayered plates and shells made of elastic and viscoelastic materials — Creep deflection of plates and shells including second order effects — Dynamic response of circular Layered plate — Nonlinear vibration of Layered plate — Nonlinear analysis of frames (geometrical and physical)— Free vibration and buckling of anisotropic (and orthotropic) conical shells — Thermal buckling of plates — Vibration and buckling of annular circular plates — Transverse Vibration of rotating orthotropic shafts of constant and varying thicknesses.

Machine Dynamics (Mechanisms, Vibrations, Acoustics and Tribology) :

Rotor Instabilities in Gas Lubricated Bearings — Static and Dynamic Stress Analysis of Cylindrical Shells with Cutouts–Static and Dynamic Behaviour of Machine Structures — 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 — 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 — Computer Oriented Design of Machine Tools Structures — Scale Model Studies in Random Vibrations of Structures — Dynamics of Radial Drilling Machine — Structural Response to Random Acoustic Excitation — Some Studies of the Static and Dynamic Behaviour of Hydrostatic Thrust Bearings — 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 — Investigation of the incompressible flow in Nozzles — Experimental Investigation of the incompressible flow in Nozzles– Experimental Investigations of Optimum Axisymmetric Diffusers — Investigation of three-dimensional Boundary Layer Development on Yawed Wings — Liquid Sheet Formation in Swirl Spray Atomisers — Experimental Investigations on the Efficiencies of Stepped Diffusers — Investigation of Annular Aerofoils at Angles of Attack.

Biomedical Engineering :

Further research has been carried out on application of finite element methods to the solution of problems in biomechanics. Thus, the analysis on stress pattern of the left ventricle has been worked out in detail. The stress concentration for a syme prosthesis has been determined and necessary cut out to reduce the stress has been recommended. Work on dynamic population modelling has been initiated.

Design and Development

Solid Mechanics :

1. Photoelastic setup for centrifugal stress measurements

2. Apparatus for the measurement of transient strains and impact forces on structures

3. Design of tilting stage apparatus for three-dimensional stress analysis

4. Set up for Laser diffractographic strain measurements

Machine Dynamics :

1. Torsional Vibration Exciter
2. Conical and Catenoidal Acoustic Horns
3. MHD. Bearing Test Rig
4. Standing Wave Apparatus
5. Hydrostatic Bearing Test Rig with Orifice Control

Biomedical Engineering :

Several electronic instruments for Biomedical use have been constructed and their use in clinical environments is under study. A portable muscle stimular is undergoing evaluations. Work on E.E.G. frequency analysis and biofeedback have gone on very satisfactorily with the latter providing therapeutic measures to epileptic patients. Phonocardiography,

E.C.G. amplifiers, E.M.G. amplifiers, nerve stimulator are some of the instrumentation completed during this period and liaison with industry to manufacture these items are in progress.

CHEMICAL ENGINEERING

Teaching and Research

The number of students on rolls during 1973–74 and number graduated are given below :

	No. on rolls	*No. graduated*
B.Tech.	147*	52
M.Tech.	53**	27
M.S.	6	2
Ph.D.	14	3

* Last three years

** First and second year

The new revised program of M.Tech. is made effective with the academic year 1973–74. The second phase of changes in rationalising the undergraduate course structure is completed and will effectively transform the UG Courses towards intensive education.

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

1.	Transfer operations	Experimental studies on parametric pumping
2.	Reaction Engineering	RTD studies
3.	Process Control	Conversion of pulse responses to frequency response
4.	Particle Technology	Foam separation
5.	High Polymer Engg.	Analysis of transport processes occurring in polymer processing

In addition to the proposals submitted to NCST for advanced centres in Particle Technology, High Polymer Processing and Development of Pneumatic dryers (submitted last year), research proposals for DRDL and CSIR were submitted for funding.

Industrial Liaison

There has been steady delineation of Industrial liaison work into routine analysis and testing oriented schemes to using faculty abilities in solving technical problems on a regular consultancy basis. Some such schemes undertaken during 1973–74, involved areas such as "Advice on pollution Problems in Tobacco industry", "Consultation for Marine Chemicals Development".

General

Some of the faculty members are sparing their services in working on advisory bodies such as Chemical Engineering Research Committee of CSIR, Radio isotopes in Industry panel of BARC and NCST Committee on Desalination.

CHEMISTRY

The Department continued teaching Chemistry as usual to the B.Tech., M.Tech., M.Sc., D.I.I.T. (Technical Analytical Chemistry) and Ph.D. Courses of the Institute. During the year under review fourteen students qualified for the M.Sc. degree and three students for the D.I.I.T. Nineteen persons submitted theses for the Ph.D. degree among whom five are Staff Members of the Department.

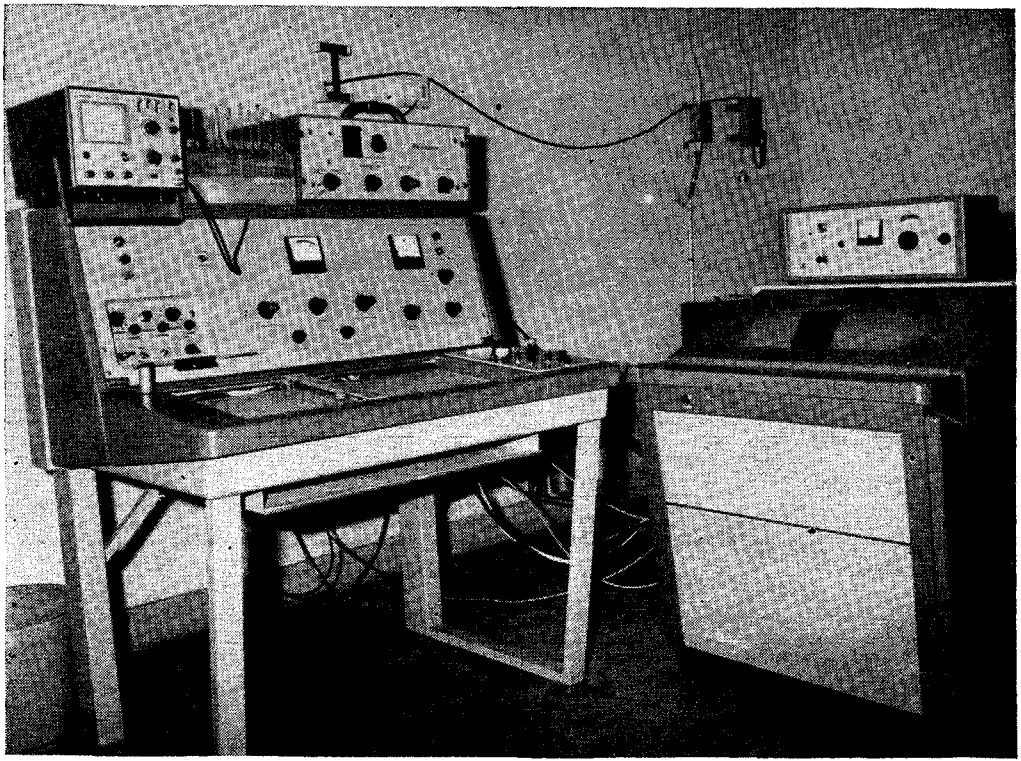
Research Work

The Faculty of the Department was actively engaged in research in the following major fields: Theoretical and Structural Chemistry, Solid State Chemistry, Inorganic Chemistry, Coordination Chemistry, Analytical Chemistry, Polymer Chemistry, Chemical Kinetics, Catalysis, Electro-Chemistry and Organic Chemistry — synthetic and reaction mechanism. Sixty five research scholars are working for Ph.D. degree, among them thirty five are supported by outside agencies such as C.S.I.R., Department of Atomic Energy, PL-480 etc. Over sixty five research papers were published by the Faculty members in International Scientific Journals, forty five papers have been accepted for publication, and over twenty papers were presented at Seminars and Conferences.

The Department has rendered increased assistance by way of analytical and Consultancy services to a number of Industrial Organisations, Government Departments and Educational Institutions.

CIVIL ENGINEERING

During the year 1973–74, the Department of Civil Engineering continued to offer courses for B.Tech and M.Tech degrees and Research courses for M.S. and Ph.D. in various branches of Civil Engineering. In addition, one year postgraduate diploma course leading to D.I.I.T. in Building Technology has also been offered. A new two year M.Tech degree course in Transportation Engineering was started from August 1973 besides another two year B.Tech degree course in Naval Architecture for graduate engi-



Varian A-60-D NMR Spectrometer in Special Instruments Laboratory, (Dept of Chemistry.)

neers has been started from January 1974. 10 students qualified for B.Tech and 10 for M. Tech degree in the three branches of post-graduate studies, i.e. Hydraulic Engg., Soil Mechanics and Structural Engineering, 3 students qualified for the award of D.I.I.T. in Building Technology; 6 were awarded Ph.D. degree and one M.S. degree. In addition 25 research scholars (including part time) are working for Ph.D.

