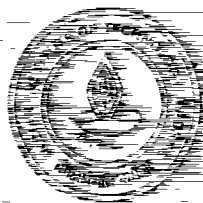


**TWENTY NINTH  
ANNUAL REPORT**

**1957-58**



**INDIAN INSTITUTE OF TECHNOLOGY  
MADRAS**

**TWENTY NINTH**  
**ANNUAL REPORT**

# TWENTY NINTH ANNUAL REPORT

1987 - 88



**INDIAN INSTITUTE OF TECHNOLOGY**

**MADRAS**



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## THE VISITOR

Shri R. VENKATARAMAN  
*The President of India*

### The Board of Governors

#### *Chairman*

Sri A. Sivasailam (upto 20—12—87)  
Sri A. L. Mudaliar (from 21—12—87)

#### *Ex-Officio*

Prof. L. S. Srinath  
Director  
Indian Institute of Technology, Madras

#### *Nominees of State Governments*

Sri Dr. B. N. Krishnamurthi  
Director of Technical Education  
Government of Karnataka, Bangalore

Dr. T. R. Natesan  
Director of Technical Education  
Government of Tamilnadu, Madras

Dr. R. Jayaraman  
Director of Technical Education  
Government of Kerala, Trivandrum

Smt. M. Chaya Ratan, I.A.S.  
Government of Andhra Pradesh  
Hyderabad

#### *Nominees of the Council*

Dr. V. C. Kulandaiswamy  
Vice-Chancellor  
Anna University of Technology  
Madras

Sri Suresh Krishna  
President, Confederation of Engg. Industry  
23, 26, Institutional Area  
Lody Road, New Delhi

Dr. M. Santappa  
INSA Senior Scientist  
Anna University, Madras

Dr. (Mrs) Lila Gulati  
Centre for Development Studies  
Trivandrum

#### *Nominees of the Senate*

Dr. M. K. Achuthan  
Department of Electrical Engg.  
I.I.T., Madras

Dr. G. V. N. Rayudu  
Department of Mechanical Engg.  
I.I.T., Madras

#### *Secretary*

Dr. N. V. C. Swamy (upto 20—1—88)  
Dean of Administration and Registrar  
Sri V. Shanmugam (from 21—1—88)  
Registrar

## **The Finance Committee**

### *Chairman*

Sri A. Sivasailam (upto 20—12—87)

Sri A. L. Mudaliar (from 21—12—87)

### *Members*

Sri I. B. Sangal  
Dy. Educational Adviser (Tech)  
Ministry of Human Resources Development  
Govt. of India, New Delhi

Dr. M. Santappa  
INSA Senior Scientist  
Anna University  
Madras

Sri L. S. Narayanan  
Financial Adviser  
Internal Finance Division  
Government of India, New Delhi

Dr. T. S. Ramanatha Iyer  
Director of Technical Education  
Government of Kerala  
Trivandrum

Prof. L. S. Srinath  
Director  
Indian Institute of Technology  
Madras

### *Secretary*

Dr. N. V. C. Swamy (upto 20—1—88)  
Dean of Administration and Registrar

Sri V. Shanmugam (from 21—1—88)  
Registrar



## The Buildings and Works Committee

### *Chairman*

Sri A. Sivasailam (upto 20-12-87)

Sri A. L. Mudaliar (from 21-12-87)

### *Members*

Prof. L. S. Srinath  
Director  
I.I.T., Madras

Superintending Engineer  
C.P.W.D. Madras (Ex-Officio)

Prof. T. P. Ganesan  
Chairman  
Estate and Works Committee  
I.I.T., Madras

Chief Engineer  
P.W.D. Madras (Ex-Officio)

Sri N. Malayalam  
Executive Engineer  
I.I.T., Madras

Sri V. N. Murthy  
Estate Officer  
I.I.T., Madras

### *Secretary*

Dr. N. V. C. Swamy (Upto 20-1-88)  
Dean of Administration and Registrar

Sri V. Shanmugam (from 21-1-88)  
Registrar

## SENATE

Srinath L S (Chairman)

M. K. Achuthan  
P. Achuthan  
R. S. Alwar  
S. Ambirajan  
K. Anantha Padmanabhan  
M. S. Ananth  
G. Aravamudan  
P. K. Aravindan  
B. V. Aswathanaryana Rao  
V. Balakrishnan  
K. Balaraman  
D. K. Banerjee  
K. A. Bhaskaran  
T. K. Bose  
N. V. Chandrasekhara Swamy  
K. A. Damodaran  
Dipak Choudhuri  
Ch. Durga Prasada Rao  
K. Elango  
C. Ganapathy  
N. Ganesan  
T. P. Ganesan  
V. Ganesan  
K. V. Gopalakrishnan  
T. Gopichand  
M. S. Gopinathan  
S. Jambunathan  
D. Johnson Victor  
V. B. Johri  
C. Kalidas  
R. Kalyanakrishnan  
V. Kalyanaraman  
P. Kalyanasundaram  
C. S. Krishnamoorthy  
S. Krishnan  
A. V. Krishna Rao  
V. M. Krishna Sastri  
A. Kuppurajulu  
J. C. Kuriacose  
K. Lakshminarayana  
H. N. Mahabala  
V. Mahadeva Iyer

P. T. Manoharan  
Megha Singh  
H. Md. Roshan  
M. Mukunda Rao  
V. G. K. Murti  
Y. V. G. S. Murti  
C. R. Muthukrishnan  
R. Nagarajan  
Nainan. P. Kurian  
M. S. Narasimhan  
S. Narasimha Rao  
K. Narayana Bhat  
Y. Narayana Rao  
R. Narayan  
R. Natarajan  
V. S. Nazir Ahmed  
V. Paramasivam  
M. A. Parameswaran  
K. R. Parthasarathy  
K. M. Patil  
H. S. Paul  
P. K. Philip  
C. N. Pillai  
O. Prabhakar  
B. S. Prabhu  
D. Prithvi Raj  
H. C. Radhakrishna  
S. Radhakrishna  
R. Radhakrishnan  
V. Radhakrishnan  
V. M. Radhakrishnan  
K. Radhakrishna Rao  
J. P. Raina  
N. Rajagopalan  
R. Rajagopalan  
J. Rajaram  
V. S. Raju  
V. Ramjee  
R. Ramji Rao  
S. R. Ramadas  
T. V. Ramakrishna  
V. Ramakrishnan

**SENATE— (contd)**

M. Ramakrishna Udupa  
A. Rama Mohana Rao  
L. N. Ramamurthy  
V. Ramamurti  
H. Raman  
R. Raman  
M. Ramanujam  
K. V. S. Ramarao  
B. Ramaswami  
G. Rangarajan  
M. Ravindran  
G. V. N. Rayudu  
P. Sankaran  
L. V. K. V. Sarma  
L. V. L. N. Sarma  
C. A. Sastry  
S. B. S. Sastry  
V. V. Sastry  
M. Sathyanarayana  
K. N. Seetharamu  
V. Seshadri  
B. M. Sivaram  
R. S. Sirohi  
V. Sivaramakrishnan  
J. Sobhanadri  
A. K. Sreekanth  
G. Sridhara Rao  
S. Srinivasa Murthy

P. S. Srinivasan  
R. Srinivasan  
R. S. Srinivasan  
S. K. Srinivasan  
T. M. Srinivasan  
V. Srinivasan  
K. Srinivasaraghavan  
P. Srinivasa Rao  
V. Sriramulu  
U. N. Srivastava  
G. V. Subba Rao  
P. Subbarami Reddy  
G. Subramanian  
N. Subramanian  
R. Subramanian  
S. Subramanian  
H. Suresh Rao  
Surjit Singh  
C. S. Swamy  
T. K. Varadan  
Y. B. G. Varma  
R. Vasudevan  
Vedam Subrahmanyam  
M. A. Veluswami  
V. Venkat Rao  
N. Venkatrayulu  
M. Venugopal  
B. Yegnanarayana  
S. S. Yegnanarayanan

**Three educationists from outside the Institute nominated  
by the Chairman, Board of Governors**

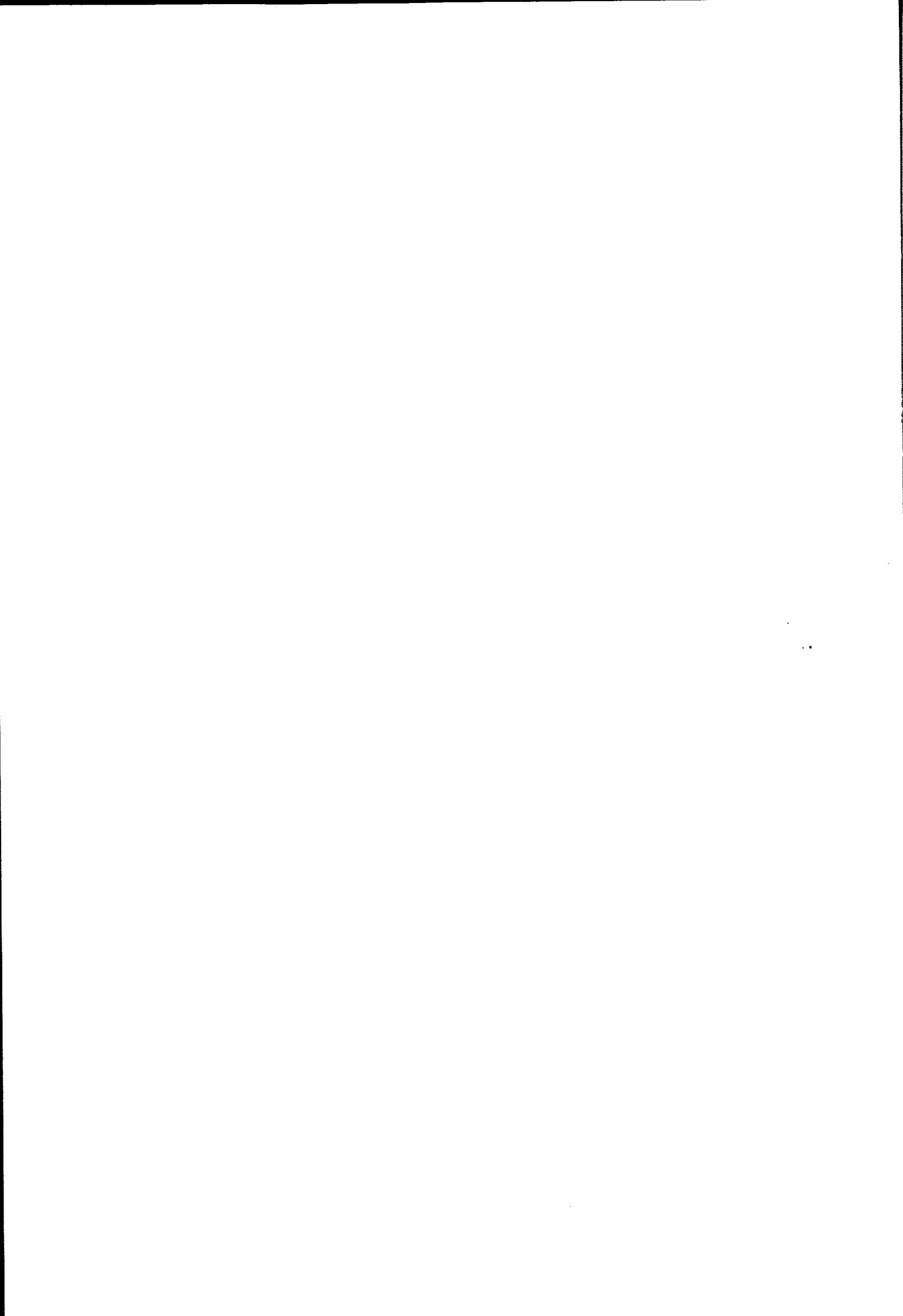
R. M. Honavar  
S. Krishnaswamy  
C. V. Sundaram

**Members of the Faculty (Nominees)**

G. S. Davies  
K. J. L. Iyer  
V. S. Kumar

N. Parameswaran  
E. G. Tulapurkara

Secretary  
V. Shanmugam



# REPORT BY THE DIRECTOR

for the period

APRIL 1987 to MARCH 1988

As in the previous years, the Institute continued its progress in various academic spheres during the year under report.

## 1. Student Strength

There were 1062 undergraduate students and 1209 postgraduate and Research Scholars at the Institute.

## 2. Awards/Distinctions to faculty

Dr. D. R. G. Achar, Associate Professor, Department of Metallurgical Engineering has been elected as the Chairman of the Indian Institute of Welding, Madras Branch for the year 1987-88.

The Nominating Committee of the National Society of Fluid Mechanics and Fluid power has nominated Prof. H. C. Radhakrishna, Hydroturbomachines Laboratory, Mechanical Engineering Department, as Vice President of its Governing Council for the years 1987 and 1988. Subsequently, he was elected for the said post.

National Research Development Corporation awarded Rs. 25,000/. to Dr. V. Radhakrishnan, Professor, Mechanical Engineering Department, IIT Madras and Dr. B. T. Achutha, Assistant Professor, Government B. D. T. Engineering College, Davanagere, (former QIP Research Scholar, Mechanical Engineering Department) for the development of "Spiral Grooving of the Sides of the Grinding Wheels for reduction of Corner Wear in Cylindrical Plunge Grinding".

Prof. Surjit Singh, Dean, Academic Courses was elected 'Fellow of the Indian National Science Academy'.

Dr. Harihar Raman, Professor and Head of the Civil Engineering Department, was nominated as a Member of the National Advisory Committee for research and Development in the following two areas :

- 1) River and Estuarine Hydraulics
- 2) Construction Methods, Planning and Management of WR Projects.

The National Advisory Committee has been formed by the Central Board of Irrigation and Power in the Ministry of Water Resources.

Dr. T. Nagarajan, Assistant Professor, Mechanical Engineering Department, was awarded the second Prize for his paper entitled "Design and Performance of a Fast Acting Extremely Leak Tight on/off Valve" at the Fifth All India Fluid Power Conference held at Bangalore during September 1987.

Dr. K. Prasada Rao, Lecturer, Metallurgical Engineering Department, received an Award for the best presentation of the paper entitled the "Scc of Austenitic wrought and weld Metals Containing Ferrite" at the 41st Annual Technical Meeting of the Indian Institute of Metals held at Trivandrum during 12-14 November 1987. The paper was co-authored by Dr. S. Pathak and R. Ramesh.

The paper entitled "A New Lumped Parameter Model for the Coupled Rocking and Sliding Vibrations of Embedded Footings" by Dr. N. R. Krishnaswamy, Asst. Professor and Dr. N. Ravi, former Research Scholar, Civil Engineering Department, published in the Indian Geotechnical Journal Volume 16, No. 3, July 1986, pp. 259-275, was adjudged as the Best Paper on "Soil Dynamics and Vibration Problems in Foundation Engineering" and were awarded the Indian Geotechnical Society - Prof. Shamsheer Prakash Biennial Prize for the years 1985-86.

Dr. B. V. A. Rao, Professor, Applied Mechanics Department, received a Cultural Doctorate in Philosophy of Engineering of the World University, Arizona, U.S.A. at the 40th International Conference of the World University held in Madras from 25th to 29th November 1987.

Dr. V. Ganesan, Professor, Mechanical Engineering Department, was the recipient of the "Best Presentation Award" for his paper entitled "Fuel Saving in Two-Stroke Spark Ignition Engines - A New Approach in the Scavenging Process" in the Tenth National Conference on I. C. Engines & Combustion, held at Rajkot between 17th and 19th December 1987.

The paper Entitled "Oxygen Transfers from the Nitro Groups to Sulphur in Allyl o-Nitrophenyl Sulphide and Sulphoxide on electron impact" by Dr. D. V. Ramana, Dr. N. Sundaram and M. George, presented at the Fourth National Symposium on Mass Spectrometry held at Indian Institute of Science, Bangalore was adjudged the First Place in the Organic and Biochemistry Session with a certificate and a cash award.

The Institution Prize for 1986-87 was awarded by the Institution of Engineers (India) for the paper entitled "Reflection Characteristics of Wave Absorber - A Case Study" by J. S. Mani, Senior Scientific Officer, Ocean Engineering Centre.

Prof. M. S. Gopinathan, Chemistry Department, was elected as Fellow of the Indian Academy of Sciences, Bangalore, for his work in Quantum Chemistry.

Prof. G. V. Subba Rao, Material Sciences Research Centre, was elected as Fellow of the Indian Academy of Sciences, Bangalore.

Prof. Megha Singh, Biomedical Engineering Division Applied Mechanics Department, was elected as a Fellow of the Royal Society of Medicine, London, England.

### 3. Awards/distinctions to students:-

Mrs. K. Srigouri, Research Scholar, Physics Department, was awarded DAAD Fellowship by the German Academic Exchange Service of the Federal Republic of Germany, for advanced studies in the field of Laser Technology for the year 1987-88.

The prestigious Charles Le-Geyt Fortescue Fellowship has been awarded to Mr. N. S. Kumar, Final year B.Tech. student, Electrical Engineering (Electronics) IIT Madras for the year 1987-1988. The fellowship which is awarded by the Institute of Electrical and Electronics Engineers (IEEE), USA, on the basis of an international competition, carries a stipend of \$ 100,00/- and is for one year of full time graduate work in Electrical Engineering in the United States or Canada. This is the second time that this award is made to a student of IIT Madras. Mr. Joy Thomas was the recipient of this award for the year 1984-85.

The young Scientist INSA Award of Rs. 5,000/- and Medal for the year 1987 was awarded to Dr. C. Jonathan (former Research Scholar, Physics Department), Project officer, Engineering Design Centre. The Award has been given to him in recognition of his contributions to Speckle Metrology.

Dr. Mahadevan Satyanarayanan, graduate of M.Tech. (1977) in Computer Science of this institute, has been awarded the US Presidential Young Investigators Award for 1987. He is currently on the faculty in the Department of Computer Science at the Carnegie Mellon University, Pittsburg, U.S.A., and is one of the developers of the distributed operating system ANDREW for a campus network which connects upto a thousands PCs and work stations. The award can bring upto \$ 500,000 in research funds over the next five years.

A paper entitled "Reaction of Tetrasulphur Tetranitride with (Morpholino) diphenylphosphine" (C. J. Thomas and M. N. Sudheendra Rao) was presented by Shri C. J. Thomas in the Inorganic Chemistry Section at the 23rd Annual Convention of Chemists (Indian Chemical Society) 1986. This was selected as one of the two best papers and were awarded a Cash Prize and a Certificate.

A paper entitled "Prediction of Longitudinal Distortion in Welded Structures using FEM" authored by Shri G. Ravichandran, Shri S. Suresh, research scholars, and Dr. K. Prasada Rao, Lecturer, Metallurgical Engineering Department, was adjudged Winner of H. D. Govindaraj Memorial Award 1986 in 1987. This award carries a cash presentation of Rs. 2,000/- to the winners,

Dr. B. Jayaram, who had obtained his Ph.D. degree in Physics from this Institute, and who is currently working at National Physical Laboratory, New Delhi, was selected as the "CSIR Young Scientist" for the year 1986 for his work on Super Conductivity. The Award was presented to him by the Prime Minister on 26th September 1987.

In the ROTARY COMEX 87 Exhibition organized by the Rotary Club of Meenambakkam from 20th to 22nd September 1987 with "Computers for Children" as the theme, IIT Madras stall was given the 'Best Exhibitor Award'. The Computer Science & Engineering Department exhibited the projects developed under CLASS Project and the Computer I/O Peripherals for Indian Languages developed under a DOE sponsored project.

Shri S. Sampath and Kum. R. Saraswathi, Research Scholars of the Chemistry Department were awarded the second and third prizes respectively for presentation of research papers at the Electrochemistry students meet organised by SAEST (Madras Chapter) on the 31st October 1987.

Dr. N. Vasanthy, University of Texas, Austin (USA) ex-Research Scholar from the Dept. of Chemistry who obtained the Ph.D. degree of IIT Madras in 1986, for her studies in the area of Biochemistry was awarded the Alexander Von Humbolt Fellowship (1988) for advanced training in FRG.

Shri A. Muralidharan, a candidate of M. S. Entrepreneurship Programme, participated in the National Contest on 'Indian Language Processing Software Package', sponsored by the Department of Electronics in connection with the Computer Society of India Convention 1988, and received the First Prize for his exhibit. This is a multilingual word processor developed by him as part of his work at this Institute, which supports Hindi, Tamil, Telugu and Malayalam along with English. This meets the standards prescribed by the Department of Electronics for Indian language processing and also letter quality printing for Hindi.

Dr. Raghavachari Srivatsan, an alumnus of the Institute, who passed out with B.Tech. Aero. in 1977, was a Recipient of IR-100 Award for 1987. These awards are presented by Industrial Research and Development Magazine, annually, to scientists and engineers who have developed the 100 most significant products for technology for that year. Dr. Srivatsan gets the award for the invention of a "Take Off Performance Monitoring System" TOPMS, along with two other associates from National Aeronautics and Space Administration (NASA, Longley).