Under the Quality Improvement Programme a Summer School in "Model Analysis of Structures" was held in June 1974. Several teachers of various engineering colleges in the country participated.

Research Work

Research activity in the Department maintained its growth in variety and volume. During the year 50 research programmes which include faculty research, M.Tech. and M.S. Programmes were on hand. Two research programmes sponsored by C.B.I.P. are under way.

In the year under review, over 25 technical papers and discussions were published in important technical journals in India and abroad. The faculty members and research scholars either submitted or presented 10 papers at conferences/seminars held in India. Prof. Johnson Victor attended the National Productivity Council on "Project Feasibility Studies" held in Manila, and Japan during Feb-March 1974, as a member representing India.

Liaison with industry has been further strengthened and several consultation works both for Government and private organisations have been taken up besides testing works.

ELECTRICAL ENGINEERING

During the year under review, 71 students of the Department qualified for B.Tech. Degree, 35 students for the M.Tech. degree and one for the M.S. Degree. Three candidates were awarded the Ph.D. degree bringing the total number of Ph.D. degrees awarded to 19.

Research Work

Research work in the Department had been quite extensive in the different wings of the Department and was on pure and applied topics. During the year under review, 34 research papers have been published in leading technical journals in India and abroad, while 29 more were accepted for publication. The faculty members of this Department also presented 7 papers at technical conferences in India and abroad.

Applied Research/Industrial Consultancy

1. Project work relating to the development of a Demonstration Digital Computer, sponsored by the Atomic Energy is under completion.

2. High speed unwinder drives — project sponsored by M/s. Bharat Dynamics Ltd., is in the final stages of completion.

3. The collaboration between M/s. Kirloskar Electric Co., Bangalore and Indian Institute of Technology, has since resulted in the development of an economical speed change induction motor, which has wide industrial acceptance.

4. Consultancy services relating to the computer application to power systems are offered to the Tamil Nadu State Electricity Board and Tata Consultancy Engineers.

Centre for Systems and Devices

The building for the Centre for Systems and Devices was inaugurated on 3rd June 1974 by Prof. K.T. Chandy, Chairman, Board of Governors, and the staff had already moved into it.

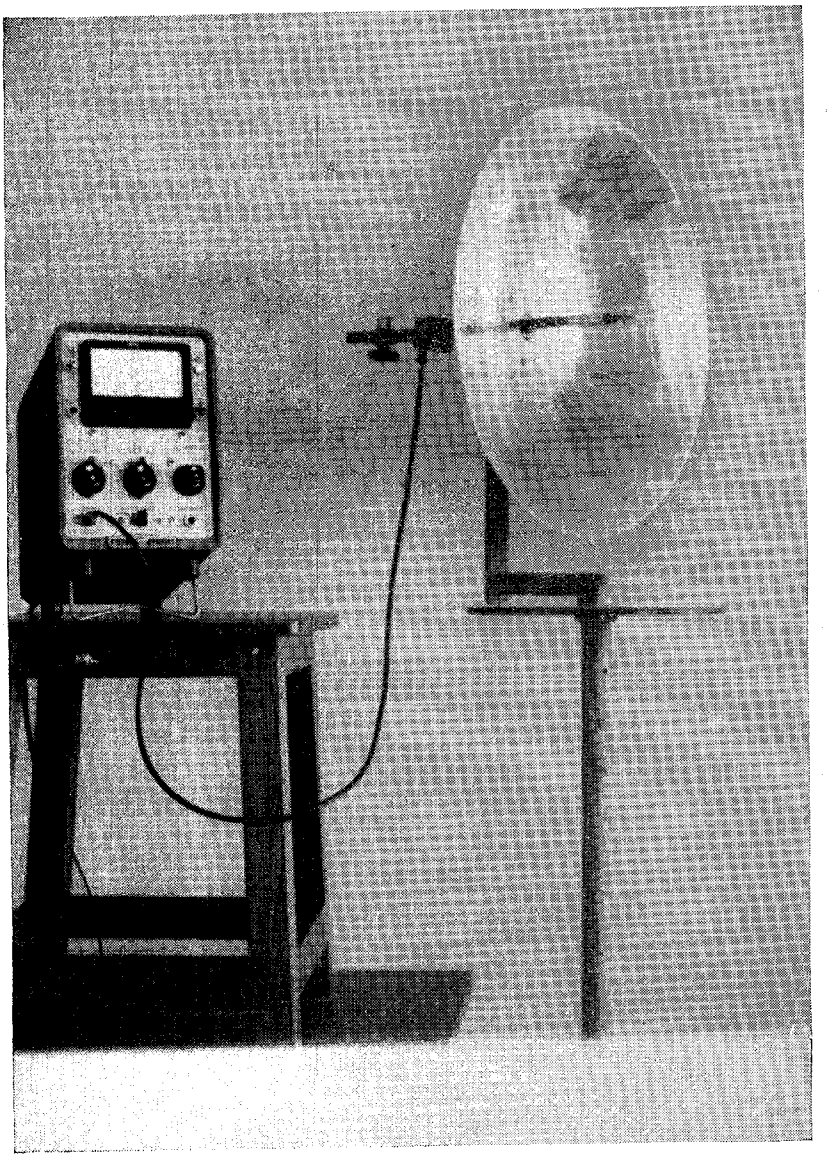
Cumulative Statistics pertaining to the Department

S.No :	*Subject :*		*Total Number*
1.	Degrees awarded :	B.Tech :	634
		M.Tech :	215
		M.S.	1
		Ph. D.	19
2.	Publications :		
		Indian Journals	59
		Foreign Journals	250
3.	Patents taken		1
4.	Books written		1
	Laboratory Manuals		4
	Network Analyser Guide		1
	Technical Reports and Notes		8

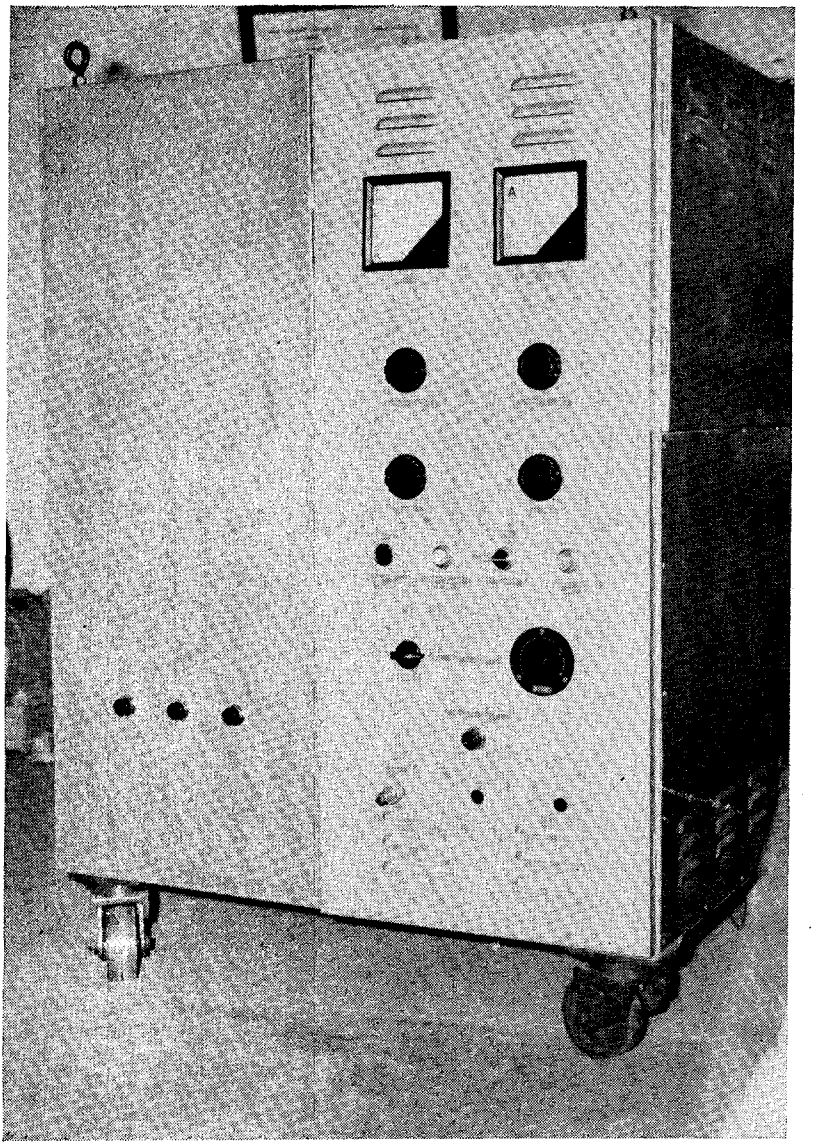
HUMANITIES AND SOCIAL SCIENCES

During the year under review research work covered areas of Humanities, Social Sciences, Industrial Engineering and Industrial Management. One student completed his research on 'Inventory Control' and was awarded the M.S. Degree in Industrial Engineering. Four research papers were published and 5 papers were presented in conference.

During the year the Department improved its liaison with industry, Senior Faculty members conducted executive development programmes for some of the leading industrial houses and Public sector industries under the auspicious of the several professional bodies like Indian Society for Training and Development, Institution of Engineers of India, Operational Research Society of India, Madras Management Association, the Institute of Chartered Accountants, Institution of Plant Engineers, Institute of Public Enterprises etc.



Testing of Fibre-reinforced plastic (FRP) parabolic antenna at 10,000 MAZ. (Dept. of Electrical Engineering.)



Thyristor Controller for Wirespool Unwinding (Built by Control Engineering Laboratory, Department of Electrical Engineering, for Messrs. Bharat Dynamics Limited, Hyderabad.)

All the Post-graduate students in Industrial Engineering and Management in their final year were deputed to various industries in Madras and outside Madras for doing live-wire Industrial Problems as part of their Project work.

Number of candidates working for research degrees during the year under review was as follows :—

Ph.D.— 2
M.S. — 6

Conference/Seminars/Special Programmes

Special Programme :—The Department organised as a part of the Quality Improvement Programme Summer School/Short term course for teachers of Colleges and universities in 'Quality Control and Standardisation' and 'English in Engineering Curriculum'.

The Department actively involved in Management training programme for Hindustan Aeronautics Ltd. during the period under review.

Dr. V. Anantaraman attended a One-week Training on 'Achievement Motivation' conducted by Prof. Nadkarni and George Koveth, ISTD, New Delhi, in February 1974.

Four staff members of the Department underwent Training under Quality Improvement Programme :

1. Prof. P. Ramachandran — HMT (Watch Factory), Bangalore.
2. Dr. L.V.L.N. Sarma — HMT (Finance and Accounts), Bangalore.
3. Shri. V. Arumugam — Lakshmi Machine Works Ltd., Coimbatore (Overall functioning of the Industry)
4. Dr. C. Ramachandran — Hindustan Aeronautics Ltd., Bangalore (Personnel and Industrial Relations Dept.)

Conference :—

Dr. V. Anantaraman presented the following papers :—

1. *Role of Management Institution in moulding emerging organizational patterns.* Key note address to the concurrent session on Role of Management Education Institutions, 5th National Convention of the Indian Society for Training and Development, Bangalore – 26th April 1974.

2. *Emerging pattern of Engineering Education :* A paper presented to the National Symposium in Diversification of Engineering Education. The Institute of Engineers, Bangalore, 19-20, April 1974.

Seminar

Dr. Y. Nagendra attended a Seminar organised by ICSSR at Hyderabad in April 1974.

The Language of Malgnkar's 'The Princes' —a paper presented by Shri P. Rama Rao at the Seminar on 20th Century Literature held at Andhra University P.G. Centre, Guntur in April 1974. (It is under print in a book of essays and proceedings of the Seminar)

Publications

1. Problems of Promoting Research in Economics and Means of Assistance to Supervisors and Guides in Southern Universities, Bulletin of the Madras Institute of Developmental Studies, Vol. III, No. 12, Special Number December 1974 (Dr. V. Anantaraman).

2. Papers accepted for Publications : 'Land Revenue Policy of the East India Company in Madras ' to appear in December 1974 and March 1975 issue of Indo-British Review :—Dr. C. Ramachandran and Prof. R.K. Gupta.

3. Markovian Approach for prediction of Tyre retreading work-load in Transport industry — Published in State Transport News of Tamilnadu, June 1974.

MATHEMATICS

The Department continued to undertake teaching for the B.Tech, M.Tech., M.Sc., M.S., and Ph.D. courses. The faculty members were actively engaged in research work in the following areas :

(1) 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 Bioengineering, (xi) Mathematical Physics, (xii) Topological Dynamics.

As in the past, the Department collaborated with other Departments in research activities as well as teaching.

As the Journal of Mathematical and Physical Sciences continued to attract large number of original papers from abroad and inside India during its eighth year, the number of issues per volume has been increased from four to six. In 1973, a special issue of the journal was brought out to commemorate the silver jubilee of Indian Independence. This consisted of articles by the leading Indian Scientists about their research contributions.

About 150 Indian delegates and eight foreign delegates participated in the 18th Congress of the Indian Society of Theoretical and Applied Mechanics organised during December, 1973 at this Institute. An exhibition on Fluid Mechanics consisting of about 80 charts, pictures, and photographs was organised by the Department during the conference.

The monograph on 'Stochastic Point processes and their Applications' by Prof S.K. Srinivasan has been published by Charles Griffin and Co., England. The UGC book writing programme by Prof. S. K. Srinivasan and K.M. Mehata has been successfully completed and the book 'Stochastic Processes' by these authors is in the course of publication by the Tata-McGraw Hill. Under the same programme, the manuscript of the book ' Probability and Random Processes ' by Prof. S. K. Srinivasan and K.M. Mehata is under preparation and is expected to be ready by December 1974.

Drs. R. Subramanian, P. Achuthan, and K. Venkatesan are engaged in translating the German book 'Praktishe Mathematik fur Ingenieure und Physiker' into English. This book will be published by the Allied Publishers.

Professor S.K. Srinivasan attended the symposium on 'Stochastic Problems in Solid Mechanics' conducted by the Civil Engineering and Solid Mechanics Division of the University of Waterloo, Canada, in September 1973. He gave a series of lectures on general stochastic processes in this Symposium and also visited various other Universities in the U.S.A.

Dr. S. Kalpakam attended the International Congress of Mathematicians held at Vancouver, Canada, in August 1974. She presented a paper entitled 'Finite Dam with Alternating Linear Input and Output'. She also gave a seminar on 'Stochastic Problems Associated with pulse Labcling Mitotic Indices in Proliferating Cells' in the Biophysics Department of the State University of New York at Buffalo and a seminar on 'Regenerative Processes Imbedded in the Stochastic Processes of Dams and Queues' in the Civil Engineering Department of the University of Waterloo, Canada.

Drs. A. Thyagaraja and S. Sukavanam attended the symposium to commemorate the 50th anniversary of Bose Statistics held in the Indian Institute of Science, Bangalore in July 1974.

A two-day symposium on Reliability Theory was organised in June 1974 in which about 20 participants from all over India took part.

The Department runs a weekly seminar. This year several special lectures on the advances in Mathematical Science were given by members of the faculty and several distinguished mathematicians from other institutions in the City.

"Mathematical Observer", a wall paper of general mathematical interest, was brought out once in 15 days during 1973–74.

The following foreign dignitaries visited the Department during the year and addressed the Mathematics Seminar.

1. Professor Miss. Evelyn Frank, Illinois University, U.S.A.
2. Professor M.A. Jaswan, The City University, London.
3. Dr. O. Pironneau, University of Cambrigde, England.

4. Professor E.R. Suryanarayana, University of Rhode Island, U.S.A.
5. Professor G.A. Nariboli, IOWA State University, U.S.A.
6. Professor V.S. Vaidyanathan, (Visiting Professor, 73–74)
   State University of New York, at Buffalo, U.S.A.

MECHANICAL ENGINEERING

The Department executed its major task of imparting instructions to the students of the B.Tech. and post-graduate courses, promoting research and development activities sponsored by outside agencies in addition to their own. The Department engaged itself also by organising quality improvement programme and continuing education activities.

A new course at post-graduate level (DIIT in Machine Design) was introduced during the year. 11 candidates for the Ph.D., 1 for the M.S. have registered during the period under review. 26 of the faculty members are continuing their research programmes for higher degrees. 68 papers have been published/presented and 17 have been accepted for publication in the journals/conferences all over the world.

Research work

The research and developmental activities of the Department are as follows :

Fine Technics : Some of the research activities in this field are Resonant Magnetic Suspensions, Interfero Meter Elements, Automatic Controllers, He-Ne Lasers, 35 mm camera & OTF measuring instruments.

Heat Transfer and Thermal Power : Heat Transfer in fluidised beds, free convective flows, thin films, pulsating flows and studies in heat exchangers, heat transfer between stator and rotor rows.