Shri N. Kumarasubramaniam and Shri M. Nagarajan, M.Tech. Production Engineering Students, have won the I Prize in the Technical Quiz Competition conducted during the "Production Engineers Meet 88" at the Madras Institute of Technology, Madras.

### **Computing facilities**

The computing facilities at the Institute have been given a fillip with the installation in the Computer Centre of a Siemens 7580-E time sharing system with 80 Siemens terminals and 70 PC's connected to it. The system works with BS 2000 operating system. It has a very good system dialog facility and a screen editor. Usual language processors and many application packages are available with the system.

A CAD work station with a high resolution graphic terminal (1024 × 1280 pixels per sq. in.) and an 8 colour HP plotter, provide the necessary Engineering design facility. SICAD and CADIS-2D graphics software are useful for Computer aided design in interactive mode.

In the database area, packages are available for network database and relational database with the required query system. The universal transactions monitor facilitates the implementation of transactions applications.

By November 1988, the Centre will have a Unix based Siemens MX500-60 system with B terminals and an ethernet processor to connect to the department-wide ethernet network.

Networking the Siemens system with all the other computer systems of the Institute is proposed to be taken up shortly. Siemens system then becomes the gateway for the Institute to talk to a wide area network of all other IIT's through satellite in the near future.

### **5 Convocation**

The 24th Convocation was held on 31st July 1987 in the Student Activities Centre. His Excellency Mr. Guenther Schoedel, Ambassador of the Federal Republic of the Germany, delivered the Convocation address. At this Convocation 297 B.Tech, 296 M.Tech, 39 M.Sc. and 32 M.S. degrees, and 61 Ph.D. degrees were awarded.

### **6. Industrial Consultancy and Sponsored Research**

The consultancy and sponsored research programmes of the Institute continued at the same level as in the earlier years. Total sanctioned value of consultancy during the year was Rs. 83 lakhs and that of sponsored research Rs. 278 lakhs.

National Science Foundation, Washington D.C., U.S.A. has awarded a grant of approximately Rs. 38.00 lakhs for the Joint IIT-MADRAS-NEW YORK UNIVERSITY project entitled "Pressurized Fluidized Bed Combustion of Low-grade Coal - Award in Indian Currency". The Principal Investigator is Prof. V. M. Krishna Sastry and Co-Investigator is Dr. Ajit Kumar Kolar, Mechanical Engineering Department. The duration is three years.

### **7. Chairman, Board of Governors**

The term of the Chairman, Shri A. Sivasailam, expired on December 20, 1987 and Shri A. L. Mudaliar has been appointed as the new Chairman of the Board of Governors for a term of three years beginning from December 21, 1987. The Institute is privileged to have Shri A. L. Mudaliar, who is a distinguished management consultant and a top-notch business executive in the country at the helm of its affairs.



## 8. Staff matters

Prof. N. V. C. Swamy was appointed as Deputy Director of the Institute with effect from 14th March, 1988.

Shri V Shanmugam took over charge as Registrar of the Institute with effect from 21st January, 1988.

Detailed reports of Research Centres, Departments and other Sections are given in the accompanying pages.

## DETAILS OF THE REPORT

Admission, Award of Degree and Prizes

### Student Admission 1987-88

The number of students and scholars admitted to various courses (1987-88) is given in Table- 1

Table-1

#### ADMISSION 1987-88

Sl. No.	Department	B. Tech	M. Tech.	M.Sc.,	M.S.	Ph.D.	Total
1.	Aerospace Engineering	19	10	...	...	1	30
2.	Applied Mechanics	...	12	...	4	9	25
3.	Chemical Engineering	32	19	...	3	12	66
4.	Chemistry	...	...	22	...	11	33
5.	Civil Engineering	29	42	..	8	5	84
6.	Computer Science & Engg.	26	28	...	12	4	70
7.	Electrical Engineering	67	48	...	8	5	128
8.	Humanities & Soc. Sciences	...	26	...	2	4	32
9.	Mathematics	...	...	21	...	4	25
10.	Mechanical Engineering	61	84	...	18	15	178
11.	Metallurgical Engineering	24	12	...	2	5	43
12.	Naval Architecture	16	...	...	...	...	16
13.	Ocean Engineering	...	5	...	6	7	18
14.	Physics (solid State Tech)	...	7	20	...	12	39
<b>Total</b>		274	293	63	63	94	787

The total 787 includes the following :

Foreign Nationals	8	Sponsored Candidates	33
Scheduled Castes	48	External Registration	6
Scheduled Tribes	7	Project Staff	17
Women	61		
QIP Scholars	34		

## Degrees Awarded

The number of degrees awarded at the Twenty-fourth Convocation of the Institute on 31st July 1987 is given below in Table-2. His Excellency Mr. GUENTHER SCHOEDEL, Ambassador of the Federal Republic of Germany delivered the convocation address.

**Table-2**  
**NUMBER OF DEGREES AWARDED**

Sl. No.	Discipline	B. Tech.	M. Tech.	M.Sc.	M.S.	Ph.D.	Total
1.	Aeronautical Engineering	14	45	...	1	1	61
2.	Applied Mechanics	...	14	...	1	3	18
3.	Chemical Engineering	35	16	...	4	5	60
4.	Chemistry	...	...	16	...	15	31
5.	Civil Engineering	39	31	...	2	3	75
6.	Computer Science	27	27	...	4	...	58
7.	Electrical Engineering	72	60	...	3	8	143
8.	Humanities & Soc. Sciences	...	13	...	3	2	18
9.	Mathematics	...	...	8	...	6	14
10.	Mechanical Engineering	76	62	...	4	9	151
11.	Metallurgical Engineering	22	15	...	6	4	47
12.	Naval Architecture	12	...	...	...	...	12
13.	Ocean Engineering	...	6	...	4	1	11
14.	Physics	...	7	15	...	4	26
<b>Total</b>		<b>297</b>	<b>296</b>	<b>39</b>	<b>32</b>	<b>61</b>	<b>725</b>

With this Convocation in July 1987 the number of degrees awarded so far by the Institute is:

B.Sc. (TA)	20	DIIT	245
B.Tech.	5942	M.S.	556
M.Tech.	3767	Ph.D.	1040
M.Sc.	851		

**Grand Total ; 12421**

## PRIZES

The names of academic Prize Winners of the year are given below :

### 1. PRESIDENT OF INDIA PRIZE :

(For the student of the B. Tech. Degree courses with the best Academic record)

Shri. Govindan Ramesh.  
B. Tech. (Computer Science and Engineering) and  
Shri. G. Ramalingam  
B. Tech. (Computer Science and Engineering) (Bracketed)

### 2. GOVERNOR'S PRIZE :

(For all round proficiency in B. Tech. degree course curricular and extra Curricular)

Shri. George George.  
B. Tech. Electrical Engineering  
(Electronics)

### 3. MERIT PRIZES (for the students with the best academic record in each discipline of each course)

#### B. TECH. COURSE :

Civil Engineering  
Metallurgical Engineering  
Naval Architecture  
Electrical Engineering (Electronics)  
(Philips India Prize)  
Electrical Engineering (Power)  
(Siemens Prize)  
Mechanical Engineering  
(Banco Foundation Prize)  
Chemical Engineering  
(Reliance Heat Transfer (P) Limited Prize)  
Aeronautical Engineering (HAL Prize)  
Computer Science and Engineering  
(Alumni Association Prize)

Shri. Venkateshwaralu B.  
Shri. Balakrishna J. V.  
Shri. Ramanarayanan Gopalakrishnan  
Shri. Ramesh R.

Shri. Nanjunda Kumar G.

Shri. Arumugam Sundaresan S.

Shri. Viswanathan Kumaran.

Shri. Suresh Kumar V. S.  
Shri. Govindan Ramesh.

#### M. TECH COURSE :

Civil Engineering  
Engineering Mechanics  
Ocean Engineering  
Solid State Engineering Technology  
Electrical Engineering  
(Siemens Prize)  
Mechanical Engineering  
(Prof. B. Sengupto Prize)  
Industrial Metallurgy  
(Sudharshan Bhat Memorial Prize)  
Mechanical Engineering  
(Production Engineering)  
(Dr. S. Vaidynathan Memorial Prize)  
Aeronautical Engineering  
(Air India Prize)  
Chemical Engineering  
(Dr. K. Subbaraju Memorial Prize)  
Industrial Management  
(K. V. Arunkumar Memorial Prize)  
Computer Science (CMC Prize)

Shri. Rajesh Kalra  
Shri. Gopalakrishnan S.  
Shri. Pathak Ardhendu Gajanan.  
Shri. Savargaonkar Arvind Pralhad Rao.  
Shri. Natarajan R.

Shri. Sridhar T.

Shri. Vaikuntham Lakshman Rao.

Shri. Suresh K. G.

Shri. Rajiv Seth.

Shri. Saravana Kumar K.

Shri. Harshwardhan Moharir.

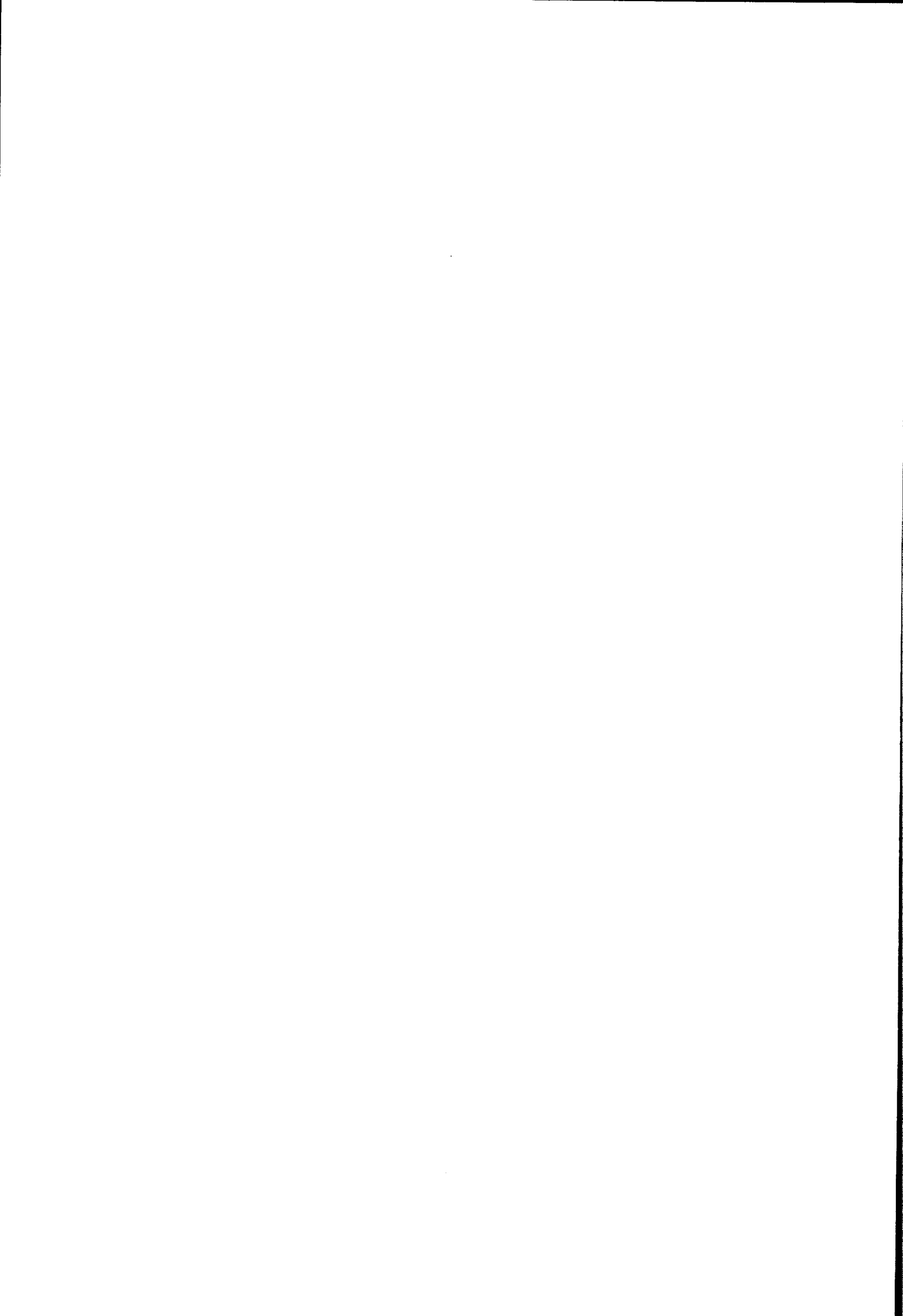
Shri. Ranbir Gupta.

**MSc. COURSES :**

Chemistry  
(V. Ratna Rao Memorial Prize)  
Mathematics  
Physics

Miss. Sridevi Narayan.

Shri. Ravichandran V.  
Miss. Hema Srinivasan.



## **RESEARCH CENTRES**

**Centre for Biosciences & Biotechnology**

**Centre for Continuing Education**

**Centre for Systems and Devices**

**Fibre Reinforced Plastics Research Centre**

**Materials Science Research Centre**

**Ocean Engineering Centre**





## CENTRE FOR BIOSCIENCES AND BIOTECHNOLOGY

### A. Courses Offered :

1. Biochemical Engineering	B.Tech. Chem. Engg.
2. Environmental Engineering	B.Tech. Chem. Engg.
3. Energy Technology	B.Tech. Chem. Engg.
4. Environmental Microbiology and biology	M.Tech. Chem. Engg.
5. Biochemistry	M.Sc.
6. Microbial Chemistry and Genetic Engineering	M.Sc. / Ph.D.
7. Medical Physics I and II	M.S. / Ph.D.
8. Biomechanics I and II	M.S. / Ph.D.
9. Medical Instrumentation I and II	M.S. / Ph.D.
10. Quantitative Physiology	B.Tech.

### B. Major areas of work :

Biochemistry, Bioenergy, Environmental, Biotechnology.

#### Work done :

Research studies continued on the following aspects.

#### Environmental Biotechnology :

With an accent on the environmental impact and ecological balance, studies are continued on the biotechnological aspects of utilization of natural resources for biomethanation.

1. The treatment of various wastes with simultaneous generation of biogas with mixed feed and culture populations has been initiated.
2. The biomethanation of *L. Leucocephala* was studied further in batch and semicontinuous reactors in order to understand the kinetics of methane generation in relation to cellulose hydrolysis.
3. Studies on the metabolic features related enzymology in a novel methanosolate are continued.

Recently environment impact study of Vijayawada Thermal Power Station was completed. Environmental impact study of a thermal power station at Kayamkulam, Kerala is under progress. A number of consultancy jobs were undertaken on treatment of waste water from different industries and reports were submitted to the industry. Based on these reports treatment plans were set up by the industries which are working very satisfactorily. For ISRO, Trivandrum and National Remote Sensing Agency, Hyderabad etc., studies were carried out on activated carbon evaluation and water treatment. Research work is going on a) Colour removal from pulp and paper mill wastes, dye house wastes etc. using low cost adsorbents and by coagulation b) Treatment of different industrial waste waters using specially designed anaerobic contact filter with biogas recovery c) Tapered flocculation for removal of turbidity, colour etc. from water and waste waters d) Effect of industrial effluents on Indian fish species e) Treatment of industrial waste waters by rotating biological discs, plate and tube settlers etc. f) Reclamation of water from different waste waters g) Effect of process modifications on pollution load from pulp and paper industry h) Urea hydrolysis using mixed culture bacteria and i) Studies on ion exchange for removal of perchlorate from waste water.

**Biochemistry of Selenium :**

1. Metabolic studies in Se deficiency.
2. Regulatory aspects.
3. Bioenergetic in Se deficiencies.
4. Role of Se in methanogenesis

**Others :**

One Ph.D. awarded in the Biochemistry area, one Ph.D. and M.S. in environmental biotechnology area.

Von Humbolt fellowship was awarded to Dr. N. Vasanthi.

**Bioconversion :**

Using E. Coli in free as well as in immobilized state, kinetics and formation of 6 APA, the intermediate in the preparation of Semi Synthetic Pencillins is studied. In this process, isolation of P. amidase is avoided. Other studies are going on in the development of tapered fermentor for SCP production. The use of coimmobilized systems for bio-conversion of starch to ethanol and model studies on kinetics of vitamin B<sub>12</sub>, is under study. Air-lift fermentor is being constructed to study the fermentation of Pencillin G. using immobilized P. *Chryosegenum*. Studies on enzymatic hydrolysis of vegetable oils using microbial enzymes are being carried out.

Nine xylose utilising anaerobic cultures were isolated and characterised, They were screened for utilization of various lignocellulose as raw materials and the nature of their end products of fermentation like VFA, acetone, butanol and ethanol were analysed. Cellulose utilizing fungi, bacteria, streptomycetes and anaerobic bacteria were also studied. New types of cellulolytic enzymes and novel mixed cultures are under study.

Research work has been carried out in the following areas (a) Biomedical Laser applications in Biology and medicine (b) Analysis of blood-flow.

### C. Consultancy Works

Title of the Project	Sponsoring Agency	Co-Investigator
<b>RETAINER CONSULTANCY :</b>		
1. Waste water treatment	M/s. Lakshmi Starch Limitd, Bangalore.	Dr. C. A. Sastry
2. Waste water treatment	M/s. Seshasayee Paper Boards, Erode.	Dr. C. A. Sastry
3. Waste water treatment	M/s. Harihar Polyfibres, Kumarapatnam,	Dr. C. A. Sastry
<b>REGULAR CONSULTANCY :</b>		
1. Water treatment	I. S. R. O. Bangalore.	Dr. C. A. Sastry Mr. K. Narayana Rao
2. Water treatment	I. S. R.O. Trivandrum.	Dr. C. A. Sastry Mr. K. Narayana Rao
3. Waste water treatment	M/s. Bush Boak Allen, Madras.	Dr. C. A. Sastry Mr. B. V. S. Gurunatha Rso
4. Waste water treatment	M/s. Hydraulics Limited, Madras.	Dr. C. A. Sastry Mr. B. V. S. Gurunatha Rao
5. Waste water treatment	M/s. Namasthe Leather Garments, Bangalore.	Dr. C. A. Sastry Mr. B. V. S. Gurunatha Rao
6. Environmental impact assessment study	Andhra Pradesh State Electricity Board.	Dr. C. A. Sastry Mr. B. V. S. Gurunatha Rao Mr. Naresh Kumar
7. Environmental impact assessment study	Kerala State Electricity Board, Kerala.	Dr. C. A. Sastry Mr. B. V. S. Gurunatha Rao
8. Water treatment	National Remote Sensing Agency, Hyderabad	Dr. C. A. Sastry Mr. K. Narayana Rao
9. Water treatment	Tata Oil Company Limited, Madras.	Dr. C. A. Sastry Mr. K. Narayana Rao

### D. Ongoing Sponsored Project :

1. Development of Electronic Speckle Pattern interferometry for cardiac funtional analysis in Health and Diseases. DST Project .....Dr. Megha Singh
2. Microbial technology studies on lignocellulose utilisation for chemical foodstocks productions. ....Dr. T. S. Chandra
3. Kinetics of degradation of *L. Leucocephala* and studies mixed Methanogenic cultures .....Dr. K. Lalitha
4. Studies on biochemical interactions of selenium .....Dr. K. Lalitha

- |  |                       |
|--|-----------------------|
| 5. Environmental Engineering,<br>Ministry of Human Resources and Development           | .....Dr. C. A. Sastry |
| 6. Biomethanation and energy farm of<br><i>L. Leucocephala</i> integrated applications | ..... Dr. K. Lalitha  |

**E. Major Equipment Purchased :**

1. pH/ion selective electrode meter.
2. Oxygraph.
3. Wipro PC XT.
4. Automatic water still.
5. Sartorius digital balance.
6. Test tube shaker.
7. Cryocans.
8. Magnetic stirrer.

A new 5 bay Laboratory of Biosciences and Biotechnology was set up in Humanities block.

**F. PAPERS PUBLISHED**

1. Sastry, C. A. "Colour removal from pulp and paper mill waste waters" *Indian J. Env. Protection* 6, 2, 105, 1986.
2. Sastry, C. A. "Characteristics and treatment of waste water from tanneries" *Indian. J. Env. Protection*, 6, 3, 159, 1986.
3. Gurunatha Rao, B. V. S. and Sastry, C. A. "Studies on characteristics and treatment of waste water from a perfumery industry. A case study. *Indian. J. Env. Protection* 7, 4, Oct. 1986.
4. Sastry, C. A. "Solid waste management in developing countries" *Industrial Safety Chronicle*, 120, Oct-Dec. 1986.
5. Sastry, C. A. "Industrial waste bio-degradation Part-I "Encology", 1, No. 6, Nov. 1986.
6. Sastry, C. A. "Industrial waste bio-degradation" *Encology*, 1, 7, Dec. 1987.
7. Kothandaraman, V. Aboo. K. M. and Sastry, C. A. "Treatment of waste water from a producer gas plant - A case study". *Indian. J. Env. Protection*, 7, No. 1, 11, Jan 1987.
8. Sastry, C. A. "Marine Pollution" *Indian J. Env. Protection*, 7, No. 2, 98, March 1987.
9. Sastry, C. A. "In plant control measures for reducing pollution load from a tannery" *Indian. J. Env. Protection*, 7, 3, 195, May, 1987.
10. Sastry, C. A. "Environmental pollution control in power plants" *Industrial Safety Chronicle*, 33, April-June, 1987.
11. Renukadevi, C, and Sastry, C. A. "Toxicity of phenol to fish" *Indian J. Env. Protection*, 7, 4, 27, July 1987.
12. Renukadevi, C. and Sastry, C. A. "Pathological changes due to O. Croisol, resorcinal and 2,5 xyleneol to the brain of a teleost saurotherodon Morsambicus" *J. Env. Biol.* 8(4) 306-314 (1987).