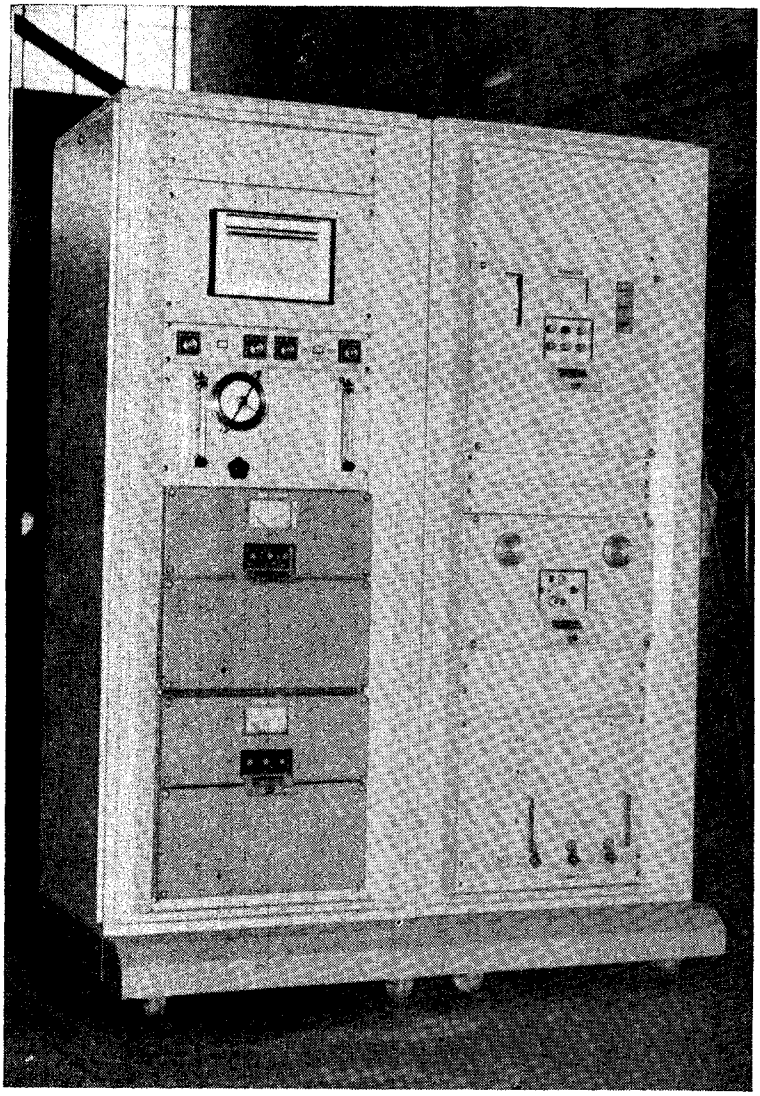
Hydro Turbomachines : Jet, centrifugal and radial flow pumps, in-line propeller pumps and axial flow pumps.

I. C. Engines : Investigations on dual fuel engines, diesel engines, M-combustion systems, vehicle emission control, combustion chambers and computer simultation studies.

Machine Tools : Ultrasonic, oscillatory machining, transient stress during tool entry, investigations on ECG, ECM, surface integrity of gears, High speed grinding wheels, wear resistance coating for tools, vibration exciters NC machine systems, processing of plastics.

Machine Elements & Mechanical Handling : Jib and EOT cranes, pneumatic conveyance systems, synthesis with two freedom spatial linkages, lubrication of gears, sintered friction material and heavily loaded line contacts.

Refrigeration & Air-conditioning : Freezing of marine products, thermal properties of porous materials and studies on binary mixtures of refrigerants.



Uras-Non dispersive infrared Exhaust gas Analyser IC Engines Lab.
(Department of Mechanical Engineering)

Thermal Turbomachines : Secondary flows in cascades, forward swept axial flow fans, centrifugal fan impellers and radial diffuser flow studies.

Thermodynamics and Combustion Engineering : Combustion engineering, Air pollution studies, desalination and solar energy.

Seminars, Winter and Summer Schools

The following seminars/winter/summer schools were arranged during the year:

1. A course on 'lasers and their applications'.
2. A training course for instrument technicians in collaboration with the Madras Productivity Council.
3. A seminar on pumps by Dr.–Ing.Otto Schiele.
4. A seminar on 'Gears' delivered by Dr.–Ing. F. Jarchow.
5. A Q.I.P. course on "Hydroturbomachines" and 'Advanced Mechanisms'.
6. A seminar on unconventional Machining Technics' in collaboration with the Madras Productivity Council.
7. "Computer technics in production engineering design and research' with Prof. Owley and Dr. Thomas (U.K).
8. The Department also participated in arranging the 4th Conference on Fluid Power and Fluid Machinery in Dec. 1973.

Sponsored Projects

The following sponsored projects are currently in progress :

1. Design and Development of Aerial Camera (Defence).
2. Heat transfer studies in large electrical machines (RDOEI)
3. Detection measurements and control of carcinogenic polycyclic aromatic hydro carbons (NSF).
4. Development of a strain rate controlled testing machine (CSIR).
5. Performance characteristics of a gas supported bearing (Directorate of Basic Research–Defence).
6. Influences of turbulence on turbine blade cascades (CSIR)
7. High speed cascade and compressor investigations (Aeronautics–R and D Board).

Industrial Liaison

The Department continues to maintain liaison with many industries and organisations. Some of the industries are :

M/s. International Instruments Ltd., Bangalore
Cork Industries, Madras
Agro Engines, Madras
T.I. Cycles of India Limited, Madras

M/s. Best and Co., Madras
Shaw Wallace, Madras
Space Science and Technology Centre, Trivandrum
K.C.P. Limited, Madras
Rani Brake Linings, Madras and
Bharat Heavy Electricals, Hyderabad.

CENTRAL WORKSHOPS

Name of the Firms	*Nature of work carried out*
Bharat Dynamics Limited, Hyderabad.	Gear box for Wire spooling Mechanism.
K.C.P. Ltd., Madras.	Bevel Gears for Hoists for Navy,
South Indian Export Co. (Pvt) Ltd. Madras.	Balancing of variable Speed Pulleys for Defence.
Aeronautical Development Establishment, Bangalore.	Gears for Aeronautical Development.
Indo-Islandic Fisheries, Madras.	Bevel Gears for Marine Engines.
Manoj Engg., Cochin.	Gear Couplings.
Engineering College, Madras.	Internal Gear cutting attachment for Shaping Machines.
Research Designs and Standards Organization, Lucknow.	Gears for Track Recording Car.
Best and Company, Madras.	Dynamic Balancing of Rotor for Alternator.
Madras Fertilizers.	Heat treating of Stainless Steel pieces as per specification.
Surgical Instruments, Madras.	Fabrication of Worm wheels and worms.
Vehicle Research and Development Section, Avadi, Madras.	Fabrication of Gears and Pinions.
Madras Dial Gauges and Measuring Instrument Co., Bangalore.	Graduation on the Micrometer Thimbles.
Zuby Machines, Madras.	Dynamic balancing of Leather Shaving Blades and Rollers.
Bharat Electronics, Bangalore.	Fabrication of Bevel Gears.

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 is as follows :

Ph. D. 23 (9 full-time, 1 under Quality Improvement Programme, 1 part-time external and 12 part-time)

M.S. 15 (9 full-time, 4 part-time and 2 part-time external)

During the period under review, 5 Ph.D. and 3 M.S. theses have been submitted.

Research and project work on the follcwing topics were carried out :-

(1) Investigation on rubber pad forming
(2) Studies on phase transformations
(3) Studies on cobalt rare earth alloys
(4) Studies on explosive cladding
(5) Studies on riseri and chill interaction
(6) Fatigue
(7) Some aspects of flow turning
(8) Kinetic studies of decarburisation of ferro-chrome under vacuum
(9) Some aspects of plastic transformations
(10) Pulsed current for inert gas shielded arc welding
(11) Codeposition of nickel and other elements by electrolytic techniques
(12) Solidification of copper and its alloys in metal moulds and thermal behaviour of metal moulds
(13) Feeding of narrow and long freezing range alloys
(14) Studies on feeding and soundness of aluminium alloys
(15) Pile-ups of screw dislocations in two phase systems
(16) Certain aspects of phase transformations in metallic alloys
(17) Beneficiation and recovery of nickel from low grade nickel ores
(18) Investigation of influence of strain rate on the yield stress of different metals
(19) Plastic deformation of metals and alloys
(20) Physical and mechanical properties of welded steel with respect to Indian materials
(21) Combined extrusions
(22) Fusion welding of mild steel to aluminium
(23) X-ray analysis of specific alloys showing shape memory effect
(24) Some studies on transformations in metallic systems by ultrasonic techniques
(25) Solidification and mechanical properties of aluminium alloys

(26) Action of chills on feeding of Al-4.5% copper alloy plate castings
(27) Some aspects of fatigue
(28) Effect of vacuum melting on physical and mechanical properties of stainless exhaust valve steels
(29) Vacuum brazing
(30) Resistance welding
(31) Studies on SG iron
(32) Powder metallurgical studies
(33) Welding of heat-treatable aluminium alloys
(34) Investigation on some aspects of rubber pad forming processes
(35) Some studies on x-ray diffraction
(36) Some studies on creep deformation with intermittent loading
(37) Studies on the operating characteristics of electric furnaces for production of pig-iron using indigenous raw materials
(38) Thermit reaction for the production of permanent magnet alloys
(39) Studies on cast iron
(40) Some aspects of wear
(41) Design and fabrication of friction welding machine
(42) Estimation of parameters for plasma cutting/welding
(43) Design and fabrication of a friction welding machine
(44) Development of fluxes for submerged strip cladding of stainless steel
(45) Influence of steel scrap on properties of arc furnace melted cast iron
(46) Studies on hot box resins and collapsible patterns
(47) Evaluation of bentonite as a bonding material in synthetic moulding sands
(48) Design and fabrication of a cantilever type rotary bending fatigue testing machine, to study the notch sensitivity of cast metals
(49) Early stages of spinodal decomposition in Al-21.5 at.% Zn alloy
(50) Studies on recovery of cold worked materials
(51) A study of permanent moulding of grey cast iron
(52) Instrumentation for acoustic emission
(53) A study of the properties of resin bonded sands used in shell moulding
(54) Commissioning of the 170 KVA resistance spot/seam welding machine
(55) Consumable guide electroslag welding
(56) Influence of preparation (conditioning) on properties of synthetic moulding sands
(57) Studies on the development of an as cast specimen for determining gas content in aluminium alloys
(58) Strip cladding of stainless steel on mild steel–preliminary investigations

(59) Studies on waxes Part II

(60) The recovery of silver from waste photographic solution

(61) Fabrication of ceramic seats

(62) To study the modification of aluminium-silicon alloys using rare earth elements

(63) Standardisation of techniques for the manufacture of graphite electrodes

(64) Extraction of zinc from galvanizing plant residues by pyrometallurgical and electrometallurgical methods

(65) Hydrostatic extrusion

(66) Commissioning of the plasma welding/cutting machine

(67) Design and fabrication of a stress relaxation machine

(68) Experimental investigations into square deep drawing process

(69) Residual stress measurements in welded structures

(70) Rubber pad forming

(71) Scanning electrolytic jet machining apparatus

(72) Observation of shape memory effect in a Cu-Zn-Sn alloy

(73) Growth of single crystals

(74) Construction of a resistivity measuring apparatus

(75) Interaction of hydrogen in alloy steels

(76) A literature survey of spinodal decomposition

(77) Studies on some powder metallurgical compacts

(78) Recovery, recrystallisation and grain growth of two-phase alloys

The Department maintained close links with local industrial establishments. Five scholarships as well as some construction materials for an extension to the metal joining laboratory have been obtained as a consequence of such relations. Some M.Tech projects also were carried out in close collaborations with the industries.

The Department organised a short term course on "Welding Technology" and also a course on "Recent Sand Practice."

Some staff and research students of the Department of Metallurgy also assisted in the commissioning of the central x-ray diffraction laboratory during August 1973. The laboratory is now working in full swing and has carried out x-ray diffraction experiments for various laboratories of the Institute.

Work was also carried out in setting up the Balzer's Evaporation Unit next to the electron microscopy laboratory.

Regular activities like technical meetings under the auspices of the local chapter of the Indian Institute of Metals, lectures by visiting Indian and foreign professors were arranged.

PHYSICS

Besides offering courses to B.Tech. students and M.Sc. courses to Physics students, the Department offered courses for M.Tech students from other Departments. Cryogenics as an elective course for M.Sc. Physics is a new special subject offered this year.

Research

Research activities of the Department covered the following fields :

(i) The influence of point defects in crystals on their electrical and optical properties.

(ii) Electron spin and nuclear quadrupole resonance.

(iii) Nuclear magnetic resonance in solids and ferromagnetic resonance in metals and alloys.

(iv) Electrical and magnetic properties of thin films.

(v) Mossbauer studies at room and liquid nitrogen temperatures.

(vi) Theoretical studies on lattice dynamics.

(vii) Theoretical and experimental studies on ultrasonic propagation in solids and liquids.

(viii) Construction of a dye laser and studies on laser Raman spectroscopy using a 3" Q switched Ruby laser.

(ix) Studies on crystal growth, thermoluminiscence and ionic conductivity.

Three members of the Department, Dr. R. Ramji Rao, Dr. B.S.V.S. Acharyulu and Mr. S. Srinivasan have gone abroad for advanced research in various aspects of solid state physics. Dr. S. Radhakrishna spent a few months visiting the Materials Research Centre at the University of Illinois and other universities in USA. Kum. G. Lakshmi, a Ph.D. student, was selected to participate in the Winter College on Surface Science at the International Centre for Theoretical Physics at Trieste, Italy and for further advanced research in the Max Planck Institute fur Festkorperforschung at Stuttgart W. Germany.

Over 30 research papers were published by the members of the Department during the year under review.

The following students have become eligible for the award of the Ph.D. degree and will receive the Ph.D. degree in the 11th convocation.

No.	*Name*	*Title of the thesis*
1.	Sri. B.S.V. Gopalam	Studies in rectifying semi conductor contacts.
2.	Sri. K. Srinivasan	Dielectric and elastic properties of some cubic crystals.

No.	Name	Title of the Thesis
3.	Sri. V. Viswanathan	Optical and thermoluminiscence investigations on pure and lead doped alkali halide crystals.
4.	Sri. C.S. Menon	Lattice dynamics, third order elastic constants and thermal expansion of some hexagonal metals.
5.	Sri. R.K. Khanna	Dielectric studies on some liquids and solids at micro wave and radio frequencies
6.	Miss. G. Lakshmi	Surface modes of vibrations in ionic crystals
7.	Sri. R. Narayana	Defect centres in caesium and rubidium halides.
8.	Sri. K.S. Girirajan	Elastic properties and equation of state of some cubic metals.

Projects

The following new projects have been awarded this year by the C.S.I.R. to some of the members of the Department. :

(i) Development of cryostats for the study of some properties of materials at low temperatures.

(ii) Pseudopotential theory and the equation of state of some metals.

(iii) Development of information storage devices.

(iv) Development of optical modulators.

In addition work on some schemes awarded by the other organisations like the DAE is continuing.

Conferences and Seminars

The high light of the year under review was the Indo-German Seminar on Advanced Solid State Physics from 20th February to 7th March 1974 and International Conference on Defects in Non-Metallic Solids from 26th February to 29th February, held by the Physics Department. Twelve scientists from Germany, France, U.K. and 35 scientists from all over India gave talks at the Seminar on all aspects of Solid State Physics. 120 papers were presented at the Conference by the participants.

CENTRAL LIBRARY

General

The year under review has been one of shortages. The Library has been facing acute shortage of space with the present book stock of 1,30,000 volumes having exceeded the capacity provided for by 30%. So also

with the growing increase in the number of students of all types, the available readers' seats have fallen short of 50% of the standard norms recommended by the UGC. Hence, extension of the Library building as contemplated in the original scheme has become a matter of prime importance.

New pattern of administrative organization introduced in the previous year has worked efficiently. The significant activities of the various divisions are as follows :

Circulation, Reference & Maintenance Division

A special unit of trained library staff was constituted to liaise with academic staff and attend to their bibliographical requirements personally, irrespective of the nature of work involved therein. The six members of the Liaison Unit made indeed a signal contribution in co-operation with the academic staff towards a balanced development of the collection through personal visits to the Departments and contacts with the faculties. It has rendered assistance in the selection of new publications by scanning various bibliographical aids for further consideration of the faculty. In this connection, the recently acquired multi-volumed sets of library of Congress Catalogues and British National Bibliography from West Germany forms an important source of information for the development of Library stock. In fact, the Unit has prepared and forwarded comprehensive lists of over 5600 publications of a value of about rupees 4 lakhs which would not only fill up gaps in the existing stock but add new dimensions to the library collection when received under the German Aid Program.

Periodicals & Documentation Division

With a view to develop the existing German scientific literature of a value of DM 7 lakhs into a Centre for German Science Information, visits to 24 research organizations in West Germany was made by the Librarian during his last tour abroad in June 1973 and established personal contacts with their publication divisions for supply of their scientific literature. A survey was also made in May '74 regarding the extent of use of German literature already available in the Library. It was seen that with more and more people coming to know the availability of german books, periodicals etc in the library through its published catalogues there has been a steady increase in the demand for German literature. Hence a proposal for establishing a national centre for German Science Information at IIT Madras was sent to the Department of Science and Technology, New Delhi.

The Documentation services were maintained uninterruptedly with the issue of 7 SDI Bulletins every week for the third year in succession. The services were also continued to be extended to other Institutions and research workers in the country on nominal payment. Indeed, 23 new subscribers from outside the Institute were added to the mailing list in 1974.

The Roster of Translators was kept active and translations were made and supplied on request from inside the Institute and other outside institutions including Department of Science and Technology, New Delhi.

The Division has also started a new Bibliographical Service based on the selected references announced in the SDI and other authentic sources available in the Library.

The periodicals — both foreign and Indian — were continued to be obtained directly from the publishers despite the arduous procedure of ordering and obtaining cheques individually for payment to them.