13. Sastry, C. A. "Air pollution problems from different industries" National safety chronicle, 25, July-Sept. 1987.
14. Venkata Rao, and Sastry, C. A. "Removal of dyes from water and waste water by coagulation and biological treatment *Indian. J. Env. Protection*, 7, 6, 441, Nov. 1987.
15. Shanthi, K. Vasanthi, N. and Lalitha, K. "Kinetic evaluation of batch fermentation of *L. Leucocephala*", 56th Ann. Meeting of the Soc. Biol. Chem. (Tirupathi Dec. 87).
16. Shanthi Krishnan, Vasanthi, N. and Lalitha, K. "Effect of selenium on the metabolism of a novel methanogen". Second congress on Trace elements in Medicine & Biology Grenoble, France, March 1988.
17. Vasanthi, N. and Lalitha, K. "Some new aspects of the physiological role of selenium regulation of glutathione and hydroperoxide metabolism. Second congress on Trace elements in Medicine and Biology, Grenoble France, March, 1988.
18. Vasanthi, N. and Lalitha, K. "Selenium mediated biochemical changes in Japanese quails. 111 Tissue uptake; distribution and sub-cellular location of injected 75 selenium labelled sodium and elements. *Biol. Trace. Elem. Res.* 14 87-100 1987.

## CENTRE FOR CONTINUING EDUCATION

The Centre for Continuing Education was established in June 1986, by merging together the different units concerned with Continuing Education activities, Quality Improvement Programmes and Curriculum Development work at the Institute, so that all these activities might be organised in an optimal manner under a single agency. As Continuing/Distance Education forms a major component in the New Education Policy, the Institute wishes to emphasise this aspect of education.

### A. Quality Improvement Programmes

This programme has been formulated and financed by the Union Ministry of Human Resources Development, Department of Education, to improve the standard and quality of technical education in India and to have a continuous upgrading of skills of teachers in engineering colleges. The schemes in operation at this Institute include :

1. Training of the faculty members of engineering colleges for higher degrees (M.Tech and Ph.D) and
2. Short term in service programmes for updating the knowledge of participants from engineering colleges in specific fields.

No. of teachers admitted to M.Tech. Programme 1987-88	22
No. of teachers admitted to Ph.D. Programme 1987-88	16
No. of teachers offered admission to M.Tech. Programme 1988-89	28
No. of teachers offered admission to Ph D. Programme 1988-89	16

### B. Advance admission to Ph.D. Programme under the QIP

From this year, it has been decided to finalise the admission to Ph D. programmes well in advance to enable the technical teachers to do the necessary spade work for about a year before actually undertaking their courses/research work. Based on this scheme the first batch of teachers to join Ph.D. Programme in 1988-89 have visited our Institute and have done some preliminary work for their Ph.D. Programmes.

### C. Reinvitation Programme

This programme was started as new activity of the Centre. This scheme provides facility for former QIP/FIP scholars of the Institute, who have already obtained their Ph.D. Degree to visit our Institute for a period of about three months for carrying out some short term experimental work or for publishing the research papers pending from their Ph.D. work. Under this scheme we have so far extended invitation to 20 former QIP/FIP scholars.

### D. Short Term Courses

The list of short term courses conducted during this year under the Quality Improvement Programme given at the end of this report gives details of the short term courses conducted with support from the Indian Society for Technical Education.

### E. Continuing Education Programmes

The details of Continuing Education Programmes held at the Institute are also given in the accompanying pages.

During this year the Ministry decided to start a continuing education project and has identified IIT Madras as one of the ten institutions at which this project will be implemented. Rs. 3.5 lakhs have been sanctioned for creating the necessary infrastructural facilities and Rs. 2.25 lakhs per annum are available as Recurring expenditure. The Centre has now acquired a Desk Top Publishing System out of this grant and is in the process of training the staff of this Institute on this system. A meeting was organised by the ISTE in March 88 for working out the modalities of the project. Under this programme it is proposed to prepare course material packages along with transparencies, slides, etc. for use in training the personnel from Indian industry.

During the year the Centre initiated action and helped to mitigate some of the problems faced by the course coordinators for e.g. with regard to accomodation, facilities for the participants, availability of lecture halls etc.

#### **F. Curriculum Development**

As part of the curriculum development activities of the centre, the following monograph/Bibliography were prepared and circulated to the various engineering colleges in the country.

1. Monograph on Principles of Metal Cutting
2. Bibliography on Mechanical Engineering Education

Under the book writing schem, we have provided financial support to the faculty of our Institute as per details given elsewhere in this report.

During this year the Ministry decided to strengthen the curriculum development activities, in line with the New Educational Policy of the Govt. of India. The Centre invited proposals from the academic departments and also held discussions with the Heads of Departments with regard to this activity. Proposals have been forwarded to the Ministry for the creation of Curriculum Development Cells in two established areas, one emerging area and a general cell. A resource development cell in the area of Mechanical Engineering has also been requested.

#### **G. IIT Madras Series in Science and Engineering**

The Institute has launched the IIT Madras Series in Science and Engineering, under which a number of eminent persons in the country have agreed to write books on important topics. These books will be roughly 64 - 100 printed pages in length. The books will be aimed at bright university students and also the scientifically minded general public. The aim of this effort is to whet the appetite of the readers to stimulate further reading and also popularise science and engineering among persons connected with various walks of life. The books will also serve in promoting continuing and distance education goals.

So far we have received the following two manuscripts for publication under the series.

1. Understanding Combustion by Prop. H. S. Mukunda of the Indian Institute of Science, Bangalore
2. The Frontier Between Physics and Astronomy by Prof. Jayant V. Narlikar of the Tata Institute of Fundamental Research, Bombay.

These manuscripts have been reviewed and recommended for publication under the series after scrutiny by Institute appointed reviewers.

M/s. Macmillan India Limited have been identified as the publisher for the series. The selling price of the books under this series will be pegged at Rs. 15/- per copy, so that the books are within the easy reach of the common man.

Department of Science and Technology, Govt. of India has responded favourably to our request for a subsidy for the publication of the books under the series and a final decision is expected shortly.

#### H. Education Technology Cell

This Cell under CCE is presently starting activities for the production of print and non-print forms of resource materials, to be used for improving the standard of engineering education throughout the country. A studio is being established so that video films on technical topics can be produced at the Institute in the near future.

#### I. All India Radio Sixth Science Sannelan

Under the auspices of the CCE, the Institute participated in the All India Radio Sixth Science Sannelan held at Madurai-Kamaraj University, Madurai in Sep. 1987, and exhibited posters, video films, slides, etc. in the areas of superconductivity and wave generators and the display of our Institute were well received by the public who attended the sannelan.

#### J Seminar on Energy Optimisation in Manufacturing and Materials Processing

The CCE organised a Seminar on 'Energy optimisation in manufacturing and materials processing' in March 1988, and this seminar was funded by the DST. Eminent persons from the country attended this Seminar and a report based on the discussions is being prepared for submission to the Department of Science and Technology, Govt. of India. The report identifies the thrust areas concerning Thermal Problems in Materials and Manufacturing Processing/ Processes and the DST has expressed a wish to use this report as a guide while funding research project proposals.

#### K. List of Short-Term Courses conducted under Quality Improvement Programme during 1987-88

<i>Sl.No.</i>	<i>Title of the Course</i>	<i>Co-ordinator(s) Department</i>	<i>Duration/ period</i>
1.	Finite Element Methods in Fluid Mechanics and Heat Transfer	Dr. K.N. Seetharamu, Professor Dr. P.A. Aswatha Narayana	2 Weeks May 1987
2.	Current Developments in Spinel Ferrites and Garnets for microwave devices and Electronic components	Dr. V.R.K. Murthy, Asst. Prof. Dr. J. Sobhanadri, Professor, Physics Dept.	2 Weeks June 1987
3.	Technology and Characterisation of Epitaxial Semiconductor films and devices	Dr. P.R. Vaya, Principal Sci. Officer Elec. Engg. Dept.	2 Weeks June 1987
4.	Wear & Wear Control Techniques	Dr.K. Gopinath, Dr. M.M. Mayuram Asst. Prof. Dept. of Mech. Engg.	2 Weeks May 1987
5.	Structures for Nuclear Power Reactor Technology and Recent Advances in Concrete Construction	Dr. H. Achyutha, Asst Prof. Prof. V. Paramasivam, Professor Prof. P. Srinivasa Rao, Professor Dr. P.K. Aravindan, Assoc. Professor, Dept. of Civil Engg.	2 Weeks March 1987



**L. List of Short-Term Courses conducted with support from Indian Society for Technical Education, during 1987-88**

<i>S.No.</i>	<i>Title of the Course</i>	<i>Co-ordinator(s)</i>	<i>Duration period</i>
1.	Design & Application of Large Electric Motors	Dr. S.S. Yegna Narayanan Dr. C. Venkateshiah Asst. Professors Dept. of Elect. Engg.	2 Weeks 18-5-87 to 30-5-87
2.	Industrial Robotics	Dr. T. Nagarajan Asst. Professor Precision Engg. & Instrumentation Lab.	2 Weeks 1-6-87 to 14-6-87
3.	Developments in Conveyer Tech.	Dr. M.A. Parameswaran Professor Dr. K. Ramakoteswara Rao Asst. Professor, Mech. Engg.	2 Weeks 22-6-87 to 3-7-87
4.	Utilisation of Ocean Engg.	Dr. M. Ravindran Dr. P A. Aswathnarayana	2 Weeks 18-5-87 to 29-5-87
5.	Optical Components, Systems & Techniques in Engineering	Dr. R.S. Sirohi, Prof. Dr. M.P. Kothiyal, Asst. Prof. Engg. Design Centre.	30-11-87 to 12-12-87

**M. List of Continuing Education Programmes Conducted from April 1987 to March 1988**

<i>S. No.</i>	<i>Title of the Course / Programme</i>	<i>Co-ordinator (s) Department</i>	<i>Period</i>	<i>Total Budget Rs.</i>
1.	Personal Selection and Appraisal systems	Dr. R. N. Anantharaman Hum. & Soc. Sci.	15th & 16th May '87	30,000/-
2.	CAD in Mechanical Engineering	Prof. M. A. Parameswaran Dr. N. Sivaprasad Mechanical Engg.	13-24 July '87	80,000/-
3.	Electronics in Industry	Mr. T. N. Ranganathan Mr. M. Kumaravel Central Electronics Centre	14-24 Sep. '87	40,000/-
4.	Computer Aided Design in Civil Engg.	Prof. C. S. Krishnamoorthy Civil Engg.	14-23 Sep. '87	60,000/-
5.	Design and Fabrication of FRP Components for Land Transport System	Dr. N. G. Nair FRP Research Centre	21-26 Sep. '87	36,000/-
6.	Analysis, Design & Testing of Port and Coastal Structures	Prof. C. Ganapathy Dr. R. Sundaravadivelu Ocean Engg. Centre	Nov. 30-Dec. 12, '87	37,500/-

<i>S. No.</i>	<i>Title of the Course / Programme</i>	<i>Co-ordinator(s) Department</i>	<i>Period</i>	<i>Total Budget Rs.</i>
7.	Finite Element Method in Engineering Analysis	Prof. V. Paramasivam Civil Engg.	7-18 Dec. '87	80,000/-
8.	One Day Workshop on Expert Systems for Engineering Design	Prof. C. S. Krishnamoorthy Civil Engg.	11—1—1988	5,250/-
9.	Biomedical Laser Technology	Prof. Megha Singh Applied Mechs.	18-30 Jan. '88	10,000/-
10.	Training Programme for Quality Control Engineers of ONGC	Prof. O. Prabhakar Metallurgical Engg.	1-12 Feb. '88	16,000/-
11.	Course on Laboratory Techniques and Management for Officers of Exports Inspection Agencies	Prof. P. T. Manoharan RSIC	20—1—88	1,200/-
12.	Product Design and Development	Prof. M. A. Veluswami Mr. T. S. Chennabasavan Mech. Engg.	15-26 Feb. '88	76,000/-
13.	Design of Coastal Structures	Dr. M. R. Pranesh Mr. J. S. Mani Ocean Engg. Centre	14-19 March '88	24,000/-

**N. Details of Financial Assistance Sanctioned during 1987-88 to the Institute Faculty Members for Writing Books/Monographs**

<i>S. No.</i>	<i>Title</i>	<i>Department Author/</i>	<i>Value Rs.</i>
1.	Random-Vibrations-Application	Dr. S. Narayanan Asst. Professor Applied Mechanics	10,000/-
2.	Monograph on "Science and Technology or Ferrit Materials"	Dr. V. R. K. Murthy Asst. Professor Physics	9,000/-

## CENTRE FOR SYSTEMS AND DEVICES

### I. DIGITAL SIGNAL PROCESSING LABORATORY

#### A. Sponsored Research Projects :

a) *New Project Sanctioned :*

'Applicability of Modern Spectral Estimation Algorithms to Improve the Performance of MTI Surveillance Systems' — Sponsored by DRDO, New Delhi (Value : Rs. 12.97 Lakhs).

b) *Project Completed :*

'High Resolution Spectral Estimation Techniques for Radar' — Sponsored by DRDO, New Delhi (Value : Rs. 5.00 Lakhs) and completed on 30-9-1987.

#### B. Consultancy Projects :

a) *Completed :*

'Digital Signal Processor for a 60-Channel Transmultiplexer' — Sanctioned by TRC, New Delhi (Value: Rs. 1.75 Lakhs) and completed on 30-4-1987.

#### C. Full-Time Courses Offered :

<i>Course No.</i>	<i>Title</i>	<i>No. of Credits</i>	<i>Student Strength</i>
a) EE 632	Digital System Design and Microprocessors	3	35
b) EE 423 (Now being offered)	Digital System Design	3	25

#### D. B.Tech. and M.Tech. Projects :

- a) B.Tech. Projects Completed : 4
- b) B.Tech. Projects on going : 4
- c) M.Tech. Projects Completed : 3
- d) M.Tech. Projects on going : 2

#### E. Publications and Presentations :

- a) K. M. M. Prabhu, 'Generalized families of windows for use in signal processing', J. IERE, Vol. 57, No. 4, pp. 174-177, July/August 1987.
- b) K. M. M. Prabhu, 'Optimum window families for digital spectrum analysis', Proc., of the ISSPA-87, Brisbane, Australia, August 24-28, pp. 257-260, 1987.
- c) K. M. M. Prabhu and P. Suresh Babu, 'Fixed-point error analysis of fast Hartley transform', Proc. of the ISSPA-87, Brisbane, Australia, August 24-28, pp. 98-103, 1987.
- d) K. M. M. Prabhu and K. Bhoopathy Bagan, 'Nonrecursive digital filter design using optimum window families', Proc. of the ISSPA - 87, Brisbane, Australia, August 24-28, pp. 188-191, 1987.
- e) K. M. M. Prabhu, K. Bhoopathy Bagan and Krishna Karanth, 'Resolution capability of group delay and other spectral estimation methods', Proc. of the ISSPA-87, Brisbane, Australia, August 24-28, pp. 251-256, 1987.
- f) T. Viswanath, M. Shankar and K. M. M. Prabhu, 'Implementing fast Fourier transforms using the Am 29500 family, Microprocessors and Microsystems, Vol. 11, No. 8, pp. 423-430, 1987.

**F. Technical Reports :**

- a) Technical Reports : 4
- b) Completion Reports : 2

**II. SEMICONDUCTOR DEVICE RESEARCH LABORATORY**

**A. Sponsored Projects :**

Ongoing Project :

'Study of Multilayered Structures of Compound Semiconductors Grown by MBE Technique with Special Reference to Integrated Optical Circuits'.  
Sponsored by DST (Co-ordinator—Dr. P.R. VAYA).

**B. Short Term Courses/Conferences Organised :**

Summer School on 'Technology & Characterization of Epitaxial Semiconductor Films and Devices'.  
June 1-12, 1987 (Co-ordinator—Dr. P.R. VAYA).

**C. Academic Research Activities :**

<i>Projects</i>	<i>Completed</i>	<i>On-going</i>
B. Tech.	4	4
M. Tech.	2	3
Ph. D.	1	2

**D. New Course Developed :**

Semiconductor Epitaxy and Technology  
(For M. Tech. Programme in Elec. Engineering)

**E. Invited Lectures Delivered By The Faculty :**

- a) A series of Lectures on Semiconductor Devices & Technologies at S.G.M. College of Engineering Shegaon (Maharashtra) - By Dr. P. R. VAYA
- b) A series of Lectures on 'Silicon Solar Cell-Fabrication & Characterization' at National Productivity Council, Madras - By Dr. P.R. VAYA
- c) On 'Molecular Beam Epitaxy' at Crystal Growth Centre, Anna University, Madras - By Dr. P.R. VAYA
- d) On 'Hot Wall Epitaxy of LTT' at Technische Universität Braunschweig, West Germany

**F. Visits Abroad :**

Dr. P.R. Vaya visited Technical University of Braunschweig, RWTH Aachen and Technische Hochschule Darmstadt, in FRG from Oct.-Dec. 1987 Under DAAD Short Term Programme.

**G. Publications And Presentations :**

- a) P.R. Vaya, K.R. Murali and Manisundaram, 'Some studies on Zinc Phosphide films grown by Hot Wall Epitaxy', Phys. Stat. Sol. (a) 105 (2) 1988
- b) P.R. Vaya and Suresh Babu, 'Optical and Electrical studies of Zn<sub>3</sub>P<sub>2</sub> films Grown by HWE Technique', 4th Int. Conf. on Solid Films & Surface (ICSFS-4) Hamamatsu, Japan - Aug 23-27, 1987 (considered in absentia).
- c) J. Majhi and P.R. Vaya, 'A study on the Si-SiO<sub>2</sub> Interface States in FZ and CZ Silicon Wafers' ICSFS-4, Japan, Aug. 23-27, 1987 (considered in absentia).

**H. Technical Reports : One**

**III. MICROPROCESSOR SYSTEMS LABORATORY :**

**A. Sponsored Projects :**

- a) Computer assisted multi-lingual text generation from phonetic shorthand
- b) C.A.L.L. software development for Hindi and other Indian Languages
- c) Telecomputer for Indian Environment - part approval found unsatisfactory (being negotiated)

**B. Full-Time Courses Offered :**

Course No.	Title	No. of Credits
454	Microprocessors & Microcomputers	3

**C. Student Projects :**

- a) B. Tech. — 2
- b) M. Tech. — 1

**D. External Assignments :**

To inspect the eight self-financing Engineering Colleges affiliated to the University of Madras as a member of the inspection commission appointed by the Registrar, Univ. of Madras.

## FIBRE REINFORCED PLASTICS RESEARCH CENTRE

### I. Courses Offered

The following elective courses were offered by the staff of the Centre :

1. Composite Structures	Odd Sem.	... PG Course
2. Theory of Composite Materials	Odd Sem.	... PG Course
3. Composite Materials	Odd Sem.	... UG Course
4. Composites Technology	Even Sem.	... PG Course
5. Composites Product Design	Even Sem.	... PG Course
6. Advanced Testing & Design Control Methods for Composites	Even Sem.	... PG Course

### II. User Oriented M.Tech. Programme

An user oriented M.Tech. programme with specialisation in 'Composites Product Design' was started this year under Defence Research and Development Organisation (DRDO) Senior Research Fellowship Programme. Under this, four positions are offered by DRDO every year. The selection is made from the students who have been offered M.Tech. admission by IIT Madras in the department of Aerospace Engineering, Mechanical Engineering (Machine Design, Machine Tool and Production Streams) and Chemical Engg. (High Polymer Stream). The selected students undergo elective courses offered by FRP Research Centre instead of the regular departmental elective courses. After completion of the programmes, the student will be absorbed in DRDO service as Scientist-B.

### III. Conferences and Seminars

An International Conference on Composite Materials and Structures was organised by the FRP Research Centre, during January 6-9, 1988. This Conference was Co-sponsored by IIT Madras, Aeronautical Research and Development Board, Indian Academy of Sciences, Indian Rocket Society and Chinese Society of Theoretical and Applied Mechanics. Eight invited lectures and 49 research papers were presented during the Conference. The Conference was attended by 148 participants of which 26 were from abroad.