Acquisition, Processing & Systems Division

With no suitable increase in the book grant, the number of books added during the year has dwindled by about a third over the previous year. As such, in view of the growing increase in the number of publications brought out in different subjects coupled with general inflationary trend, it is but necessary that the book grant is stepped up adequately to keep ourselves — the faculty and students — better informed in all the relevant disciplines. The Section has however undertaken as a special project, translation of titles of about 1000 german dissertations received from the co-operating West German Universities, and processed them during the Summer vacation and made them available to the library users.

A Partial Archive of the world famous Encyclopaedia of Cinemmatographica for the scientific films in technical subjects has been acquired with financial aid from the West German Government. As the regional Centre, it is proposed to make these films available to other research institutions also on loan. A descriptive catalogue of these films and the other films previously acquired is under publication.

With a view to participate in the UNISIST program of World Science Information System, it has been agreed that IIT Madras will become operational base for the computerised information service to the Scientists in India. It has also been agreed that UNESCO will aid the project initially with regard to the training, personnel and supply of software in colloboration with Insdoc, New Delhi. In this connection, the Central Library has obtained sample tapes in the field of science and engineering for conducting test as to their suitability for our purpose. The test on COMPENDEX (Engineering Index) tape was completed and the report released for comments. Other tests on Inspecand ISI tapes are underway. The Section has also updated the data of Union Catalogue of Serials available in all the IITs and the computer programmes tested. The printouts of the catalogues would be made available to other IITs shortly to co-ordinate inter library loans more intensively.

Administration, Reprography and Bindery Division

The high cost of binding materials coupled with the unsteady supply have seriously affected the work of the bindery where a large number of journals have accumulated for binding. Under these circumstances it has become increasingly difficult to accept binding jobs from other departments.

The demand for reprographic services is now shifted more in favour of electrostatic (Korestat) copying service from the conventional photo-

copying process. There has also been a steady increase in the demand for this service not only from the Institute faculty and the SDI Subscribers but also from several other institutions in the country. In fact the turnover has gone up by nearly 20 times with double shifts working all round the year.

Shri V.S. Nazir Ahmed, Librarian was awarded a Fellowship by the International Association for Technological University Libraries for 'Study and research of Library Management problems in academic Libraries'. He combined the Fellowship with his participation in the Triennial Conference of IATUL on "Computerised Information Services" held in Copenhagen during 5-8 June 1973 and the visits to over 50 academic and research institutions in Sweden, United Kingdom, West Germany and France known for their library automation and management. He returned to India on 9th August 1973.

Statistics on the other library activities are as follows :

Opening Hours :

		1973—74
Week days	8 a.m. — 10.30 p.m.	
Saturdays, Sundays, & Holidays	9 a.m. — 4.00 p.m.	

Membership :

		1973—74
1)	Institute members (staff & students)	5044
2)	Outside members :	
	Individual	29
	Corporate	30
3)	Consultation permits	184

Circulation :

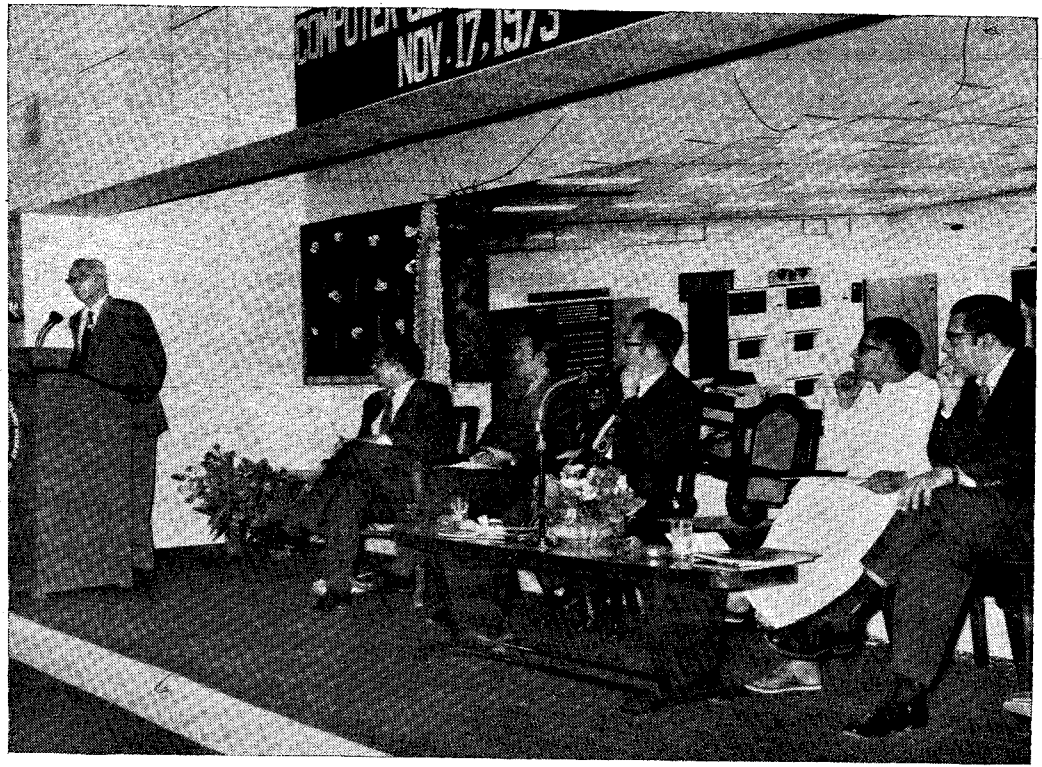
			1973—74
1)	No. of readers visited		101260
2)	No. of volumes issued		88244
3)	No.of reservations for Books–	Regd	7821
	–do–	fulfilled	6556
4)	Amount of overdue and other charges realised		Rs. 24132

Inter-Library Loan :

	1973—74
Borrowed for Institute members	356
Lent out from Institute Library	234

Acquisition :

	1973—74
Books and bound volumes of periodicals	3487
Pamphlets and reports	4438
Microfilms & Microfiches	89
Total intake during the year	8014
Total accessions upto date	1,30,027



Inauguration of the Institute's Computer Centre—November 17, 1973.

Prof. K. T. Chandy, Chairman, Board of Governors addressing the audience. Seated right to left: Dr. K. A. V. Pandalai, Director, Sri C. Subramaniam, Union Minister for Industrial Development and Science and Technology, Dr. Erhard Eppler, Minister for Economic Co-operation, Federal Republic of Germany, Dr. A. Ramachandran, Secretary, Dept. of Science and Technology, Govt. of India and Prof. S. Sampath, Head, Computer Centre.

Current Periodicals :

By subscription	1099
From Technical University, Berlin (under Aid)	102
By exchange or Gift	130

Documentation Services :

SDI Recipients	
Internal	100
External	60
LDN Recipients	
Internal	37
External	31

Reprographic Section :

Microfilms made	4471 frames
Photocopies made	5379 pages
Korestat copies	39,519 pages

Bindery :

No. of. journals & Books bound for library	1485
No. of. photocopy articles and form books bound	1439
No. of. journals & Books repaired	471
No. of. publications bound for other Departments	362

COMPUTER CENTRE

Research Work

Staff and Faculty of the **Computer Centre** were busy installing OS-MVT with HASP (version 21.6) and removing bugs in the system. Accounting routines for automatic billing were also developed. Since there were no comparable machines previously available in the country all the staff had to be trained in the Centre starting from scratch.

Seminars/Special Programmes

1) Seminar for Top Management :

A two-day Seminar on 'Computer Appreciation for Top Management' was conducted in collaboration with the Industrial Consultancy Centre on March 21, 22, 1974.

Ten Executives from German Consulate, Standard Motors, Best & Co., T.V.S., Madras Refineries Ltd., Carborundum Universal Ltd., Tamil Nadu Police, T.I. Cycles Ltd., College of Engineering, Guindy, and Electronics

Commission, Govt. of India, attended the Seminar. Computer Applications to Management Problems were also discussed at the Seminar.

2) QIP Summer School :

A Summer School on 'Computer Engineering and Applications' was conducted from May 20th — June 15th, 1974, under the Quality Improvement Programme. Thirty-one candidates from various Institutions and two candidates from Industries participated in the Programme. The course comprised Computer System Fundamentals; Programming Languages with special reference to FORTRAN IV, WATFIV and PL/I; Elements of Operating System and Time Sharing; and three typical application areas viz., (1) Operations Research; (2) Numerical Methods; and (3) Graph Theoretic Applications.

ANNEXURE 'B'

ADMISSION TO THE COURSES OF STUDY

(for the 1973-74 session)

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

Courses	*No. admitted*
B. Tech.	258
M. Tech.	217
D.I.I.T.	4
M.Sc.	54
M.S.	29*
Ph. D.	78*

* includes Q.I.P. and Part time registration.