### IV. Short Term Courses

The following short term course was conducted during the period,

Title of the course	Duration	No. of participants
Design and Fabrication of FRP Components for Land Transport System	21-9-87 to 26-9-87	14

### V. Academic Research Programme

B.Tech. projects completed	...	3
M.Tech. projects completed	...	5
M.S. projects completed	...	1
Ph.D. projects completed	...	nil
M.S. projects on-going	...	4
Ph.D. projects on-going	...	7

## **VI. Research and Development :**

(a) The following R&D projects were completed :

1. Detailed design and Analysis of Heated Structures for DRDL, Hyderabad
2. Development of FRP High Voltage Disk Insulation, an In-house development
3. Use of expert system for code of practice basad design of FRP Chemical Equipment.

(b) The following projects were continued from last year :

1. Development of self-lubricating carbon fibre reinforced thermoplastic machine element
2. Studies on polymer concrete flooring tiles
3. Proceas developmant of Reinforced Reaction Injection Moulding.
4. Studies on Metal matrix composites
5. Buckling analysis of composite laminates using finite element method,
6. Development of ceramic composites by sol-gel process.
7. Interlaminar Stresses in Composite Laminates
8. Development of Compression moulded SMC components simulating timber
9. Reinforced Reaction Injection Moulding with Nylon as the matrix materials.
10. Thermoforming of high temperature resistant fibre reinforced thermoplastics
11. Computer aided mould design for SMC moulding.

## **VII. Sponsored Projects :**

The following new sponsored projects have been taken up during this year

1. Reinforced plastics products design for Bi-cycle components, (in collaboration with TI Cycles of India, Madras) sponsored by Department of Science and Technology,
2. 'Study of Bolted Joints in Composites', sponsored by Aeronautical Development Authority, (ADA), Bangalore.
3. The work on the following project was continued :  
Development of Testing and Quality Control System for industrial use of composite sponsored by DST, New Delhi.

## **VIII. Consultancy**

Twenty consultancy projects for a total of Rs. 46,000/. were undertaken during the period. The works include design quality evaluation end product development,

## **IX. Research Publications (including papers presented in Conference)**

No. of papers published during the Period : 16

## **X. Visitors to the Centre :**

Dr. Peter Komitov from State Committee of Science and Technology, Bulgaria visited FRP Research Centre duriug Jan '88 for a week under the Indo-Bulgarian cooperation in Science & Technology.

## MATERIALS SCIENCE RESEARCH CENTRE

### A. Research and Development

A large number of High Temperature Superconducting Materials ( $T_c$  77K) have been synthesized at the Materials Science Research Centre (over 75 compounds) based on Y-Ba-Cu-O, Bi and Tl systems.

- a. Papers Published : 10
- b. Papers presented at National and International Conferences : 17

### . Equipment Added :

High temperature furnaces ( $MoSi_2$  based) which can go upto a temp. of  $1700^\circ C$  have been procured and commissioned. Glove-box for handling moisture and air-sensitive materials has been commissioned.

### C. Invited Lectures Delivered by the Faculty :

During the period Prof. G. V Subba Rao gave a talk

- (a) 'High  $T_c$  Superconductivity in Rare Earth Barium-Copper-Oxygen System', at Novosibirsk, USSR (Oct. 12-17, 1987).
- (b) Prof. G. V. Subba Rao and Dr. U. V. Varadaraju attended various National Conferences and gave invited talks on High  $T_c$  Superconductors during the year.

### D. Visitors to the Centre

20 Scientists from India and abroad visited the Centre, gave lectures and discussed with faculty and students on topics of importance.

### E. New Projects

Three new projects have been sanctioned. They are :

- (a) Indo-German collaborative research program to strengthen the activities of the MSRC.
- (b) 'Hydrogen Production Through Semiconductor Based Photoelectrochemical Cells Using Light Energy', Sponsored by DNES, New Delhi.
- (c) 'Synthesis of New Materials and Basic Studies in High  $T_c$  Superconductors', Sponsored by DST, New Delhi.



## OCEAN ENGINEERING CENTRE

### A. Continuing Education Programme

Serving Teachers Programme	Ph.D.	
No. on roll		: 3
Serving Officers Programme	M.S.	
No. on rolls (Sponsored)		: 2
Serving Officers Programme	Ph.D.	
No. on rolls		: 2

### B. Academic Research

#### *Master of Science (Completed in 1987)*

1. Launching of floating structures
2. Nearshore sediment dynamics and beach erosion along Madras coast

#### *Master of Science (ongoing)*

1. Motion response of underwater towed array
2. Hydrodynamic behaviour of semisubmersibles
3. Behaviour of piles subjected to lateral loads
4. Coastal geomorphology of Kanyakumari in relation to Quilon

#### *Doctor of Philosophy (ongoing)*

1. Installation operations of offshore steel jackets
2. Dynamic response of offshore guyed towers
3. Wave propagation in underwater shells
4. Dynamics of articulated tower
5. Buckling analysis underwater shells
6. Damping effects on concrete ocean structures
7. Action of waves on pipelines
8. Floating body dynamics by finite element method
9. Studies on piles subjected to wave loads
10. Effect of waves and currents on seabed scour
11. Strength and deformation behaviour of marine clays
12. Behaviour of anchors subjected to monotonic and cyclic loading
13. Corrosion behaviour of reinforcing steel in marine environment
14. Deterioration of concrete in marine environment
15. Performance studies of oscillated water column wave energy device
16. Development of profiles for self rectifying air turbine of a wave energy device.

### C. Sponsored Project (ongoing)

1. Configuration and dynamics of towed sonar array : Naval Physical and Oceanographic Laboratory, COCHIN.
2. Geochemistry of saline soils of Ennore coastal tract and its impact on environmental projects : Ministry of Environment and Forests
3. Computer software development for processing ocean wave data obtained from NRSA : Department of Ocean Development
4. Preparation of a project report for sea trial of wave energy device : Departmental of Ocean Development
5. Preparation of state of art report on corrosion prevention and control in marine structure : Oil and Natural Gas Commission

### D. Consultancy Services

### E. Major Consultancy Projects (ongoing)

1. Analysis of critical components of a naval ship, Nau Sena Mukhyalaya, New Delhi.
2. Analysis of a shore based missile launching facility, Cochin Shipyard Ltd.
3. Repair measure of pipeline trestle of a dock, Madras Port Trust.
4. Measurement of tie rod forces at a cargo berth, Paradeep Port Trust.
5. Design and testing of longitudinal and transverse wave absorbing system of a towing tank, Naval Science and Technology Laboratory, Visakhapatnam.
6. Hydrodynamic testing and stability of a heave—up vessel, Goa Shipyard Ltd.
7. Hydrodynamic testing of a passenger vessel, Goa Shipyard Ltd.
8. Design of fishing vessels, Government of West Bengal.
9. Performance improvement measures and related detailed engineering of drill ship, Oil and Natural Gas Commission.
10. Evaluation of condition and repair measure for RC members of a piled jetty, Madras Port Trust.
11. Corrosion of steel piles at Kandla Port, Sunshine, Varnishes and Painting Ltd.
12. Design of a cathodic protection system for a platform at Palk bay, Titanium Equipment and Anode Manufacturing Company Ltd.
13. Effluent outfall studies for a river, Peroxides India Ltd.
14. Feasibility studies on transport of chemicals by waterway, Dhrangadhara Chemical Works Ltd., Tuticorin.

### F. Short Term Courses Conducted

1. Analysis design and testing of port and coastal structures—November 1987 (2 weeks).
2. Utilisation of ocean energy — May 1987 (2 weeks) ISTE.
3. Orientation course on offshore structures for Engineers of ONGC — November 1987 (1 week).
4. Second National Conference on Dock and Harbour Engineering — December 1987.

**SPECIAL FACILITIES FOR INTERACTION WITH  
OTHER INSTITUTIONS**

Central Electronics Centre

Centre for Industrial Consultancy & Sponsored Research

Regional Sophisticated Instrumentation Centre



## CENTRAL ELECTRONICS CENTRE

### A. Apprentice Training Programme :

The Sixth apprentice training programme was started in April 1987. Number of candidates six.

### B. An Indo-German Project :

" Strengthening of the Training Programme at Central Electronics Centre " was started in December 1987 and equipment worth DM 0,9 million has already arrived in Central Electronics Centre.

### C. Research and Development :

1. Fine weighing load measurement system with associated electronics circuit. MS (Entrepreneurship) Project for PEI Lab, Department of Mechanical Engineering.
2. Development of Instrumentation amplifier system. Ph.D. project for Production Engineering Lab., Department of Mechanical Engineering.

### D. Assistance to Industry

1. Servicing and Calibration of Heterodyne Voltmeter for Visweswaraya Regional College of Engineering, Nagpur.
2. Servicing of Thyristor controlled furnace for Padmavathi Metals and Alloys Private Limited, Ponneri and earned Rs. 8000/-
3. Servicing of Fine Balancing Machine for Western Thomson (India) Limited, Pozhal, Madras and earned Rs. 750/-.
4. Preparation of Feasibility report for switch mode power supplies for State Bank of India, Madras-600 001 and earned Rs. 3000/-.
5. Servicing of Electrocheck unit for Kirloskar Electric Company Limited, Bangalore and earned Rs. 7,600/-.
6. Testing of Kaycee Switches for Kaycee Industries Limited, Madras-600 084 and earned Rs. 1500/-.

### E. Work Under Progress

1. Fabrication of pulser Circuits for Thyristor controlled furnace for Padmavathi Metals and Alloys Private Limited, Ponneri.
2. Servicing of Spectrum Analyser for Ashok Leyland Limited, Ennore, Madras-600 057, Work completed for payment of Rs. 10,000/-.
3. Repair of PID controller for Madras Industrial Linings Limited, Madras.

## CENTRE FOR INDUSTRIAL CONSULTANCY & SPONSORED RESEARCH

During 1987-88, the following programmes were continued.

(1) Industrial Associateship Scheme — The response from the Industry towards this scheme has been highly encouraging, with the membership crossing the figure of 90 during 1988. In 1987, it was 103. Under this scheme, six Technology Appreciation Programmes were organised on (a) Micro Electronics (b) Finite Element Techniques (c) Modern Materials (d) Operations Research (e) Super Conductivity and (f) Microprocessor Applications. Action has been taken to initiate new programmes such as user oriented Research projects by industry to be carried out at IIT and provision of Technology Information Service to the Industrial Associates of the Institute.

2. Under ISRO-IIT Space Technology Cell, three new projects were sanctioned and a few seminars/short term course were organised for the benefit of ISRO scientists.

3. The Consultancy & Sponsored Research Programmes of the Institute continued to be at the same levels, as in the earlier years. The total sanctioned value of consultancy being Rs. 83 lakhs and that of Sponsored Research being Rs. 278 lakhs.

(4) Against a large number of proposals submitted to the Ministry of Human Resources Development, for new programmes in emerging areas of technology, infrastructure development etc., three schemes were sanctioned for Gallium Arsenide technology, Fibre Optics and laser technology and Environmental Engineering.

(5) Majority of the candidates who were admitted to the M.S. in Entrepreneurship course have completed their programme of developing new products and a few of them have submitted their theses. One of the candidates received the Computer Society of India award of Rs. 500 for the development work carried out by him as a part of this programme.

(6) Collaborative Research Programmes with other countries were continued. While four new projects were sanctioned under Indo-German agreement for development of the facilities in catalysis, Materials Sciences, Electronics and Production Engineering, the exchange programme under STEP and KFA Julish were initiated. The guest professorship scheme was also continued.

(7) Exchange Programmes with Industry were organised through the Confederation of Engineering Industry (SR).

(8) While Two patent applications were made during the year. One patent was issued in the name of the Institute.

(9) An agreement has been entered into with M/s. Gujarat Narmada Auto Ltd. for transfer of know-how for fuel efficiency devices of two stroke engines.

## REGIONAL SOPHISTICATED INSTRUMENTATION CENTRE

### A. Courses :

The faculty of RSIC take part in the part teaching and research activities of Chemistry and Mechanical Engineering Department and such activities are included under these Departments.

### B. Research and Development :

Faculty members of RSIC guide research work in Molecular Spectroscopy and Instrumentation leading to Master's and Ph.D. degrees. A total of 12 students are registered under the faculty members for Ph.D. and 3 M. S / M. Tech / M. Sc. degrees. 2 students got their Ph.D. degrees during the academic year 1987 - 88.

A total of 20 research papers have been published in Journals of International repute.

### C. Assistance to Industry and other Academic Institutions :

Analytical and investigative research services were provided on the various equipments available, to academic institutions, national and private laboratories, which is one of the main aims of setting up this centre. The breakup of services rendered to IIT/Madras (internal) and external users is given below :

Sl. No.	<i>Instrument</i>	<i>Int.</i>	<i>Ext.</i>
1.	Varian Techtron Atomic Absorption Spectrometer - AA6	21 hrs.	235
2.	UV-Vis-IR (Varian 2390)	86 hrs.	647
3.	Perkin Elmer PE-781	54 hrs.	21 hrs.
4.	PE 983 IR	119 hrs.	848
5.	EM 390 NMR	265 hrs.	306
6.	Varian E-4-EPR	95 hrs.	254 hrs.
7.	Carry-82 Laser Raman	211 hrs.	68 hrs.
8.	Polytech FIR-30-FAR IR	199 hrs.	85 hrs.
9.	Single Crystal X-Ray Diffractometer	710 hrs.	953 hrs.
10.	Aminco Bowman Spectrofluorimeter	304 hrs.	14 hrs.
11.	Scanning Electron Microscope	279 hrs.	114 hrs.
12.	Varian E-112 EPR Spectrometer	213 hrs.	136
13.	ESCA-AUGER	360 hrs.	56 hrs.
14.	Vibrating Sample Magnetometer	— —	73
15.	Finningan Mat GC-MS Mass Spectrometer	781 hrs.	51

### D. Sponsored Project :

1. NMR Investigations of structure and dynamics of molecules
2. Vibrational Spectroscopic studies using matrix isolation
3. Magnetic resonance studies of spin labelled biological systems
4. Design and Development of a digital data processor for instrumentation
5. Vibrational studies of Phase Transitions at high pressures and temperatures

#### **E. Awards :**

Professor Surjit Singh has been elected to the Fellowship of Indian National Science Academy, New Delhi.

Professor P.T. Manoharan was selected for the INSA Rengadhama Rao Memorial Lecture Award 1987.

#### **F. New Equipment :**

A Matrix Isolation accessory has been installed to work on vibrational studies or complex spectra at 10K.

#### **G. Invited talks presented by Faculty :**

Professor P. T. Manoharan :

1. Our Experiences in ESR Spectroscopy — IISc, Bangalore
2. 5 lectures on Quantum Chemistry — SV Univ., Tirupati
3. Exchange Interactions in stacked metal dithiolenes - IIT/Kanpur
4. Spectroscopic Investigations on bleomycin iron complexes and siderphores - IACS, Calcutta
5. Modulations of heme environment in reconstituted hemo-globins-University of Bern, Switzerland
6. 7 lectures on ESR of Low Symmetry Systems - University of Freiburg, Freiburg

Professor Surjit Singh :

1. Raman Spectra of Molecular Interactions - Panjab Univ, Chandigarh
2. Vibrational Relaxation of Molecular Interaction - AC College, Madras
3. Vibrational Spectra of Solute Solvent Interactions - Hungarian Academy of Sciences, Budapest

Professor S. Subramanian

1. Principles of two dimensional NMR Spectroscopy - RRL/CCMB Hyderabad
2. Computer Simulation of ESR and NMR spectra with PC - BHU Varanasi
3. Huckel Mo calculations using PC - BHU, Varanasi
4. Quantum Chemistry and Group Theory - Sri Krishnadevaraya Nagar University, Anantapur
5. Product operators and HR Pulse FT NMR - Max Planck Inst, for Polymer Research, Mainz, W. Germany
6. Some Novel one and two dimensional HR NMR methods - Central University, Hyderabad
7. Lectures in Magnetic Resonance and Group Theory - ANJA College, Madurai University

Dr. T. K. K. Srinivasan ;

1. Vibrational studies of Phase Transitions on alkyl substituted ammonium - Experimental Physik III Univ. of Bayenter, W. Germany



**Dr. S. P. Venkatesan ;**

1. **Surface Temperature Measurement in Petroleum Processing Industry : Possibilities and New Ideas - Presented at JPL, Caltech, Pasadena to invitees from the Petroleum Industry, July 1987.**

#### **H. Workshop - Short - Term Courses :**

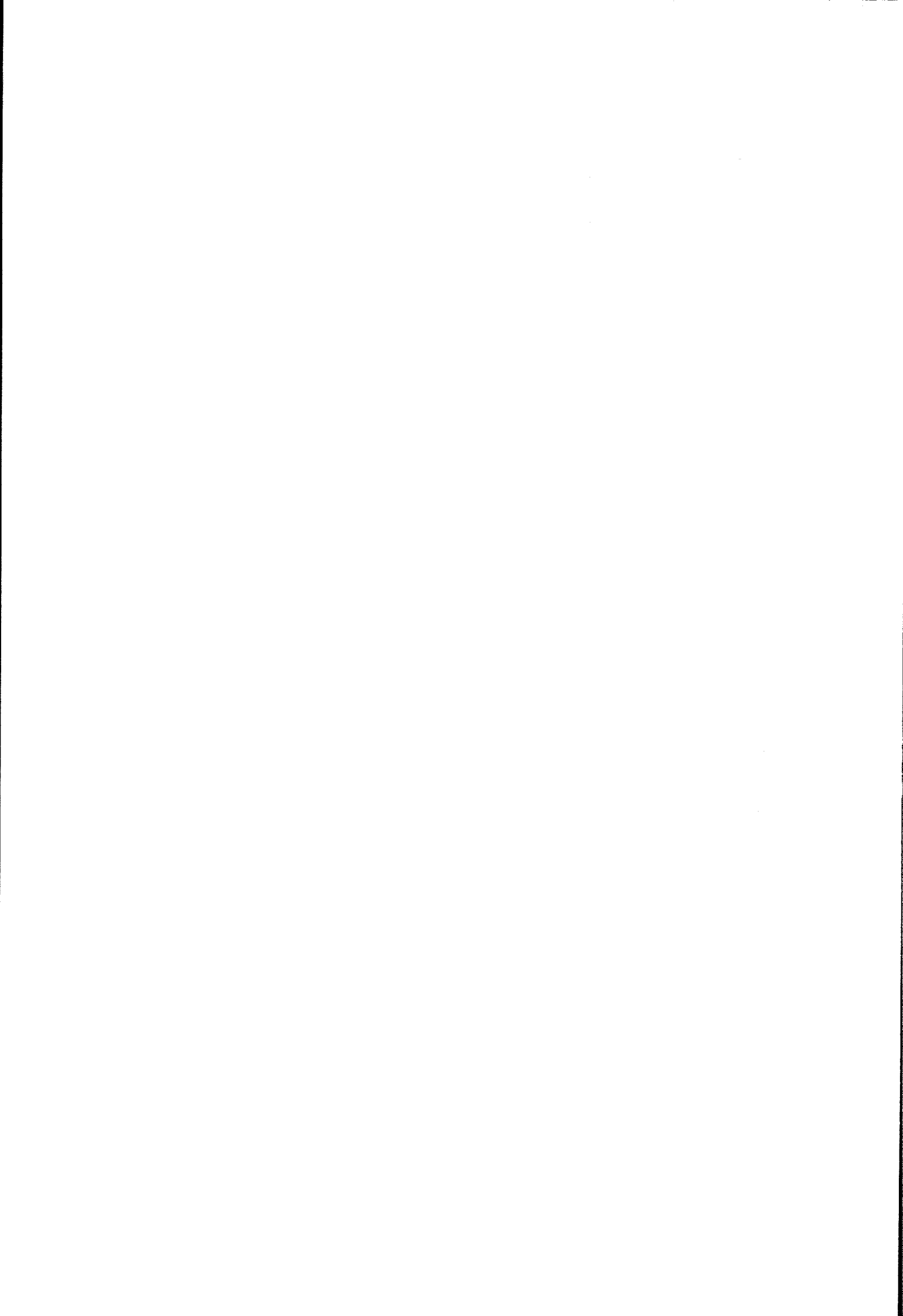
National Symposium on Modern Trends in Inorganic Chemistry was conducted during January 1988. About 80 participants from India and six experts from abroad participated in the symposium. The symposium was jointly sponsored by DST, CSIR, UGC, DAE, IISc, Bangalore, and IIT Madras.

#### **I. Lectures from Visiting Scientists**

1. Professor Antony T. Tu, Colarodo, Univ., USA
2. Dr. Jeffry Alger, NTH, Bethesda, USA
3. Dr. Peter Day, Oxford Univ., UK
4. Dr. R. Schollhorn, University of Berlin, W.G.
5. Dr. I. B. Bersuker, Inorg. Chem., Kishinev, USSR
6. Dr. K. S. Murray, Monash University, Australia
7. Dr. F. Jellinek, Univ. of Gronningen, The Netherlands
8. Dr. A. V. Mischekev, Academy of Sciences, Novosibirsk, USSR
9. Dr. Ch. Elschenbroich, Philips Univ., Marburg, W.G.
10. Dr. James Durig, Univ. of South carolina, USA
11. Dr. B. R. Hudson, Univ. of Oregon, USA
12. Dr. K. Balasubramanian, Arizona State Univ., USA

#### **J. Development Programmes on the anvil**

1. Matrix Isolation studies of molecular interactions
2. Development of Instrumentation for Electron Nuclear Double Resonance
3. Construction of low frequency EPR spectrometer
4. Calculation of second order molecular properties by finite perturbation theory
5. Development of facilities for time domain EPR
6. Development of an infrared Spectrometer
7. Study of chemically induced dynamic nuclear polarization
8. Biradical studies using spin labels on model systems
9. Evaluation of vibrational correlation functions
10. ESR, EXAFES and Mossbauer studies on Metalloproteins
11. Study by 1D and 2D NMR molecular structure and dynamics
12. Study phase transitions using Raman and IR spectroscopy
13. Spectroscopic studies on excited molecules
14. Liquid crystalline character of human hemoglobins at room temperatures



**CENTRAL SERVICES FACILITIES**

**Airconditioning Unit**

**Central Gas Supplies**

**Central Glass Blowing Section**

**Central Photographic Section**



## AIRCONDITIONING UNIT

Dr. N. Venkatrayulu, Professor of Mechanical Engineering is the Head Airconditioning Unit since May 1986. Sri K. Parthasarathy, Senior Maintenance Engineer and Sri S. K. Swamy, Technical Officer are responsible for the activities in the Airconditioning Unit.

The Institute has about 500 window airconditioners as on date. The maintenance, service and repairs of all these airconditioners is the responsibility of the A.C. Unit since its inception in 1970. Almost all the airconditioners (95%) are in good working condition.

The 7 packaged Airconditioners in Structural Engineering, Civil Engineering Computer system, Electrical Engineering Computer system, Electronic lab and senate room are in working condition.

There are now 16 Nos. 3TR Triomatic aircooled Airconditioners installed in the various laboratories of the Institute and are in working condition.

The Central A/C plant in the Applied Chemistry is being reactivated.

The 40 TR central plant in library, 40 TR Central plant at CLT, the 40 TR central plant in New RSIC Building are in working condition.

The new 150 TR A/C plant for the Siemens Computer and its Building has been installed and is working satisfactorily, since 21-11-87. The complete installation was supervised and maintained by the A/C unit.

The 80 TR A/C plant for the IBM 370 computer is also in working condition.

The induced draft FRP cooling Towers installed at the Library and CLT have been connected up with piping for parallel operation with wooden cooling towers or FRP cooling tower. The FRP cooling towers will be commissioned shortly.

In addition, several water coolers for process water in the various laboratories, water-coolers for drinking purposes in various buildings, refrigerators, in various departments and refrigerating equipment like humidity chambers and constant-temperature baths are also serviced and maintained by the A. C. Unit/air.

## CENTRAL GAS SUPPLIES UNIT

The Central Gas Supplies Unit continued to procure gases like nitrogen, oxygen, argon etc. from the suppliers and distribute to various departments, sections and centres.

## CENTRAL GLASS BLOWING SECTION

The Central Glass Blowing Section is one of the important infrastructural facilities of the Institute since its inception in 1972. Being a central facility this section undertake design and fabrication of scientific glass apparatus for R & D application for various departments. Besides meeting the in-house needs, this section also frequently undertakes jobs for the industry under the industrial consultancy programme.

This section has a range of modern glass working equipments largely procured from the Federal Republic of Germany as a component of the collaborative programme and these include Horizontal cum Vertical Lathe, Universal Lathe, Forming Lathe and High Vacuum Systems. It is also well equipped with a good number of sophisticated burners, drilling and cutting equipments, grinding and polishing equipments, and such other tools necessary for fashioning out a variety of glass apparatus and instruments. Though the section's services are utilised by the student community and researchers of different departments, its contribution in specialised areas like Cryogenic Glass systems, high vacuum system is quite significant in recent years. The Central Glass Blowing Section also offers elementary training in scientific glass blowing to post-graduate students. The section has adequate facilities for Quartz working and has developed high level of expertise in this area.

As part of industrial consultancy programme this section has to its credit the following specialised works.

Cryostat, Spherical and Cylindrical dewars (Window silvering), Luggin probe, Adiabatic calorimeter, Laser housing tube with water jacket, Mercury container for voluminometer, Reaction kettles, Reactor tube for CBC anneal, Jet electropolisher, Double walled transfer tube, vacuum tube collector for solar energy, Quartz wares (Crucible, combustion tube, crystal growing quartz sheath etc.)

## CENTRAL PHOTOGRAPHIC SECTION

Since the inception of the Section in 1967, it has been catering to the different photographic needs of the various faculties in the institute (both staff and students) such as Photo-taking, Movie Taking and processing of Black and White Film, Microphotography, Photomicrography, Slide Preparation, Documentation, Circuit diagrams (printed circuits) developing, enlarging and printing. It also helps in making audio visual programmes (in Black and White and also in Colour) highlighting the various research activities of the Institute.

Apart from above, it also undertakes and helps various ICC sponsored research work in the areas of research photography, such as traffic survey, highspeed photography, documentation, etc.

## **DEPARTMENTS**

**Aerospace Engineering**

**Applied Mechanics**

**Chemical Engineering**

**Chemistry**

**Civil Engineering**

**Computer Science and Engineering**

**Electrical Engineering**

**Humanities and Social Sciences**

**Mathematics**

**Mechanical Engineering**

**Metallurgical Engineering**

**Physics**





## AEROSPACE ENGINEERING

### A. New Courses Introduced

Weapon Systems

### B. Papers Published

- 1) R. M. S. Gowda, 'Mode Shapes for the buckling of Polar Orthotropic Circular plates' — Com. Volume in honour of Dr. K. A. V. Pandalai, edited by Dr. T. K. Varadan, Jan. 1988.
- 2) S. Krishnan and R. Jeenu <sup>ph.D</sup> 'Low Pressure Burning Characteristic of AP/CTPB Composite Propellants with burning rate Modifiers' — Com. Volume in honour of Dr. K. A. V. Pandalai, edited by Dr. T. K. Varadan, Jan. 1988.
- 3) G. Natarajan, G. Subramanian and T. K. Varadan, 'Convenient Construction of Tetrahedral finite elements for Quasi — Harmonic Equation', Journal of Computers and Structures Vol. 25, No. 2, PP 303-306 1987.
- 4) A. V. Krishna Murthy, T. K. Varadan and K. Vijaya Kumar 'Free Edge Interlaminar Stresses in Laminates under Transverse Loads', Journal of the Aeronautical Society of India. Nov. 1987.
- 5) B. S. Sarma and T. K. Varadan, 'Nonlinear Free Flexural Vibration of thin circular cylindrical shells', A.I.A.A. J, Feb. 1988.
- 6) ~~B. S. Sarma~~ and T. K. Varadan, 'Ritz finite element approach to nonlinear vibrations of anisotropic plates', Proceedings of the int. Conf. on Composite Materials and Structures, Jan. 6-9, 1988, I.I.T. Madras, PP 359-372.
- 7) M. Ganapathi, T. K. Varadan and G. Prathap, 'Linear Vibrations of anisotropic laminated plates using field consistent triangular plate element', Proceedings of the Int. Conf. on Composite Materials and Structures, Jan. 6-9, 1988, IIT, Madras PP 257-262.
- 8) G. Subramanian and Prasad N. Akella, 'A Selective diffraction order based lens plane grating shearing interferometer for the study of bent plates', Strain, 23(2), 55-59, 1987.
- 9) G. Prathap, G. Subramanian and C. Ramesh Babu, 'Stress Oscillations in plane stress modelling of flexure — a field consistency interpretation', Int. Journal of Num. Methods in Engg., 24(4), 711-724, 1987.
- 10) G. Subramanian, C. V. Raghava Rao and K. Pramadaivalii, 'A Circular Cylinder in a flow field with parabolic velocity distribution — a numerical study', Comput. Math. Application, 14(2), 127-132, 1987.
- 11) G. Subramanian and T. S. Balasubramanian, <sup>ph.D</sup> 'Beneficial Effects of steps on the free vibration characteristics of beams', Journal of Sound and Vib., 118(3), 555-560, 1987.
- 12) A. Krishnan and K. A. V. Pandalai, 'Analysis of Cantilevered Laminates', Proceedings of the Int. Conf. on Composite Materials and Structures, Jan. 6-9, 1988, I.I.T., Madras, PP 188-200.
- 13) J. Kurian and A. K. Sreekanth, 'Density Gradient Measurements of Vibrational Relaxation in  $N_2 + H_2O$  and  $Ar + H_2O$  mixtures', Proceedings of the 16th International Shock Tube Symposium, Aachen, 1987).
- 14) J. Kurian and A. K. Sreekanth, 'Laser Schlieren Study of vibrational relaxation of  $N_2$  by  $H_2O$ ', Chemical Physics 114 (1987),
- 15) K. A. Damodaran, 'Preliminary design studies on a Hypersonic Cruise Missile', Com. Vol. in honour of Dr. K. A. V. Pandalai, edited by Dr. T. K. Varadan, Jan. 1988,

- 16) K. A. Damodaran and M. C. Chakrapani, 'Preliminary Design Studies of an Airship for Communications and Early Warning Systems', Proceeding of the Seminar of Flexible Aerodynamic Deceleration and Ballon Technology, Agra 1987.
- 17) P. Arunachalam and K. A. Damodaran, 'Development of a reverse flow annular Combustion Chamber for Gas Turbine', Proceedings for the National Conf. on I.C. Engines and Combustion, 1987.
- 18) K. A. Damodaran and P. Rájasekhar, 'Gas Turbine fuel Control System using Microprocessors', Proceedings of Xth National Conf. on I.C. Engines and Combustion, 1987.
- 19) B. S. Sarma, T. K. Varadan and K. Rama Rao, 'Ritz finite element approach to Non Linear Panel flutter of Mindlin Plates', Com. Vol. in honour of Dr. K. A. V. Pandalai, edited by Dr. T. K. Varadan, Jan. 1988.

**C. Special Instruments/Facilities Added**

- 1) Micro-Processor based flight data Display System.
- 2) Digital Micro-Wave Doppler Velocity Meter for measuring speed vs time of a projectile.

## APPLIED MECHANICS

### A. Educational Programme: QIP

	Ph.D.	M.Tech.
No. of Trainees so far	8	4
No. of rolls in each course	4	—

### B. Short Term Courses Conducted

- a) QIP Summer School : 'Finite Element Method in Fluid Machines and Heat Transfer' May 4-15, 1987.
- b) ISTE Summer School : 'Utilisation of Ocean Engineering' May 18-29, 1987.
- c) Second International Conference on Physiological Fluid Dynamics conducted in August, 1987.

### C. Research Publications

No. of Papers Published 60

### D. Departmental Projects

- a) ARDB Project — Wake Development in a longitudinally curved stream (1987—1990)
- b) DST Project — Studies Around Three Dimensional Bluffed Bodies Relevant to Building and Environmental Aerodynamics.
- c) ISRO Project — Flow Around spheres relevant to droplet combustion phenomena.
- d) CBIP Project — Development of pump turbines — Design and Analysis of 'S' cambered profiles for fully reversable axial flow pump turbines.
- e) DNES Project — Generations of Aerodynamics data for blade section of wind energy system.
- f) Development of Electronics Speckle Pattern-Interferometre for Cardiac Functional Monitoring in Health and Diseases sanctioned by D.S.T. in March, 1987.

### E. Assistance to Industry : Industrial Consultancy Centre

- a) Stress Analysis of autogenous grinding mills.
- b) Seismic Simulation studies — analytical and experimental.
- c) Stress analysis of integral coaches.
- d) Stress analysis of impellers, closed frame presses, helicopter launching grid, storage tanks.
- e) Site investigation on vibrating mills.
- f) Noise pollution studies.
- g) Analytical and experimental transmission line dynamics.
- h) Theoretical Stress Analysis on Helicopter Launching grid.
- i) Model Analysis of Helicopter Launching grid.

**F. New Major Equipment Added**

- a) Bearing Analyser, SPM Sweden.
- b) Signal analyser system. Rion, Japan.
- c) Waveform Recorder, Hioki, Japan.
- d) Power Amplifier and Electromagnetic Exciter, West Germany.
- e) A hot wire anemometer
- f) Laser doppler flow meter and
- g) Halwitt Packard Colour plotter.

**G. Visitors to the Department :**

- a) Mr. Ebersback from the Institute of Machines, T.U., Kassel, West Germany — March, 88.
- b) Prof. O. Mahrenholtz, Technical University of Hamburg, Federal Republic of Germany.

**H. Invited Lectures Delivered by the Staff :**

Dr. V. Ramjee : On 5—2—88 gave a special lecture at MIT — Aero. Department 'Some aspects of Experimental Fluid Machines'.

**I. Other Information**

**Developmental Programme in the Near Future :**

A Blower with 20 H.P. Motor is to be installed in the new building that is being constructed.

The Biomedical Engineering Division is interested to

- a) use image processing techniques for analysis of foot pressures in normal and leprosy, for analysis of cardiac movements for diagnostic purposes and
- b) design of artificial limbs for handicapped.

# CHEMICAL ENGINEERING

## Serving Teachers Programme

### A. Quality Improvement Programma

No. of Trainees Presently working 3

### B. Department Lectures and Seminars (Guest Speakers)

- 1) Dr. Muhilan D. Pandian, University of Newada, USA
- 2) Dr. R. Thangappan, Managing Director, Tatanium Tantulam Products (Pvt.) Ltd., Madras.
- 3) Dr. S. Ramachandran, Principal Consultant, Process Analysis Centre for Emerging Technologies, SAIL, Madras.
- 4) Dean L. Ulrichson, Professor of Chemical Engineering, Iowa State University, Amex, Iowa, USA.
- 5) Dr. D. C. Hopper, Professor, Department of Chemical Engg. University of Louisville, USA.
- 6) Dr. M. Bali, Industrial Consultant, U.K.
- 7) Dr. K. V. Padmanabha Murthy, Professor, Jawahrlal Nehru University, New Delhi.

### C. Research

#### Research Publications

1. Papers published 26
2. Papers present 33

	M.S.	Ph.D.
Completed	5	2
On Going	5	21

### D. I. C. C. including Retainer Consultancy

1. Hindustan Latex Limited, Trivandrum.
2. Lakshmi Starch, Bombay.
3. Harihar Polyfibres, Kumarapatnam.
4. M/s. Adheswara Chemicals Limited, Madras.
5. M/s. Protech, Madras.
6. Snam Micro Abrasives Pvt. Ltd., Bangalore.
7. Neyveli Lignite Corporation Ltd., Neyveli.
8. Dharangadara Chemicals Works Ltd., Madras.
9. M/s. Dastur & Co., Madras.
10. FACT Engineering and Design Organisation, Udyogamandal
11. M/s. Pioneer Rubber Industries, Madras.
12. M/s. Fuller K.C.P., Madras.
13. M/s. Beardsell Insulation Ltd., Madras.

**E. Retainer Consultancy**

- |                         |                                      |
|-------------------------|--------------------------------------|
| 1) Prof. Y. B. G. Varma | 1) Hindustan Latex Ltd., Trivandrum. |
| 2) Prof. C. A. Sastri   | 1) Lakshmi Starch Ltd., Bombay.      |
|                         | 2) Harihar Polyfibres, Kumarapatnam. |
|                         | 3) Seshasayee Papers                 |

**F. Invited Lectures Delivered by the Staff**

- |                       |   |
|-----------------------|---|
| 1) Dr. N. Subramanian | 1) Delivered lectures on Polymer Rheology at the UGC — Sponsored 2 weeks course in the Cochin University.   |
|                       | 2) Delivered a Keynote address on 'Some facets of research for polymer applications on the Anniversary of Department of Polymer Science & Technology, Cochin University, July 1987. |

## CHEMISTRY

### A. New Sponsored Projects

- a) Synthesis of C-aryl glycosides via Pericyclic reactions, DST Project (Rs. 6.04.600/-)
- b) Indo German Aid Programme for strengthening the Catalysis Division (Dr. J. C. Kuriacose and 12 others)
- c) Monoradical and biradical in transition ion matrices, CSIR (Rs. 2 lakhs)

### B. Visits to Foreign Universities by the Faculty

- a) Dr. S. R. Ramadas, visited University of Tsukuba, Sakura-Mura, Ibaraki, Japan (June 22-July 16, 1987)
- b) Dr. C. Kalidas visited Mendeleev Institute of Technology, Moscow, USSR (May 11-17, 1987) sponsored by IUPAC.
- c) Dr. Kalidas, visited the University of Boston, Boston, to attend the IUPAC General Assembly (Aug 18-Sept. 10, 1987)-Sponsored by IIT Madras and IUPAC.
- d) Dr. P. T. Manoharan, University of Fribourg (May-June 1987)
- e) Dr. P. T. Manoharan, NIH, Bethesda, Maryland (June-July 1987)

### C. Papers Presented & Conferences Attended

The following staff of the Department presented paper/and/or chaired sessions at International Conferences.

- a) Faraday division of Royal Society of Chemistry, Durham, U.K. (Dr. C. Kalidas)
- b) International Congress on Corrosion, Madras (Dr. R. Narayan)
- c) International Conference on 'sulphate reducing bacteria' at Bombay (Dr. T. S. Chandra)
- d) International Conference on 'Hetero-atom Chemistry', Kobe, Japan (Dr. K. K. Balasubramanian, Dr. S. R. Ramadas, Dr. M.N.S. Rao)
- e) International Conference on 'Photochemistry', Hungary (Dr. K. K. Balasubramanian)
- f) International Congress of 'Heterocyclic Chemistry' Heidelberg, West Germany (Dr. K. K. Balasubramanian)
- g) Gordon Research Conference, Santa Barbara California, USA (Dr. P. T. Manoharan)

### D. Invited Lectures by Faculty at Indian Universities

- a) Dr. V. R. S. Rao, Department of Chemistry, at R.E.C., Trichy (Sept. 1987)
- b) Dr. S. R. Ramadas, Chemistry Department at S. V. University, Engineering College, Tirupati (December 1988)
- c) Dr. S. R. Ramadas, Chemistry Department at Postgraduate School for Biological Studies, Ahmednagar, Maharashtra (February 1988)
- d) Dr. D. V. Ramana, Department of Chemistry, at Pondicherry University (September 1987)

- e) Dr. D. V. Ramana, RSIC, at Central Drug Research Institute, Lucknow (February 1988)
- f) D. M. N. Sudheendra Rao, Department of Chemistry, at R.E.C. Warangal (February 1988)
- g) Dr. M. N. Sudheendra Rao, Department of Chemistry, at Kakatiya university, Warangal (Feb. 1988)
- h) Dr. M. N. S. Rao, Dept. of Chemistry, at A. C. College, Madras (March 1988)
- i) Dr. T. S. Chandra, Department of Chemistry at Department of Botany, New College, Madras

#### **E. New Major Equipments Installed**

- a) IR Spectrophotometer.
- b) Rotary thin-film vacuum distillation unit.
- c) Thermo-gravimetric Analyzer (TGA)
- d) Differential Thermal Analyzer (DTA)
- e) Differential Scanning Calorimeter
- f) Fourier Transfer IR Spectrometer with Photo-acoustic mode.
- g) Capillary Chromatograph.
- h) UV Spectrometer.
- i) CHN-Analyzer.
- j) Areameter.
- k) Pore-distribution measurement Unit
- l) Hydrogen Plant.
- m) Fermentor Unit.
- n) R-600 Hitachi Nuclear Magnetic Instrument.

#### **F. Awards and Honours**

- a) Dr. M. S. Gopinathan, elected to Fellow of Academy of Sciences.
- b) Dr. D. V. Ramana was awarded I Price for his paper on 'Oxygen transfer from the nitrogroup to sulphur in allyl-o-nitrophenyl sulphide and sulphoxide on electron impact at the National Symposium, Bangalore.
- c) Dr. R. Narayan, elected to executive council for the Electrochemical Society, India.
- d) Dr. R. Narayan, elected as Chairman, Electrode group. SAEST, Karaikudi.
- e) Dr. C. Kalidas, Nominated as National representative on IUPAC Commission, V.8, by INSA for the period 1987-89.
- f) Dr. K. K. Balasubramanian, -Prof. T. R. Govindachary's 60th Birthday Commemoration Award for research in Organic Chemistry.
- g) Dr. P.T. Manoharan, -Renganadhama Award in Spectroscopy, awarded by INSA.