STUDENT POPULATION AT THE INSTITUTE (1973-74 SESSION)

For the academic session 1973-74 the strength of students in the different courses was as follows :

Course/Programme	*Full-time*	*Part-time*
B. Tech.	1248	—
M. Tech.	388	2
D.I.I.T.	35	—
M.Sc.	93	2
M.S.	65	18
Ph. D.	242	122
Post-Doctoral fellows	4	—

ANNEXURE 'C'

TENTH CONVOCATION OF THE INSTITUTE

11th August, 1973

The Tenth Convocation of the Institute was held at 5-30 P.M. on Saturday, the 11th August, 1973 in the Open Air Theatre of the Institute. Shri K.T. Chandy, Chairman of the Board of Governors of the Institute presided over the Convocation. Shri M. S. Pathak, Member, Planning Commission, Government of India, was the Chief Speaker.

The Director conferred the Degrees and Diplomas on 219 candidates who attended the Convocation and in-absentia on 272 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	3	3	6
Mathematics	6	2	8
Physics	4	3	7
Aeronautical Engineering	3	—	3
Chemical Engg.	2	—	2
Civil Engg.	3	—	3
Electrical Engg.	4	—	4
Industrial Engineering	1	1	2
Mechanical Engg.	4	—	4
Metallurgy	2	1	3
	32	10	42
M.S. Degree			
Aeronautical Engg.	—	1	1
Chemical Engg.	—	3	3
Civil Engg.	1	—	1
Engineering Mechanics	1	—	1
Mechanical Engg.	—	2	2
Metallurgy	1	—	1
	3	6	9
M.Sc. Degree			
Chemistry	12	7	19
Mathematics	7	5	12
Physics	3	13	16
	22	25	47

	In Person	In Absentia	Total
M.Tech. Degree			
Aeronautical Engg.	3	5	8
Chemical Engg.	13	14	27
Civil Engg.	9	3	12
Electrical Engg.	13	20	33
Engineering Mechanics	—	6	6
Industrial Engg.	3	10	13
Industrial Management	3	9	12
Mechanical Engg.	15	38	53
Metallurgy	7	11	18
	66	116	182
B.Tech. Degree			
Aeronautical Engg.	10	4	14
Chemical Engg.	16	28	44
Civil Engg.	6	7	13
Electrical Engg.	28	30	58
Mechanical Engg.	22	36	58
Metallurgy	14	8	22
	96	113	209
D.I.I.T.			
Building Technology	—	2	2
Grand Total	219	272	491

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 Kumar Balasubramanian, winner of the President of India Prize.

After Shri K. T. Chandy's introductory speech, Shri M. S. Pathak delivered the Convocation Address.

List of Prize Winners

Prizes awarded at the Tenth Convocation of the Institute held on 11th August, 1973.

President of India Prize

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

Shri Kumar Balasubramanian (Electrical Engineering—B.Tech.)

Governor's Prize

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

Shri Narendra Kumar (Mechanical Engineering—B.Tech.)

Merit Prizes

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

M.Sc. Degree Course

Shri M. Nagarajan (Chemistry)

Shri Srinivasan Kesavan (Mathematics)

Shri L. Lakshmanan (Physics)

M.Tech. Degree Course

Shri K. Sudhakar (Aeronautical Engineering)

Shri M. Saminathan (Chemical Engineering)

Shri G. Swaminathan (Civil Engineering)

Shri Avinash Manohar Kulkarni (Engineering Mechanics)

Shri G.S. Natarajan (Industrial Engineering)

Shri Chandrakant H. Shah (Industrial Management)

Shri K. Korula Cherian (Metallurgy)

B.Tech. Degree Course

Shri N. Lakshmi Sankar (Aeronautical Engineering)

Shri M.A. Sreekumar (Chemical Engineering)

Shri K.M. Chandrasekaran (Civil Engineering)

Shri B. Venkateswaran (Metallurgy)

Siemens Prizes

(Presented by M/s. Siemens Engineering & Manufacturing Company 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

Shri S. Ramakrishnan

B.Tech. Degree Course

Shri Puvvada Gandhi

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).

Shri Kumar Balasubramanian

Banco Foundation Prize

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

Shri K.V. Dandekar

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 in M.Tech. Degree Course in Mechanical Engineering).

M.Tech Degree Course

Shri Nand Lal Sachidev (Mechanical Engineering)

ANNEXURE 'D'

NUMBER QUALIFIED FOR THE DEGREES/DIPLOMAS AT THE END OF 1973-74

Degree	Number			
	I Class with distinction	I Class	II Class	Total
B.Tech.	16	174	46	236
M.Sc.	3	28	8	39
M.S.	—	—	—	26
M.Tech.	7	164	11	182
D.I.I.T.	2	19	2	23
Ph. D.				
Engineering Mechanics	4			
Chemical Engineering	3			
Chemistry	13			
Civil Engineering	6			
Electrical Engineering	3			
Mathematics	3			
Mechanical Engg.	2			
Metallurgy	2			
Physics	9			45
			Total	551

ANNEXURE 'E'

PATTERN OF GRADUATION

(1964-74)

The number of candidates who were awarded Degrees/Diplomas at the first ten Convocations and the number awarded at the Eleventh Convocation (held on 9th Sept. 1974) are as follows :

Degree	Awarded at the first Ten Convocations (1964-73)	Awarded at the Eleventh Convocation (1974)	Total
B.Tech.	2301	236	2537
M.Sc.	305	39	344
M.Tech.	813	182	995
D.I.I.T.	82	23	105
M.S.	36	26	62
Ph.D.	154	45	199
Total	3691	551	4242

ANNEXURE 'F'

PLACEMENT OFFICE

This Office has been successfully serving as a liaison between the graduating students and potential employers. The accompanying statement No. I shows the latest placement position of the graduates and post-graduates of the Institute.

During the year 1973–74, this Office made contacts with nearly four hundred companies, out of which 150 companies/establishments from both Public Sector and Private Sector responded. Representatives from 47 organisations visited the campus and interviewed students for selection. The details about the Placement of students who passed out in 1973 are shown in Statement No. II.

The Placement Office continues to keep in touch with as many industries and organisation as may require technically qualified personnel, and furnished them with information on the courses offered with specialisations in the various branches, to enable them to have a detailed information about 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 and M.Tech. degree courses for practical training during summer and winter vacations which, while enabling the students to acquire practical experience, also serve 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.

Statement I

PLACEMENT OFFICE

Consolidated statement showing the placement position of students belonging to 1964–1973 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	
1973	491	74	41	3	162	152	59	
	3691	333	413	190	1143	1267	341*	4**

* Continued efforts are made to collect full particulars and the statements updated. Though the full details in these cases are not available, it has however been the pattern that 60% of those who had passed out got fixed up either within the country or outside within 6 months of their getting their degree and 90% within one year.

** Deceased.

PLACEMENT POSITION – 1973 BATCH

Statement II

BRANCHES	No. Passed Out	Studying in India	Studying Abroad	Employed Abroad	Employed in Public Sector	Employed in Private Sector	Position Not known
B.Tech.							
Aeronautical Engineering	14	4	7		3		
Chemical Engineering	44	10	3		2	3	26
Civil Engineering	13	1				8	4
Electrical Engineering							
Electronics	32	15	5	1	5	3	3
Power	26	3	1		2	19	1
Mechanical Engineering	58	11	9	2	6	30	
Metallurgy	22	7	2		5	7	1
M.Tech.							
Aeronautical Engineering	8				8		
Chemical Engineering	27	2	2		10	13	
Civil Engineering	12				4	8	
Electrical Engineering	33	4	2		21	4	2
Engineering Mechanics	6				2		4
Industrial Engineering	13					13	
Industrial Management	12		1			11	
Mechanical Engineering	53		1		31	21	
Metallurgy	18		1		6	11	
M.Sc.							
Mathematics	12	6	1				5
Physics	16	5					11
Chemistry	19	6	5		4	2	2
M.S.	9				5	4	
Ph.D.	42		1		36	5	
D.I.I.T.	2				2		
	491	74	41	3	152	162	59

ANNEXURE 'G'

INSTITUTE GYMKHANA

The Academic year 1973-74 for the Institute Gymkhana started with the Gymkhana elections, which were keenly contested. Immediately after the elections, preparations commenced for building up various teams for the Inter IIT-Meet. It is to the credit of our teams that in spite of several adverse circumstances they were able to train themselves up and win the Inter-IIT-Meet at Bombay with comfort and thus achieve a hattrick. The feature of this year's Inter IIT Victory was the large number of trophies which were annexed by our Institute team.

The Gymkhana organized the Inter-University Cricket tournament (South Zone) for the Rohinton Baria Trophy during December 1973. A large number of teams participated and the conduct of this tournament helped in giving a face lift to a few of our sports facilities.