### **G. Industrial Liaison Activities**

- a) Madras Refineries Ltd., (Dr. D. V. Ramana)
- b) May and Baker Ltd., India (Dr. S. R. Ramadas)
- c) M/s. Lucas TVS, (Dr. T. S. Chandra)
- d) M/s. Ganesh Enterprises, Madras (Dr. V. R. S. Rao)
- e) M/s. Switzer India Ltd., Madras (R. Narayan)
- f) M/s. American Remedies, Madras (Dr. P. T. Manoharan)

### **H. Visitors**

- a) Dr. K. Sankaran, Research Associate, University of South Carolina, USA.
- b) Prof. Karl Jug, University of Hannover, Hannover.
- c) Dr. H. J. C. Jacobs, Leiden University, Leiden.
- d) Prof. Dr. Akira Yoshikoshi, Tohoku University, Japan.
- e) Prof. Mageswaran, University of Jaffna, Sri Lanka.
- f) Prof. R. D. Peacock, University of Leicester, U.K.
- g) Prof. K. Juttner, University of Karlsruhe, Germany, FRG.
- h) Prof. Dr. W. Plieth, Freie University of Berlin.
- i) Prof. T. Mallat, Technical University of Budapest, Hungary.
- j) Dr. Prasad Polavaru, Venderbilt University, Nashville, Tennessee, USA.
- k) Dr. Stan Evans, Finnigan Mat, UK.
- l) Prof. R. G. Cooks, Purdue University, USA.
- m) Dr. Sigmund Csicsery, Richmond, California.
- n) Dr. Ashok Krishnaswami, Stevens Institute of Technology, USA.

## CIVIL ENGINEERING

### A. Invited Lectures by Distinguished Visitors

<i>Sl. No.</i>	<i>Name</i>	<i>Topic of Lecture</i>	<i>Period of visit</i>
1.	Prof L. Christians T. V. Berlin	Mud Housing	29-11-87 to 3-12-87
2.	Dr. R N. Hawkes Bartlett School of Architecture	Building Acoustics	5-1-88 to 25-1-88
3.	Prof. Gerrot Minke Kassel University, West Germany	Experimental Architecture from light weight structures to low-cost housing	21-2-88 to 1-3-88
4.	Prof. Dr. Ing. Klaus Dierks Professor of Civil Engg. Technical University of Berlin	Soil Structure Interaction	21-2-88 to 11-4-88
5.	Mr. Chris Jeffreys Dundee College of Technology, U.K.	Urban Drainage	16-11-87 to 30-11-87
6.	Prof. Sriramulu Vinnakota Marquette University, U.S.A.	Recent Development in Steel Structures	4-8-87
7.	Prof. Girija Vallabhan Texas Technical University, U.S.A.	Elastic Foundations	6-11-87
8.	Prof. Haresh C. Chah Chairman, Dept. of Civil Engineering Stanford University U.S.A.	An expert system to develop Seismic Vulnerability of Structures	6-1-88

### B. Invited Lectures by IIT Faculty in Other Institutions

<i>Sl. No.</i>	<i>Name of the Faculty</i>	<i>Name of the organisation and topic of lecture</i>	<i>Period of visit</i>
1.	Dr. N. R. Krishnaswamy Asst Professor Geotechnical Engg. Division	Institution of Engineers (India) and I.S.T.E., Karnataka State Centre, Bangalore-1 'Dynamic of Machine Foundations'	13-2-88
2.	Dr. C. S. Krishnamoorthy Professor Structural Engg. Laboratory	23rd Annual Convention of the Computer Society of India, Madras 'CAD/CAM the State-of-the ART'	6-1-88 to 9-1-88

### **C. Educational Activities Under QIP**

A short Term Course on 'Finite Element Methods in Engineering Analysis' was conducted from 7th to 18th December 1987. Prof. V, Paramasivam was the Course Co-ordinator.

### **D. New Equipment Procured**

1. Digital Strain Indicator.
2. Universal Triaxial Cell outfit with Transducers.
3. Direct Shear Apparatus outfit with LVDT.
4. Bench-type Consolidometer connectable to data logger.
5. Shaping Machine.
6. Radar Speed Meter.
7. Payment Unevenness Integrator.
8. Automatic Compactors for Soil and Bituminous Mixes.
9. Hardness Tester for Mastic Asphalt.
10. Personal Computers (PC/AT, PC/XT).

### **E. Laboratory Facilities Created**

1. A Wind Tunnel for Testing Building Models has been fabricated.
2. A test set-up for testing Marine Soil samples has been created.
3. Steel Beam Lateral Buckling Test set-up has been fabricated.
4. An Experimental set-up for recovery of bitumen in the bituminous pavement recycling process has been developed.

### **F. Seminars and Symposia Attended/Chaired by Faculty**

1. Dr. H. Raman was nominated as the Area Co-ordinator for preparing the 'Approach Document on Water Resources' for submission to Planning Commission.
2. Dr. C. S. Krishnamoorthy chaired a session on 'Modelling in the 2nd International Conference on Applications of Artificial Intelligence in Engineering' held at Boston from 4th to 8th August 1987.
3. Dr. K. Elango chaired a Technical Session in the National Seminar on 'Groundwater Development in Coastal Tracts', held at Trivandrum on 29th and 30th January 1988.
4. Dr. H. SureshRao chaired a Technical session in the National Seminar on 'Groundwater Development in Coastal Tracts', held at Trivandrum on 29th and 30th January 1988.
5. Dr. V. Kalyanaraman attended (i) The International Conference on 'Steel and Aluminium Structures', CARDIFF, U. K.. July 8th to 10th, 1987 and (ii) A Seminar on 'Structural Mechanics', conducted on January 3rd 1988 at Madras.

6. Dr. H. Achyutha attended (i) an International Conference on 'Modern Techniques in Construction', 22nd and 23rd September 1987 at Singapore and (ii) an International Symposium on 'Fibre Reinforced Concrete', 16th to 19th December 1987 at Madras.
7. Dr. S. B. Pattnaik attended the 2nd Indian Engineering Congress Conference during January 17-19 at Hyderabad, India.

#### **G. R and D Under Progress**

1. Hollow block wall systems-Analysis, Design and Testing.
2. Development of Expert System for building repair and maintenance problems.
3. Building Components in Ferro Cement.
4. Durability of concrete and corrosion of reinforcements in RCC in adverse environments.
5. Energy conservation in buildings.
6. Analytical and experimental studies in noise pollution.
7. Experimental and analytical studies in the area of reinforced earth using Geotextiles.
8. Ground improvement using stone columns.
9. Knowledge based expert system for preliminary design of RC buildings.
10. Non-linear finite element analysis and experimental investigations on concrete framed structures.
11. Behaviour of skew Bridge Decks.
12. Vibration study on Railway bridge with prestressed concrete decks.
13. Finite Element Analysis of Axi-symmetric Structures.
14. Non-linear Finite Strip Analysis of Fibre Composite Stiffened Plates.
15. Optimum Design of Layered, Fibre Composite Stiffened Plates.
16. Studies on 'Infilled Frames with Openings Subjected to Static Loads'.
17. City-pair Travel Demand Modelling.
18. Simulation Studies on Bus Transit.
19. Multi objective Optimisation of Water Resources Systems.
20. Application of Goal programming in Reservoir Operations.
21. Boundary Element Methods in Hydraulic Engineering.

#### **H. Indo-German Collaborative Project**

1. Indo-German Projects on Appropriate Technology for Rural Housing was completed. The duration of the Project was three years. Arising out of this work, a patent has been applied for a Cam-Block Press for manufacture of pressed soil-cement blocks.
2. Indo-German Joint Research Project titled "Water Resources Evaluation and Management Model for Rural Areas with particular reference to Narayanapuram" was completed during this year.

## **I. Industrial Consultancy and Sponsored Projects**

### **(a) Industrial Consultancy**

The Department of Civil Engineering is very active in Industrial Consultancy and has taken up challenging field problems involving Analysis, Design, Investigation, Trouble Shooting etc. in the areas of Building Planning, and Design, Soil Mechanics, Water Management, Structural Engineering and Transportation Engineering, and offered useful solutions to the problems. The following are some of the organisations that were offered consultancy.

1. Bureau of Indian Standards, Madras.
2. Dunlop India Limited, Madras.
3. Neyveli Lignite Corporation, Neyveli.
4. BHEL, Tiruchirapalli.
5. Hindustan Shipyard, Visakapatnam.
6. Electronics Corporation of India Limited, Hyderabad.
7. Axles India Limited, Madras.
8. Southern Railways, Madras.
9. Highways Department, Tamilnadu.
10. Nuclear Power Board, Bombay.
11. Tamilnadu Housing Board, Madras.
12. Standard Motors, Madras.
13. Military Engineering Services, Port Blair.

### **(b) Sponsored Research**

The following are the Sponsored Research Projects taken up by the Department :

1. CAD/CAM Programme under New Plan Scheme, funded by the Department of Education, Ministry of Human Resources Development, Government of India.
2. Preparation of Hand Book on Chimneys, funded by Bureau of Indian Standards, New Delhi.
3. Strength and Computer Aided Design of Fibre Composite Stiffened Plates funded by ARDB.

## **J. Short Term Courses Conducted**

1. Workshop on "Computer Aided Design in Civil Engineering", September 14-23, 1987.
2. Workshop on "Expert Systems for Engineering Design", 11th January 1988.
3. Short Term Course on "FEM in Engineering Analysis", December 1987.

## **K. Publications**

- |                                    |   |    |
|------------------------------------|---|----|
| 1. Papers published in journals    | : | 6  |
| 2. Papers presented in Conferences | : | 21 |

## **L. Staff Matters**

- (a) The following faculty have newly joined the Department.
  - (i) Dr. T. S. Ramanatha Ayyar, Former Director of Technical Education, Kerela has joined as Visiting Professor.
  - (ii) Dr. S. B. Pattnaik, Assistant Professor.
  - (iii) Dr. N. Indrasenan, Senior Scientific Officer Grade I.
  - (iv) Dr. S. Mohan, Lecturer.
  - (v) Mr. S. Rajeev, Lecturer.
- (b) Dr. P. Srinivasa Rao, Professor is on Sabbatical leave at the University of Karlsruhe, West Germany from October 1987.
- (c) Dr. D. J. Victor was invited to be Professor in the Department of Regional Planning, Toyohashi University of Technology, Toyohashi, Japan, from 31st April 1987 to 31st March 1988.

## COMPUTER SCIENCE AND ENGINEERING

The Department of Computer Science and Engineering has completed four years after attaining the status of a separate Department in the Institute. The third batch of B.Tech. students in Computer Science will be graduating in July 1988. The M. Tech. programme in Computer Science is continued with a normal intake of about 35. The strength of research scholars is also growing from year to year. In addition to the academic programme the department supports both sponsored research and industrial consultancy activities.

The Department of Computer Science and Engineering is actively involved in teaching and research in several modern areas of Computer Science, such as Artificial Intelligence, Fifth Generation Computing, VLSI Design, Computer Networks, Speech Recognition, Parallel and VLSI Algorithms, Simulation and Modeling, Microprocessor Based System Design etc. In particular, the Department has major sponsored research projects in Expert Systems, VLSI Design, Computer Networks and Speech Recognition.

The Department has well equipped laboratories for work in the areas of Digital Circuits, Microprocessors, Computer Systems Development, Information Sciences, Speech and Vision, CLASS project, System Software etc. There are several mini and micro computer systems available to support the teaching and research activities of the Department. In particular the Department has four Micro-VAX II systems with high resolution graphics and software for work in Artificial Intelligence, Signal Processing and Expert Systems. There are ten Vax station procured under Knowledge Based Computer Systems project. Good facilities are available for work in Robotics Control, Local Area Network and VLSI Design. During this year Siemens 7580-E time sharing system has been acquired with about 80 terminals from Germany and it became operational in December 1987. This is installed in the new building constructed for it. The system provides facilities for dialog, transactions and batch processings. Networking of various systems is achieved through TRANSDATA architecture. The system was formally handed over to IIT by German Minister in March 1988. This central facility caters to the ever growing needs of various departments/centres/sections of the Institute.

### A. List of Publications

1. B. Yegnanarayana, S. Tanveer Fathima and Hema. A. Murthy, "Reconstruction From Fourier Transform Phase With Application To Speech Analysis", ICASSP-87, Dallas Texas, April 1987. MS/PKD
2. B. Yegnanarayana, K. V. Madhu Murthy and Hema A. Murthy, "Processing of Noisy Speech Using Partial Phase", European Conference on Speech Technology, Edinburgh, Sept, 1987. MYB
3. R. Sundar, S. Raman and B. Yegnanarayana, "Studies on Speech Recognition of Hindi Stop Consonants", European Conference on Speech Technology, Edinburgh, Sept. 1987.
4. P. Eswar, S. K. Gupta, C Chandra Sekhar, B. Yegnanarayana and K. Nagamma Reddy, "An Acoustic-Phonetic Expert for Analysis and Processing of Continuous Speech in Hindi", European Conference on Speech Technology, Edinburgh, Sept. 1987. PKD
5. B. Yegnanarayana, P. Srinivasa Rao and K. Palaniswamy, "Adaptive mean and median filters for image restoration", Proceedings of ISSPA-87, Signal Processing, Brisbane, Australia, pp. 712-717, August 24-28, 1987.
6. B. Yegnanarayana and K. V. Madhumurthy, "Effectiveness of representation of signals through group delay functions", Proceedings of ISSPA-87, Signal Processing, Brisbane, Australia, pp. 280-285, August 24-28, 1987. PKD
7. B. Yegnanarayana, "Voice input/output systems for Indian languages", Proceedings of CSI-88, Madras, pp. 3-24, January 6-9, 1988.

8. P. C. Shah and H. N. Mahabala, "A New Comparison Scheme Based on Compression Ridges", DAC-87, Miami, June 1987.
9. H. N. Mahabala and G. Ravi Prakash, "Expert System for Selecon of Drills: A case study for use of Metaknowledge", II International Conference of AI in Engineering, Boston, August 1987.
16. C. R. Muthukrishnan and J. Kumar, "XINBASE - a Database system in the Unixshell", TRAC, Vol. 16 1987, pp. 220-222.
11. C. R. Muthukrishnan and G. Palshikar, "PLITS and Extensions", IFIP Conference on Distributed Processing, 1987.
12. Mrs. K. Kritivasan and R. Sitalakshmi, "Efficient Two-dimensional pattern Matching in the Presence of Errors", Information Science, 42, 1987.
13. S. V. Raghavan and S. Venkatasubramanian (Eds), Proceedings of the XXIII Annual Convention of the Computer Society of India. M/s. Macmillan Publishing Co., New Delhi, 1988.
14. S. Raman, "Microprocessor-based Peripherals for Computer Input-Output in Indian Languages", IETE Tec. Rev., Vol. 4(3), pp. 81-87, 1987.
15. Kiran Kumar and C. Pandu Rangan, "New Linear Space Algorithm for the LCS Problem" Acta Informatica, Vol. 24, pp. 353-362, 1987.
16. Harikrishna Prasad and C. Pandu Rangan, "New Efficient Parellel algoritm for Maximum empty rectangle problem". 16th Annual International Conference on parallel Processing, Pennsylvania, USA, August 1987.
17. Ramesh Govindan and C. Pandu Rangan, "Competitive Location in LI and L inf Metrics", Conference on Graph Theoretic Concepts in Computer Science, WG 87, West Germany, June 1987.
18. B. Patkar and C. Pandu Rangan, "Efficient Permutation algorithms on Mesh Connected Computers", International Conference on parallel Processing and Applications, L'Aquila, Italy, September 1987.
19. V. Arvind and S. Biswas, "An  $O(n^2)$  algorithm for the Satisfiability problem of a Class of CNF Formulas including Hon Sentences", Information Processing Letes. 24, 1987.
20. V. Arvind and S. Biswas "First order Logic augmented with a Non-deterministic Inductive Operator", 4th STACS Conference, 1987.
21. V. Arvind and S. Biswas, "Bandwidth Constrained Versions of Satisfiability Problem", 7th STACS, 1987.
22. R. Deenadayalu, "Computer Science Vol. II" Tata McGraw-Hill.
23. V. Sirohi, "Weak Buoyancy in Laminar Jets", presented 32nd ISTAM Congress, Bombay, December 1987.
24. V. Sirohi, "Jet with variable fluid properties", presentad at 32nd ISTAM Congress, Bombay, December 1987.
25. V. Sirohi, "Powell-Eyring Model Flow near an Accelerated Plate", Fluid Dynamics Research, Japan, 1987, pp. 103-204.
26. S. Jayaprakash, K. B. Lakshmanan and P. K. Sinha. "MEBOW: A Comprehensive Measure of Control Flow Complexity", COMPSAC 87, Tokyo, Japan, October 1987.
27. B. Yegnanarayana, C. Duncan and Hema A. Murthy, "Format Extraction from Group Relay Function", Proceedings of IEEE Colloquium on Speech Processing, London, pp. 2.1-2.3, January, 1988.



## B. Sponsored Projects

<i>Project</i>	<i>Agency</i>	<i>Co-ordinator</i>
1. Signal Processing in Acoustic Imaging	DOE Govt. of India	B. Yegnanarayana
2. Interactive Voice Input/Output System for a Computer	DOE Govt. of India	B. Yegnanarayana
3. Education and Research in Computer Networking under the Advanced Tech Program in Telematics	DOE Govt. of India	S. V. Raghavan
4. Knowledge Based Computer Systems	DOE & UNDP	H. N. Mahabala
5. CAD for VLSI	DOE	H. N. Mahabala
6. Digital CAD	MHRD	H. N. Mahabala
7. VLSI	MHRD	H. N. Mahabala
8. Investigation into Scientific Supercomputing	ISRO	C. Pandu Rangan
9. Cellular Automata and Application	DST	Kamala Krithivasan
10. Microprocessors	MoE	S. Raman
11. Information Sciences	MoE	N. Parameswaran
12. CLASS	NCERT	B. Yegnanarayana

## C. Professional Activities

Prof. H. N. Mahabala is the President of Computer Society of India and Member, Electronics Commission. Prof. Mahabala is the National Coordinator, Nodal Centre on Expert Systems, India Fifth Generation Project at IIT Madras.

Prof. C. R. Muthukrishnan served in the Programme Committee of 7th FST and TCS Conference. Prof. Muthukrishnan is a Member, Board of Governors, REC Suratkal, Member of Board of Studies in Computer Science REC Warangal, Member of Board of studies in Computer Science REC Trichy, Member of Board of Studies in Computer Science, Bharathiar University, Coimbatore, Member of Board of Studies in Computer Science, Central University, Pondicherry and Member of Board of studies in Computer Science in Osmania University.

Prof. B. Yegnanarayana has been appointed as Hon. Editor, Journal of Institution of Electronics and Telecommunication Engineers. Prof. Yegnanarayana has been nominated as Member, Board of Director of Andhra Pradesh Technology Services Ltd.

Dr. Mrs. Kamala Krithivasan is a member of Board of studies in Computer Science for Sri Parasakthi College of Women, Courtallam.

Dr. S. V. Raghavan was the Chairman of Programme committee of the XXIII Annual Convention of the Computer Society of India.

Dr. C. Pandurangan served in the Programme Committee for the workshop on Parallel Processing and Scientific Computing. Dr. Pandurangan is serving on the editorial board of the national level journal, Mathematics teacher and also a member of the working group, C-DACT, Pune.

Dr. S. Raman is serving as overseas Secretary, Academy of Forensic Application of Communication Sciences.

#### *Visits Abroad*

Prof. H. N. Mahabala visited Concordia University for two months during summer 1987. He also visited some universities in U.S., Canada and U.K. during this period.

Dr. Mrs. Kamala Krithivasan was on Sabbatical leave during Oct. 1986-Sept. 1987. She visited Concordia University for six months from April 1987—September 1987. She also visited some Universities in Canada during this period.

Dr. S. V. Raghavan visited some universities in U.S. and U.K. in connection with the UNDP project on ERNET. He also visited Canada to participate in the 1987 SIGMETRICS conference.

Dr. C. Pandu Rangan visited West Germany and U.K. to present papers at conferences.

Sri P. Seshasayi, Dr. M. K. Ramanujam, Mr. S. K. Ramesh, Mr. V. Mohankumar and R. Deenadayalu visited FRG between July 87 and September 1987 for participating in the training programme of Siemens 75E0-E system.

Mr. S. Jayaprakash visited the University of Maryland from June 1987 to August 1987 under the UNDP project on ERNET.

#### **D. Consultancy**

1. Development of PL/M Module for Multilingual Ticket Printer (S. Raman).
2. Retainer Consultancy for CMC, TCE, TELCO (H. N. Mahabala)

#### **E. Seminars/Conferences/Invited Talks**

Prof. B. Yegnanarayana has given invited talks on (i) "Speech Recognition, National languages understanding and computer vision" at the ISTE Annual convention in Mysore in December 1987 (ii) "Voice input/output system for Indian Languages", at CSI-88 in Madras in January 1988.

Dr. S. V. Raghavan gave an invited Talk on "Information Technology in Indian Languages State of the art" during the Southern Regional Conferences of the Computer Society of India in November 1987.

Prof. C. R. Muthukrishnan gave an invited talk on New Developments in Software Engineering at Business Industry Group conference of Computer Society of India.