The Gymkhana also organized for the first time an Inter-Collegiate Basketball Tournament held in February 1974. It is proposed to continue this tournament in the years to come. The Institute Basketball team earned many laurels during the course of the year winning as many as 5 major tournaments. It is also a matter of great pride to the Gymkhana that Sri Chandran Paul, a student of the Institute, led the Tamil Nadu Basket Ball Team during the National Tournament held in Madras in December 1973.

In collaboration with the Madras Riding Club, the Gymkhana organized a Horse Show in February 1974, which was a great attraction for the students and residents of the campus.

The Cultural and Literary activities of the Gymkhana reached their high mark during January 1974 when a 4-Day Cultural Festival was organnized. A large number of out-station colleges from far-off places like Delhi, Bombay, Jamshedpur etc. participated. From the point of view of participation, this proved to be the biggest Cultural Festival held at I.I.T., Madras. At the same time, an exhibition of photographs and paintings was also organized in which award-winning photographs from international competitions were also displayed.

The Institute Gymkhana also made its mark in the field of Literary competitions in the city. For example, the Quiz trophy of St. Mary's College, the debate trophy of the Madras Christian College, the Hi-Club Inter-Collegiate Debating Trophy etc.

Another note-worthy contribution of the Gymkhana during the year under review was the establishment of the Academic Forum to discuss academic problems between students and staff. The Academic Forum has met a few times during this year and it is hoped that in the years to come, this will help in a better mutual understanding of the problems of the faculty and the students of the Institute.

The Annual Sports Day of the Gymkhana was held on 23rd March 1974, with Sri. K.R. Shenai, the Commissioner of Police, Madras as the Chief

Guest. The participation of students and campus residents in the various events during the Sports Day was quite unprecedented. This day marked the end of the Gymkhana activities for the year 1973-74.

ANNEXURE 'H'

NATIONAL CADET CORPS

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

During the last training year, 171 cadets were on the rolls of the unit.

Inspite of the initial set back on account of the class III and class IV employees strike, the cadets evinced keen interest in the training given to them. The cadets of the unit did remarkably well in the Earl Robert and Burdhwan trophy championship by standing third amongst the eight teams participated in the tournament.

One cadet from this unit was selected as reserve for paratroop training.

The training imparted during the year was according to the laid down syllabus, with bias to the practical handling and operation of various equipment used in the services.

The first year cadets were given basic Military training to develop their bearing and gait. Every cadet was given rifle shooting practices both at the short and long firing ranges which they carried out with remarkable success.

A visit was arranged for the cadets to witness the Air Rally show at Tambaram.

The Annual Training camp which was scheduled to be held at Vizag had to be called off at the last moment on account of the Railway strike. The camp will now be held during Nov/Dec 1974.

Certificate examinations were conducted in the unit separately for the first time. The results were 'B' certificate 24 passed and 'C' certificate 1 passed.

Special ceremonial parades were jointly held for NCC promise day on 21 Aug 73. The Dean of student Affairs of the Institute took the salute and administered the pledge. A guard of Honour was also presented to Shri M.S. Pathak, Member, Planning Commission, Government of India, Chief Guest of the Tenth Convocation held on 11 Aug. 73.

One cadet and one NCC Part time officer were sent for Army attachment and refresher courses which they carried out with credit.

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

In this ninth year this Unit has trained 192 cadets.

Having switched over to 3 year training syllabus from the usual 2 year syllabus, no cadets were eligible to appear for 'B' and 'C' Certificate examinations this year.

Pilot Officer K.V. Chalapathi Rao joined the Unit on 1-9-74 after attending Pre-commission training. The other Officer, Flying Officer V. Subrahmanyam was promoted to the rank of Flight Lieutenant with effect from 1-4-72.

Long Range Practice was given to all the cadets. 30 cadets were given Gliding experience and 40 cadets were taken to Air Force Station, Tambaram for witnessing the Static and Dynamic display on 17-3-74.

14 cadets took part in Aero-modelling display during the General Meeting of the Aeronautical Society of India held at I.I.T. Madras in March 1974.

Annual Training Camp planned and arranged for May 74 at Vishakapatnam was cancelled owing to railway strike.

As usual, Promise Day Parade was held combined with the Army Wing and Prof. **R. K. Gupta**, Dean of Student Affairs, I.I.T., Madras took the salute and administered the oath.

25 cadets jointly with 25 cadets of Army Wing presented Guard of Honour to Shri **M. S. Pathak**, Member, Planning Commission, Government of India on 11-8-73 on the occassion of the I.I.T.'s tenth convocation.

INSTITUTE HOSPITAL

ANNEXURE 'I'

The Institute hospital has shown progressive growth in many spheres during the year 1973-1974 under review.

Staff : In place of Dr. Padma Srinivasan, Part-time Anaesthetist Dr. V. Ramamurthi, M.D., D.A., assumed charge as Anaesthetist and full time Medical Officer during the month of May '74. Sri S.P. Kasthurirangan, joined as Pharmacist in July '73.

Statistics

The hospital has attended to 59,995 patients during the year 1972-1973. There is considerable amount of increase in out-patients. The break up is as follows :

Men	...	24,936
Female & Children	...	25,248
Students	...	9,811
Medical Cases	...	54,297
Surgical Cases	...	5,035

Gynaec. & Obstetrics	...	663
Total Number of In-patients	...	246
Jaundice	...	46
Chicken Pox	...	66
Mumps	...	7
Measles	...	19
Miscellaneous	...	184
Enteric	...	5

Most of the In-patients were cases of infective diseases like chicken pox.

Total Number of Operations	...	347
Hernia	...	3
Hydrocele	...	10
D & C	...	10
Minor Surgery	...	324

The decline in the total number of Surgical Operations is due to lack of an Anaesthetist; inspite of it 20 major and 324 minor operations have been done.

Rest of them were minor cases like abcesses and removal of cysts etc., obstetric and Gynaecological regular check-up of pregnant women were done. Blood grouping was also done and routine Gynaecological examination was carried out.

The total number of Ante-natal cases attended				104
Gynaec.	...	...	...	663
Deliveries	...	...	...	19
Family Planning		...	...	256 (Male & Female)

In collaboration with I.C.M.R. Project from Cancer Institute, Madras screening of most of the ladies are being done to rule out any early "Cancer of the Cervixuterus" till April 1974.

Family Planning advice is given to almost all the eligible mothers and fathers. Child welfare clinic was conducted, a health record is maintained for the children. Each one is given a Health Card, wherein the rate of growth weight and all the immunisation are entered.

Immunisation :

Routine immunisation programme was undertaken. It was very encouraging to note that not even a single case of Whooping cough, Cholera, Small pox, or Tetanus in children or in adults was noticed in the Campus. There was no case of "Whooping Cough" in the Campus for the 4th year in succession.

Immunisation work	...	6252
Small Pox	...	999
Triple Antigen	...	1080
Polio-Oral	...	1080
T.A.B.	...	1236
Cholera	...	1857

There are about 26 cases of Primary Complex in Children who were investigated and treated.

Building and equipment : Operation theatre was provided with a SLPA, Mobile Operation lamp, which is modern and convenient.

In addition to the staff and their families and Students of the Institute, the hospital also attended to the participants of Summer Schools of various Departments, H.A.L. Trainees, Q.I.P. Students, the Staff of Vanavani High School, Central School Staff, Mess Staff of Hostels, State Bank Staff, and Post Office Staff etc. We have undertaken the Medical Check-up of Central School Students, nearly 850.

The following are the statistics of laboratory investigations.

Total Investigation	...	5,173
Urine	...	1,835
Motion	...	450
Blood	...	2,815
Blood group	...	47
Miscellaneous	...	26

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Administration

Director	Prof. S. Sampath (till 30-9-73.) Dr. K.A.V. Pandalai (from 1-10-73).
Deputy Director	Prof. S. Sampath
Dean, Industrial Liaison	Prof. R.G. Narayanamurthi
Dean, Administration	Dr. P. Venkata Rao
Dean, Students	Prof. R.K. Gupta
Registrar	Sri. C.V. Sethunathan
Dy. Registrar	Sri. T.S. Rajagopalan
Asst. Registrar-I	Sri. W. Hanumesi Rao
Asst. Registrar-II	Sri. V. Shanmugam
Asst. Registrar-III	Sri. M. Gopalan
Asst. Registrar-IV	Sri. D Thiagarajan
Audit Officer	Sri. R. Venkataraman
Stores and Purchase Officer	Sri. S. Pattabiraman
Finance & Accounts Officer	Sri. A.V. Karunakaran Nambiar
Executive Engineer	Sri. Y.S. Nagaraja Rao
Hony. Consulting Physician	Dr. P.M. Palani
Medical Officers	Dr. D. Harirajan Dr. (Smt.) Shanta Krishnamurthi Dr. P.C. Soundara Rajan
Anaesthetist cum General Duty Medical Officer	Dr. V. Ramamurthi
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 (till 19-10-73) Dr. R. Vasudevan (Dept. in Charge from 20-10-73)
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