#### **F. Visitors to the Department**

1. Prof. Satish K. Tripathi, University of Maryland, USA
2. Prof. Ian M. Leslie, Cambridge University, U.K
3. Prof. Chris Adams, Rutherford Appleton Laboratory, U.K
4. Prof. Dona Nav, University of Maryland, USA
5. Prof. V. Radhakrishnan, Concordia University, Canada
6. Prof. Burkle, University of Kaiserslautern, FRG

7. Prof. Haupt, University of Aachen, FRG
8. Prof. Tuchel, University of Aachen, FRG
9. Prof. Backus, University of Kaiserslautern, FRG
10. Prof. Worden, University of Kaiserslautern, FRG
11. Prof. K. Culik, University of South Carolina, USA
12. Prof. J.W.R. Griffiths, Loughborough University, UK
13. Prof. Berslich, University of Bremen, FRG

**G. Changes in Staff Position**

Mr. Sundar and Mr. Aravind joined the Department as Lecturers.

Dr. C. Pandurangan was promoted as Assistant Professor.

Mr. L. V. Satyanarayana and Mr. T. Ramalingam joined as SSO II.

Mr. P. Seshasayi was promoted as Manager.

Mr. Ramesh was promoted as SSO II

## ELECTRICAL ENGINEERING

### A. Invited Lectures By Staff :

1. a) Stray losses in power transformers and Reactors at Crompton Greaves Ltd., Bombay  
b) Computer aided analysis of Electric Magnetic and Thermal problems in Electrical Machines at Crompton Greaves Limited.  
c) Certain Topics on large Electric Motor Design, at Crompton Greaves Ltd.,  
By Dr. S. S. Yegna Narayanan
2. Image Processing, Fibre Optics.  
a) at IIT Bombay  
b) Delhi University  
c) IISc Bangalore  
By Dr. J. P. Raina
3. a) Telemetrics at IIT Kanpur  
b) Synchronization and ISDN,  
By Dr. B. Ramamoorthy
4. a) Micro processor based testing of ferromagnetic materials at REC Warangal  
b) Microprocessor based determination of symmetrical components, VRCE Nagpur  
c) Transducers in Instrumentation, CEC Madras  
By Dr. P. Sankaran
5. Inductive Voltage Dividers, Novel Capacitive Transducers at REC Warangal  
By Dr. V. G. K. Murti.

### B. Lectures By Invited Speakers :

1. Language - directed computer Architecture - Dr. R. Sridhar
2. Fast generalized Hough Transform and its applications to shape Recognition -  
Sri. K. Venkatesh Prasad
3. Failures in Micro Electronic services, due to over stressing, Dr. P. S. Neelakantaswamy
4. Energy Management Trends, Dr. Anil K. Jampala
5. Dynamic stability of power systems. - Prof. M. A. Pai
6. Medium Voltage switch gear research activities in TV Dresden - Prof. Dr. Helmut Bohme
7. Semiconductor Devices & MBE of II-VI compounds - Dr. S. Srinivasan
8. Recent trends in DSP Architecture - by Dr. S. Srinivasan
9. Artificial Intelligence & Applications by - Dr. A. K. Mukhopadhyay.
10. Wide Band packet network, - Dr. S. Dravida
11. Neural Networks, Mr. Srinagesh Satyanarayana
12. Materials for opto electronics - by Dr. N. B. Singh.

### **C. Educational Programmes :**

1. Short term course on Telemetrics - IIT Kanpur - by Dr. B. Ramamoorthy
2. ISTE Short term course on Design Application of large electric motors.  
Co-ordinator : Prof. S. S. Yegna Narayanan & Dr. C. Venkatasashaiah 25 May - 1987 to 6 June - 1987
3. Co-ordinated Network program to set up a Power Electronic Facility at REC Calicut - Dr. G. Sridhara Rao
4. Workshop on 'Familiarization with standard Nomenclature in Electrical Engg'.  
17 Sept 1987 - by Dr. P. Sankaran

### **D. New Equipment Procured :**

Microprocessors and Digital Systems Lab

1. IBM PC/AT, 8086 mp Training kits

Electronic Circuits and Digital Systems Lab :

1. Thickness Monitor
2. 7½ Digit Multimeter
3. LCR. Bridge

**Aeronomy and Lasers Communication Lab :**

1. Work station based on Fairchild Clipper

**Control Engineering Lab :**

1. IBM PC/AT, IC Tester,
2. Microprocessor kits
3. IM/DC Machine set

**Television Engineering Lab :**

1. Uninterrupted Power supply
2. Large screen Video Projection System Sony
3. PC Computer 68030
4. CCD B/W Camera with lenses.

**Control Engg. Lab ( Robotics )**

1. 100 MHz 4 Channel Oscilloscope

**Power Systems Lab :**

- 2 IBM PC/AT Computers

### **E. Laboratory Facilities Created :**

**Television Engg. Lab :**

Existing facilities updated for B. Tech and M. Tech

#### **Electronic Circuits and Semi conductor Devices Lab :**

1. Low temperature, high pressure oxidation facility for Gallium - Arsenide
2. L C R Bridge

#### **Control Engineering ( Robotics )**

1. A new Robotic Lab is being set up
2. A Robot with the associated computer
  - a) and Microprocessor development system were obtained as a gift from Alexander Von Humboldt Foundation for research work ( Dr. P. A. JANAKIRAMAN )
  - b) Another similiar Robot was gifted by Alex. Von Humboldt Foundation to Dr. V.V. Sastry.

#### **F. Seminars Attended :**

1. Indo - US Workshop on Signal Processing and systems, Jan 1988, Dr. B. Ramamoorthy
2. IV International Workshop on ' Physics of Semi conductor Devices - Rama Seshagiri Rao
3. IV International Workshop on ' Physics of Semi conductor Devices - Dr. K. N. Bhat
4. IV International Workshop on ' Physics of Semi conductor Devices - Dr. Karmalkar
5. IETE Conference on Telecommunications at IETE, Goa center - Dr. J. P. Raina
- 6
  - a) SPIE Conference on Fibre Optics/Electro Optics 16th Aug 1987, San Diago USA
  - b) International Symposium on Electronic Devices circuits, I I T Kharagpur, 16th Dec 1987 - Dr. Ashok Jhunhunwala
7. ' Microprocessors application to Power systems ' Symposium organized by the Institution of Engineers (India) - Dr. A. Kuppurajulu acted as the Chairman of the symposium
8. 5th International symposium on High Voltage Engineering - Dr. Y. Narayana Rao.
9. Workshop on Introduction of IS in Technical Education, National Seminar, New Delhi - Dr. P. Sankaran

#### **G. Seminars Conductd :**

1. Special Invited Lectures by experts from Crompton Greaves, Bombay, WS Insulators, S & S Power Switch Gear Ltd., Kirloskar Elec. Co., Indian Railways, NTPC., MRF, during the workshop on Design, Application of large Electric Motors.

#### **H. Distinguished Visitors :**

1. Dr. R. Sridhar, Dept of Elec and Computer Engg, Buffalo, USA
2. Sri. K. Venkatesh Prasad, Dept of Elec and Computer Engg., Rutgers Univ., USA
3. Dr. P. S. Neelakantaswamy, Director, Electronics Programs, R I T Research Corporation, Rochester, New York, USA
4. Anil K. Jampala, ESCA Corpotation USA
5. Prof. M. A. Pai, University of Illinois, USA
6. Prof. Dr. Helmut Bohme, Electrical Engg., Technical Unit Dresden ( GDR )

7. Dr. Raman, S. Srinivasan, AT & T Bell Labs, NJ, USA
8. Dr. S. Srinivasan, Dept of Electrical Engg San Jose Univ, California USA
9. Dr. A. K. Mukopadyay, President, AKM Associates, California, USA
10. Dr. S. Dravida, AT and T Bell Labs USA
11. Mr. Srinagesh Satyanarayana, Columbia University, USA
12. Dr. N. B. Singh, Westinghouse Co Pittsburg, USA
13. Dr. R. Hridayanath, IRDE Trivandrum
14. Dr. K. Sitaram, USA
15. Prof. Grau, West Germany
16. Prof. Besslich, West Germany
17. Prof. J. P. Agarwal, USA
18. Prof. Raymond Steele, University of Southampton
19. Dr. MVK Chari, International G. E., Schnectady, USA  
(Application of Finite Element methods to Elec. M/c.)
20. Dr. S. R. Kannan, Crompton Greaves, Bombay
21. Mr. T. Kasturi, WS Insulators, Madras
22. Mr. S. R. Santanam, S & S Power Switchgear Co. Ltd, Bangalore
23. M. Ganesh, Kirloskar Electric Co, Bangalore
24. Dr. P. K. Dorai Raj, Indian Railways
25. Dr. P. K. Kundu and K. Sanyal NTPC
26. Mr. S. Kalimani, MRF Ltd, Madras

#### I. R and D in Progress :

1. Department of Atomic Energy sponsored Research on Homopolar Generator for pulsed power applications - Dr. S. S. Yegna Narayanan
2. Homopolar Generator for a Rail Gun :  
funded by Armament Research and Development Establishment (A R D E) Pune -  
Dr. S. S. Yegna Narayanan
3. Atmospheric Laser Communication - Dr. Ashok Jhunjunwala
4. Two Dimensional Digital Filters - Dr. P. Subbarami Reddi
5. Polycrystalline Silicon Solar Cells, Sponsored by BHEL - Dr. K. N. Bhat
6. Text to Speech Synthesis, DOE Project - Dr. C. Eswaran
7. Speech Coding, Wireless LANS, Acoustic Tomography - Dr. B. Ramamoorthy
8. Tracking under noisy condition - Dr. P. A. Janakiraman
9. Microprocessor Control of Power Electronic Devices, Computer aided design of Electric Machines - Dr. G. Sridhara Rao
10. Stability Studies on Current Source Inverter fed Induction Motors - Dr. P. Sasidhara Rao

11. Pollution Performance of

- a) High Voltage Insulators under direct voltage surface discharge
- b) Breakdown of synthetic insulating materials.
- c) Pollution monitoring using Co2 laser - Dr. Y. Narayana Rao & Venkateshaiah

12. Algorithms for Energy Management - Dr. A. Kuppurajulu

- 13. a) Microprocessor based magnetic testing
- b) VAR measurement under non sinusoidal conditions
- c) Compensating net works - Dr. P. Sankaran

**J. B. Tech Projects :**

<i>S. No.</i>	<i>Student's Name</i>	<i>Title</i>	<i>Guide</i>
1.	R. Ramesh	Low Bit Rate speech coding using multipulse LPC	Dr. B. Ramamoorthy
2.	A. Sarangarajan	Design of ADPCM coder for subband coding	Dr. B. Ramamoorthy
3.	V. Bapi Raju	TCE oxidation of Silicon	Dr. Ramaseshagiri Rao
4.	N. Nedenja Kumar	TCE oxidation of Silicon	Dr. Ramaseshagiri Rao
5.	R. Sairam & K. G. Sarma	Modification of MOSFET characteristics	Dr. K. N. Bhat
6.	Sivakumar	Oxidation of Silicon and GAAS	Dr. K. N. Bhat
7.	Nayak N Bhagwat	Low Temperature, High Pressure oxidation of Si & Ga As in Oxygen Plasma	Dr. K. N. Bhat
8.	P. N. Janardhanam	Power systemsimulator	Dr. K. Raman
9.	Wagle Vidyadhar Hari	Microprocessor based relay	Dr. K. Raman
10.	Subramaniam Sankar	Application of Computer Graphics to Power system	Dr. K. Raman
11.	Sunil J. Nounha	Integrated voice and Data Fibre optic communication system for power station	Dr. Ashok Jhunjunwala
12.	Sivasankar chandar	Design of Distributed Computer system	Dr. Ashok Jhunjunwala
13.	Sanjaygupta	Developmentof a Node card for a parallel processing system	Dr. Ashok Jhunjunwala
14.	Rajat Mukerjee	Numeric Control	Dr. Ashok Jhunjunwala



<i>S. No.</i>	<i>Student's Name</i>	<i>Title</i>	<i>Guide</i>
15.	Suman.Rao	Microprocessor control of a Robot using a rotating serror	Dr. Ashok Jhunjunwala
16.	Sadas'v S. Vambatkar	Speed torque characterestic of an Induction M/c	Dr G. Sridhara Rao
17.	Anilkumar Yadav	Energy conversions in a doubly fed induction generator	Dr. G. Sridhara Rao
18.	R. Sreeram	Oscilloscope Sweep and Time base C R T	Dr. J. P. Raina
19.	Arun Krishna	Software for Computation and Graphic Representation	Dr. V. Seshadri
20.	B. Shankar	Comparative evaluation of lasergyros	Dr. V. Seshadri
21.	R. Sridhar	2 D patterns and Fourier Descriptor plots	Dr. V. Seshadri
22.	Talgaonkar	Time optimal Bang Bang Servomotor	Dr. V. Seshadri
23.	Ramanath Kausik	Microprocess or controller for static VAR compensator	Dr. Venkata seshaiah
24.	P. V. Mathew	Development of HV impulse voltmeter	Dr.Venkata seshaiah
25.	Anish Sharma	Development of a HV DC source for pollution performance studies on insulators	Dr. Venkata seshaiah
26.	J Krishna Kishore	Determination of symmetrical components by using micro processors	Dr. P. Sankaran

**K. M. Tech Projects :**

1.	R. B. Dhavare	Switch mode power supply	Dr. J. P. Raina
2.	Mrs. K. Geetha	Microprocessor based PWM Inverter for variable voltage source	Dr. P. Sasidhararao
3.	Vikash Kumar Jain	Electronic phase balance for conservation of electrical energy in a 3-phase induction motor	Dr. P. Sasidhararao
4.	G. Bhuvaneshwari	Speed control of induction motors usin PWM inverter	Dr. G. Sridhar Rao

<i>S No.</i>	<i>Student's Name</i>	<i>Title</i>	<i>Guide</i>
5.	Sunil Nayak	Design studies of Homopolar generators for pulsed power applications	Dr. S. S. Yegnanarayanan
6.	P. Duraikannan	Diagnosis of Faults in a 3 phase induction motor	Dr. S. S. Yegnanarayanan
7.	Murugesh	Slotted ring network for campus integrating voice & Data	Dr. Ashok Jhunjunwala
8.	Sudip kumar	Data Acquisition system for plant Automation	Dr. Ashok Jhunjunwala
9.	Vijay babu	A token bus controller for a factory floor	Dr. Ashok Jhunjuuwala
10.	Mohammed Anif	8086 based development system	Dr. R. Parimelalagan
11.	V. N. Rathi	On Board Algorithm for Automatic Bomb release from Aircrafts	Dr. V. Seshadri
12.	S. Nayak	Microprocessor based multimode Navigator	Dr. V. Seshadri
13.	I. P. Singh	Feature correlation - 2D Patterns using Fourier Descriptors	Dr. V. Seshadri
14.	G. V. Paul	Synthesis of cubic polynomials for Robot joint trajectories	Dr. V. Seshadri
15.	B. Vivek	Computer modeling of cerebral networks	Dr. V. Seshadri
16.	Vijaychandra	Expert system for preserving diagnostics for Garret Engines	Dr. V. Seshadri
17.	R. M. Raine	Emotive Classification of speech signals	Dr. V. Seshadri
18.	T. R. Sharma	Efficient Algorithms for character Recognition	Dr. V. Seshadri
19.	M. V. S. Rao	Torpedo Depth controller	Dr. V. Seshadri
20.	E K. Gopi	Design of power system stabilizer	Dr. K. Ramar

<i>S. No.</i>	<i>Student's Name</i>	<i>Title</i>	<i>Guide</i>
21.	Y. P. Prabhakar Rao	Studies on the effects of Geometry and field plate on the platinum silicide Scholtky Barrier Diodes	Dr. K. N. Bhat
22.	A. S. Nair	Text to speech synthesis	Dr. Eswaran
23.	A. C. Mal	Microprocessor based zero-crossing spectrum analyser	Dr. Eswaran
24.	K. Sreenivasalu	Design & Development of a Micro Computer system for speech analysis	Dr. Eswaran
25.	M. C. Chandorkar	Pulse width modulated Transistor Inverter	Dr. B. Ramaswami
26.	N. Srikumar	Signal Recognition is protective relaying	Dr. C. Venkateshaiah
27.	Vijay Bhaskar Akella	A fast algorithm for Economic load dispatch using sparsity techniques	Dr. A. Kuppurajulu
28.	K. San.hanam	Economic load despatch based on Ac flow reference	Dr. A. Kuppurajulu
29.	J. Premachandran	Closed loop control for power systems based on Kuhn Tucker Theory	Dr. A. Kuppurajulu
30.	B. Jayaram	Miroprocessor based measurement of reactive power in non sinusoidal circuits	Dr. P. Sankaran
31.	S. Muralidharan	Microprocessor based D. C. Hysteresis loss measurement	Dr. P. Sankaran
32.	H. V. Saikumar	A Binary Inductive Voltage Divider with Microprocessor control	Dr. V. G. K. Murti
<b>L. M. S. Projects :</b>			
1.	Radha Govadhan	Computer controlled Mini Lathe	Dr. V. Seshadri
2.	Rajana Sukla	Indian Script character Recognition	Dr. V. Seshadri
3.	A. Vedagiri	Internal combustion engine simulator for starter motor reliability testing	Dr. P. Saidharan Rao

<i>S. No.</i>	<i>Student's Name</i>	<i>Title</i>	<i>Guide</i>
<b>M. Ph.D. :</b>			
1.	G. Pavitran	Phase equivalent reduction in plane and application	Dr. V. Seshadri
2.	K. Sukulal	Studies on the effects of doping gradation on the performance of Bipolar Transistors and solar cells	Dr. K. N. Bhat
3.	K. Surendran	Studies on converter fed induction motor drives	Dr. Vedam Subramanyam
4.	S. Narayana Iyer	Some reduction techniques for linear continuous and discrete systems to yield accurate transient and frequency responses.	Dr. Vedam Subramanyam

**N. Indo German Collaboration :**

**Control Engineering Lab :**

Speed control of squirrel cage. Induction motor (Completed) Dr. R. Parimelalagan

**O. Industrial Testing :**

**Electrical Machines Lab :**

1. Wiper motors for Maruti cars - tested for TVS & Compared with Japanese motors
2. Energy saving solid state schemes - evaluated for English Electric Co. Ltd.

**Measurements & Instrumentation Lab :**

3. Testing of Energy motors and calibration-for M/s. Kothari Chemical
4. Iron loss measurement on transformer laminations-for M/s. Easwaran Co Ltd

**High Voltage Engineering Lab :**

5. Testing of Transformers, reactors and lightning arresters.

**P. Assistance to Industry :**

**Electronic circuits and Semiconductor devices Lab :**

1. Polycrystalline Silicon solar cells for BHEL Hyderabad

**Aeronomy & Lasers Communications Lab :**

2. Fibre optic communication link for W S Insulators.
3. Fibre optic communication systems for ECIL
4. Retainer consultant (Dr. Ashok Jhunjunwala) for comptech Electronics.

### Electrical Machines Lab :

5. Fault Diagnosis for 3 phase 800 HP, 6.6 KV, 50 Hz slip-ring Induction Motor-MRF Ltd
6. Finite element analysis programs for HV apparatus, W S Insulators
7. Capacity estimation of a Web-offset press, SOLNA - Sweden for Daily Thanthi, Madurai.

### High Voltage Engineering :

1. Over voltage studies on 400 KV system for Neyveli Lignite Corp.
2. Development of Soft-ware package for distribution system planning-for M/s. 3C systems, Madras.

### Measurements and Instrumentation Lab :

1. Instrument transformer error determination.
2. Evaluation of U.P.S.

### Q. Publications :

1. A new time domain method for power system stabilizer design with output feed back - Electric Machines & power systems, Vol 13 No 2 1987 - Dr. K. Ramar
2. On the proof of modified form of shanks conjecture - proceedings of Indo US workshop, Bangalore - Jan 12, 1988 - Dr. Dr. P. Subbarami Reddy
3. Studies on inverter fed 5 - phase induction motor accepted for publication in IEEE Tran on Power electronics - Dr. R. Parimelalagan
4. Analysis of planar bulk acoustic wave devices, Elizabeth Elias & A. Jhunjunwala, Electronic letters, pages 240-242, Vol 24, No 4 Feb 1988
5. Development and tuning of Kalman fitters for Robot trajectory identification accepted for NASTRAC 88 Bangalore by R R Abhyankar & V. Seshadri
6. The correct equivalent - box representation of the buried layer in B C MOSFETs intermo of implementation parameters IEEE Electron Device letters, Oct 1987 - S. Karmalkar and Dr. K. N. Bhat
7. Thermal oxidation of GaAs at 250°C, Electronic letters, Vol 23, Nov 1987 - Dr. K. N. Bhat & Nandita Basu
8. High pressure oxidation of Si (100) for production of ultra thin oxide MIS diodes thin solid films, (UK), Vol 156, PP 243-257 Jan 1988 by Nandita Basu & Dr. K. N. Bhat
9. On the choice of appropriate ionization coefficients for break down voltage calculations, solid state electronics (UK) Vol 30 PP 787-792 Aug 87 - C. Basava Goud & Dr. K. N. Bhat
10. Role of life time and energy band gap narrowing in diffused junction silicon solar cells. IEE proceedings, (UK) Vol 134, (Opto electronics), PP 249 - 258, Aug 1987 - By Dr. K. Sukulal & Dr. K. N. Bhat
11. Universal Digital Biginads which are free of limit cycles : IEEE Trans on circuits and systems, Vol CAS 34, PP 1243-1248, Oct 1987-Dr. C. Eswaran, A. Antonio & K. Manivannan.
12. DSP Architectures : current trends. proceedings of 30th Mid west symposium on circuits, Syracuse Univ, Aug 1987 - G Umamaheswari, Dr. S. Srinivasan, Dr. C. Eswaran

13. On stop band sensitivity of Digital filters, IEEE Trans on circuits, systems, Vol 34, PP 582-84 May 1987 by K. S. Prasad, Dr. C. Eswaran & Dr. V. G. K. Murti
14. Sensitivity of Driving point function based wave digital filters IEE Electronics Letters, - by K. S. Prasad & Dr. C. Eswaran
15. VHF propagation studies in coastal route, symposium on propagation factors in space communications, IETE, IIT Madras, September 1987 - by Dr. D. K. Banerjee & Dr. V. Subrahmanyam and Ramasubramaniam
16. A spread spectrum wireless LAN for multipath fading environments ROC of Indo US workshop signal processing and system, Bangalore Jan 1988 - by B. Ramamoorthy & Gandhi
17. Perfect capture ALOHA for local radioenvironment in Journal of selected advances in communication, June 1987 - by B. Ramamoorthy & AAM Salah, D. Godman
18. Identification of an FM signal under noisy condition-Accepted for publication, IEEE trans on acoustics & signal processing Dr. P. A. Janakiraman & K. V. Ranga Rao
19. Tracking of moving objects using vision-technical report C W R U, USA 1987-Dec-Dr. P. A, Janakiraman
20. Analysis of voltage source Inverter fed induction motor, Journal IE (India) Vol 67, 1987 by L.D.S. Reddy, M.V.L. Prakash, Dr. Vedam Subramanyam
21. Analysis of commutation of self controlled synchronous motor ibid, Vol 18, 1987, PP - 1 to 7 by Dr. Vedam Subramanyam, N. Gopalakrishnan
22. On the stability of a static slipenergy recovery scheme proceedings of IEE 1987 - by Dr. Vedam Subramanyam & Dr. Surendran
23. A method of model reduction techniques to match both transient and frequency responses, advances in simulation, Vol 8, April 1987, PP 1-16 by Dr. S. Narayana Iyer, Dr. Vedam Subramanyam
24. Investigation on a multiple converter fed induction motor electric energy conference proceedings, Adelaide, Australia, Oct 1987
25. Study of surface conductivity and ESDD on contaminated porcelain insulators - 5th international symposium on high voltage engineering - Dr. Y. Narayana Rao & R. J. Xavier
26. Imitation and growth rate of dry-band formation on polluted insulators - 5th international symposium on high voltage Engg - Dr. Y. Narayana Rao and Dr. S. Gopal
27. Microprocessor determination of phase angle in the presence of harmonics - IEEE trans on industrial electronics Vol IE - 34, PP 263 - 265 May 1987 by Dr. P. Sankaran and V. V. B, Rao, V. Vasu
28. Vortex shedding flow meters, International conference on modeling and simulation AMSE, New Delhi, Oct 1987 - by V. Parameswaran, Dr. P. Sankaran and Srinath kumar.

## **R. Future Plans :**

### **Electrical Machines Lab :**

1. Development of software for microprocessor based electric drives.
2. CBIP Sponsored research project in the area of HT Motors in thermal power plants.

3. Field calculations for BHEL - MHD
4. Simulation of power electronic circuits
5. Software for steady state & transient analysis of Electrical drives

**Television Engineering Lab :**

1. Fibre optics communication activities  
Development of Rural telephone system  
Ga AS Technology for VHSIC/VLSI circuits
2. LPCVD polycrystalline silicon MOSFET for 3D integration

**High Voltage Engineering and Power Systems Labs :**

1. DST Project on Power systems simulation
2. Fibre optics in high voltage engineering

**Measurements and Instrumentation Lab :**

1. Development of fibre optic current and voltage transformers
2. Development of data acquisition systems in instrumentation
3. Multidimensional and 2D filters

**S. Awards and Patents :**

Microprocessor based land navigator - patent applied for by Dr. V. Seshadri

**T. Staff/any Other Data :**

**Books Published :**

1. Thyristor control of electric drives by Dr. Vedam Subrahmanyam, Tata Mc Graw Hill, 1988
2. A course on Electric drives by - Dr. Vedam Subrahmanyam Tata Mc Graw Hill (accepted for publication)

## HUMANITIES AND SOCIAL SCIENCES

### A. New Courses introduced.

- HS 710. Indian Epics and Moral Values
- HS 735. Forecasting Methods and Applications

### B. Research Publications.

Research Papers Published. 16

### C. Invited Lectures by Faculty.

#### 1. Dr. S. Ambirajan

Lecture on 'Liberalisation in a Historical Perspective' at Institute of Command Studies and Irrigation Management, Bangalore May 21, 1987.

Lecture on 'Objectives of Higher Education. Ideals and Reality Seminar on Indian Higher Education, Madras Christian College, September 19, 1987.

#### 2. Dr. Dipak Chaudhuri.

Lecture on 'Project Management' at CPWD, Madras.

Lecture on 'Reliability Models for Optimum Maintenance' at IPE, Madras.

#### 3. Dr. R. N. Anantharaman

Lecture on 'Psychology of Accidents' at Regional Labour Institute, Madras.

#### 4. Dr. T. T. Narendran

Lecture on 'Project Management' at CPWD, Madras.

#### 5. Dr. L. S. Ganesh

Lecture on 'Maintenance Performance Indicators' at Indian Institution of Plant Engineers.

#### 6. Dr. B. Subramanian

Lecture on 'Kommunikationsmodelle in FSU' at Max Max Mueller Bhavan, Madras.

### D. Seminars Conducted.

Dr. R. N. Anantharaman. 'Statistical Analysis in Psychology' on 8th January 1988.

'Personnel Selection & Appraisal Systems on 15th & 16th May 1987.

(for Personnel Managers from various industries)

### E. Seminars/Conferences. Paper presented' by Faculty

#### 1. Dr. S. Ambirajan

'Evolution of Financial Strategies in Indian Business' Seminar on Strategy and Structure IIM., Ahmadabad 6-9, April 1987,

#### 2. Dr. Dipak Chaudhuri

One paper at 26th National Convention on Indian Institute of Materials Management at Calcutta.

Two papers at 4th International Conference on Plant Engg., Bangalore, January 1988.



**3. Dr. Evangeline Manickam**

Paper read at XXII Annual IAAS Conference, Feb. 22-24, 1988.

**4. Dr. R. Malathy**

Two papers (1) Silver Jubilee Conference of the Indian Econometric Conference Jan. 4-6, 1988.  
(2) Seminar on 'Issues in Human Capital Theory and Human Resource Development Policy'  
MS Univ, Baroda Feb. 11-13, 1988.

**5. Mr. C. Rajendran**

Paper presented at the 20th Annual Convention of ORSI at Pune, in January 1988.

**F. Visitors to the Department.**

Prof. Dr. Jacob Steiner, Institut for Literaturswissenschaft, Universitat Karlsruhe, West Germany.

Prof. S. Arasarathnam, Head of the Department of History, University of New England, Australia.

Dr. M. M. Srinivasan, Dept. of Industrial and Operations Engg., University of Michigan, USA.

Dr. John Hunter, Fullbright Professor, Michigan State University, USA.

**G. Equipment acquired.**

Computer net work. Addition of one PC/AT and 3 PC's.

## MATHEMATICS

### A. Teaching

The department continued to impart education in several aspects of Mathematics, Mathematical sciences and applications thereof at the different levels—B. Tech., M. Tech., M.S., M.Sc., and Ph.D., Members of the Department participated in giving the preparatory course in mathematics to a batch of SC/ST students.

### B. New courses, curricula

A few new courses have been introduced and some existing syllabi reviewed and revised. The fresh entrants to the M.Sc. course have started with the revised scheme which includes a project work/dissertation carrying 4 credits. Syllabi in mathematics for B.Tech./M.Tech. are being revised.

### C. Research

Work is in progress in the following areas of specialization :

Applied probability, Stochastic processes. Operations research, Statistics, Statistical inference, Bio-statistics Biomathematics.

Elasticity, Piezoelectricity, Fluid mechanics, Ship hydrodynamics, Magneto-hydrodynamics, Bio-fluid dynamics, Boundary layer theory, Hydrodynamic stability, Gas dynamics Wave propagation, Suspension rheology, Biomechanical sciences.

Graph theory, Combinatorial mathematics.

Mathematical Modelling, Variational optimization.

Numerical Analysis, Pade' approximants, Approximation theory, Theory of splines, Fixed point theory, Nonlinear analysis, Differential inequalities, Differential equations, Stability of motion, Functional differential equations, Singular perturbation problems, Complex analysis.

Theoretical Physics, Special relativity, General relativity, Cosmology Soliton theories, Statistical physics, Quantum optics, Quantum mechanics and fields, High energy particle physics, Magnetic fields and elementary particles, Unification theories.

### D. Computer Laboratory

The department has started providing facilities, though limited, for modern computing. Attempts are being made to strengthen this important input into the teaching and research work. Two P.C.'s are at present being operated.

### E. Seminar-cum-Discussion Hall

A long-felt need to have a suitable seminar hall has begun taking shape and is expected to be ready soon.

### F. Xeroxing machine

Making copies of research papers as an urgent, accessory convenience to stimulate and support the research activities of the faculty and scholars has now become possible, thanks to the installation of the photocopying Modi Xerox machine in March '88.

### **G. Seminars**

As a regular feature for inculcating aptitude to thorough inquiry, exploration/expression of ideas and presentation of results of research, the seminars have been organised at least once every week. Participating members comprise the scholars and faculty of the department as also invited guests from inside and outside the Institute.

### **H. Special lectures**

On topics of special interest series of lectures have been arranged occasionally. Professor Beckmann delivered a set of lectures on Dynamic Programming and Inventory Control and Professor M. Deakin gave a series of lectures on Catastrophe theory.

### **I. Distinguished visitors**

During the year under review the department had the privilege of welcoming a number of eminent visiting professors, from among whom being : Profs. C. N. Kaul ( Kharagpur ), K. Govindan (Trivandrum), M. Deakin (Australia), K. Beckmann (Munich University, FRG; Brown University, U.S.A.) S. D. Nigam, Dr. Mrs. K. Sony ( Knoxville, U. S. A. ), L. Debnath ( Florida, U. S. A. ), J. J. Seidel (The Netherlands).

### **J. Symposia / conferences conducted**

The department actively participated in holding an International symposium during Dec. 22-26, 1987 on the occasion of the Srinivasa Ramanujan Centenary Celebrations. It has had the rare opportunity of welcoming and hosting a galaxy of distinguished mathematicians and scientists including Noble Prize winner Prof. S. Chandrasekhar (Chicago) researchers from centres such as TIFR, Bombay; Centre for Advanced Studies, Princeton, USA; Cambridge, UK.

### **K. Journal of Mathematical and Physical Sciences (JMPS)**

The JMPS has continued to publish research papers from India and abroad. A special issue of the Journal in two parts covering over 300 pages christened as 'Srinivasa Ramanujan Special Number' has been published with articles from invited researchers from all over the globe. On the retirement from service of Prop. K. A. V. Pandalai the chief-editorship of the Journal has been taken over by Dr. P. Achuthan, Professor in the Department of mathematics.

### **L. Faculty matters**

Dr. C. V. Raghava Rao is on special, long term leave. Dr. S. N. Venkatarangam has taken sabbatical leave. A few faculty members are finalising plans for going abroad on research assignments.

### **M. Short term course/symposium/conference (to come)**

- i) A short term course on Mathematical Modelling in Science and Technology for 4 weeks is being arranged for the teachers in Engineering Institutions.
- ii) The IX High energy Physics Symposium in collaboration with the institute of Mathematical Sciences, Madras and supported by DAE, is being organised.
- iii) Preparations for an international Conference on Mathematical Modelling in Science and Technology to be held during August, 88 are in full swing. It is expected that interest and intense activities in and around mathematical modelling will form an integral part of the Department's progressive programmes.

#### **N. Ph.D. work completion**

Six scholars received their Ph.D. degree in the 1987 Convocation. Six scholars have completed their thesis work, since then.

#### **O. Publications**

- (i) A number of papers communicating results of original research have been sent for publication/published during the year.
- (ii) Writing of a few books by the faculty has been completed/taken up :  
Dr. R. Subramanian and Dr. S. K. Srinivasan on Inventory control, in collaboration with Professor M. J. Beckmann, Dr. K. R. Parthasarathy on Graph Theory, Dr. P. Achuthan and Dr. S. N. Majhi on Mathematical Modelling.
- (iii) Some of the faculty members continued to review/referee papers for Journals, National and International.

#### **P. Participation in special programmes**

Some of the scholars have taken part in special programmes/conferences held elsewhere. Miss. R. Esther Grace participated in the Summer School—'Optimization, Control and Related Subjects', organised by the International Centre for Pure and Applied Mathematics, Nice, France during Aug. September 1987.

A few faculty members gave invited lectures at various centres of work.

Dr. (Mrs.) S. Kalpakam presented a paper at the 6th International Conference on Mathematical Modelling held at St. Louis, U.S.A. in Aug. 1987.

Dr. K. R. Parthasarathy gave an invited talk in the workshop on Discrete Mathematics and Computer Science held at IISc. Bangalore in September 1987.

Dr. V. B. Johri gave invited lectures at Simla (May 87), Nagpur (Oct. 87), Allahabad (Nov. 87) and Goa (Dec. 87) on Different aspects of Cosmology.

Dr. P. Achuthan delivered two invited talks in the International Conference on Mathematics at Annamalai University and Anna University during Dec. 87.

#### **Q. Projects**

A Research project entitled 'Flow of Multiphase Suspensions : Its theoretical and experimental studies' with financial aid from the Board of Research in Nuclear Science, DAE has been submitted by Dr. S. N. Majhi in collaboration with Dr. Megha Singh, of the Biomedical Department.

Some more are on the anvil.

#### **R. General**

- (i) Two educational tours for students have been conducted, one to RAC, Ooty (May 87) and the other to Kavalur Observatory (March 88) under the auspices of the Astronomy Club.
- (ii) Under a special grant from the Central Government a good number of books in Mathematics and allied fields were added to the Library during the year.
- (iii) Dr. P. Achuthan has been elected, Academic Secretary of the Ramanujan Mathematical Society, India.
- (iv) Members of the faculty continued to serve on educational/research bodies and render help in the formulation of courses and conduct of examination/interviews like NTS.
- (v) Prof. P. Achuthan has taken over the Headship of the Department from July 1, 1987.

## MECHANICAL ENGINEERING

### A Faculty

Professors	Assoc. Professors	Asst. Professors	Lecturers	Design Engineers	SSOII's
17	3	21	8	2	3

### B. Deputation / Assignments Abroad / Resignations / Retirement

The following faculty member is abroad for an assignment.

1. Dr. M. Madhusudana Rao, Asst. Professor

The following faculty member has resigned from the Department

1. Dr. K. Srinivasan, Asst. Professor

### C. Mechanical Engineering Association

The following lectures were arranged :

1. "His reminiscences of IIT Life and Thereafter" Inaugural Lecture by Sri. V. Amudhachary (Ex. IITi an) Manager. East Land, Ashok Leyland, Madras.

### D. Other Activities :

1. Screening of Technical films.
2. Design Contest.
3. A Talk and Video show on 'Flexible Manufacturing Systems and Computer Integrated Manufacture' — by P. Sundaresan, Manager, HMT Limited.
4. Open House.
5. Mechanical Engineering Quiz.
6. Mechanical Engineering Sports.

### E. Educational Tour :

Pre-final year B. Tech students accompanied by Dr. G. V. N. Rayudu, Professor and Dr. G. Muthuveerappan, Asst. Professor went on Industrial Educational Study tour lasting for about 15 days in Nov., - Dec., 1987.

## METALLURGICAL ENGINEERING

1. No. of research papers published in journals and in press	37
No. of students awarded Ph. D degree in the Convocation held in 1987	4
No. of students awarded M. S. degree in the Covocation held in 1987	6
No. of students completing their requirements for Ph. D.	5
No. of students completing their requirements for M. S.	4

### No. of Students Registered :

for Ph. D.	:	Regular	19
	:	External	17
	:	Part Time	3
M. S.	:	Regular	2
	:	External	22

### A. Assistance to Industry :

The Department continued to offer consultancy services to industries. A few of the assignments is mentioned below :

1. X-ray diffraction studies for M/s Indo National Ltd, Madras-600 006.
2. Residual stress measurements for VSSC, Trivandrum.
3. Failure analysis of boiler tubes for M/s. FACT, Cochin.
4. X-ray diffraction analysis of nickel alloy for CECRI, Karaikudi.
5. Ultrasonic test on adopter disc for M/s. TTS and Brothers, Madras-14.
6. Tensile and impact strength, fracture studies for NLC, Neyveli.
7. Metallographic analysis for Madras Refineries Ltd, Madras.

### B. Sponsored Projects :

1. Studies on Creep, Fatigue and hot corrosion behaviour of Ni<sub>3</sub>Al and similar intermetallics.  
Sponsored by DST of value Rs. 2.91 lakhs.  
Coordinators : Dr. K. J. L. Iyer and Prof. V. M. Radhakrishnan
2. Creep and Fracture characteristics of austenitic stainless steel with and without weldments.  
Sponsored by DAE of value of Rs. 4.2 lakhs.  
Coordinators : Prof V. M. Radhakrishnan, Dr. K. J. L. Iyer, Dr. K. Prasad Rao.
3. Fatigue and Fracture of Aluminium Alloys.  
Sponsored by ARDB value Rs. 6.3 lakhs.  
Coordinators : Prof. V. M. Radhakrishnan, Dr. S. D. Pathak.
4. "Superplastic Forming of Some Aluminium & Titanium Alloys-Phase II".  
Sponsored by ARDB value Rs. 4.70 lakhs (3 yrs)  
Coordinator : Prof. K. A. Padmanabhan
5. "Explosive Compaction of High TC superconducting Materials"  
Sponsored by DST value Rs. 6 lakhs (2 yrs)  
Coordinators : Prof. K. A. Padmanabhan, Dr. P. Venugopal.
6. "Extending and Revamping Materials Testing Facility"  
Indo-German Project value Rs. 2.25 crores  
Coordinators : Prof. K. A. Padmanabhan, Prof. V. M. Radhakrishnan, Dr. P. Venugopal and Dr, S. D. Pathak.

### C. Awards :

Dr. K. Prasad Rao  
Lecturer, Met. Engg.

- i) H.D. Govindaraj Memorial Award on the occasion of National Welding Seminar '87 held at Bangalore (Nov. 87) for the best Research Paper presented at National welding Seminar '86, October 1986. Title of the paper: "Prediction of Longitudinal Distortion in welded structure using FEM.

Co-authors: Mr. G. Ravichandran and Mr. Suresh.

The award carried a cash prize of Rs. 2000/- and a certificate.

- ii) Awarded a Cash prize of Rs. 200/- for the best presentation of paper in the session "Corrosion and Oxidation" at the Annual Technical Meeting of Indian Institute of Metals held at Trivandrum during 12-14th November 1987. The title of the paper was 'Stress corrosion cracking of austenitic weld and wrought materials containing Delta Ferrite'.

Co-authors: Mr. R. Ramesh and Dr. S. D. Pathak

### D. Other Staff Matters:

- Dr. D. R. G. Achar was invited at the 1987 Asia Pacific Convention on Welding and NDT at Singapore, 23 - 25 November 1987 to chair a technical session and to present two papers.

Elected as Chairman, Indian Institute of Welding Madras Branch.

### E. Lectures Delivered by Distinguished Visitors :

- 1) Prof. Dr. B. Ilchner, Head, Department of Materials, Federal Institute of Technology, Lausanne, Switzerland.  
2-3-87 — Microstructural changes during creep of 12% Cr. steel.  
3-3-87 — Current work on Low Cycle Fatigue and Thermal Fatigue at Lausanne.  
4-3-87 — Small Components with composition Gradient :  
Why and How ?  
Current Research at Lausanne.
- 2) Mr. Satish I Rao, Research Scientist, Virginia Polytechnic Institute, Virginia, USA  
29-6-87 — "Analysis of Near Surfaced -spacing Gradients using X-ray diffraction".
- 3) Dr. R. Narasimham, Caltech, USA  
10-7-87 — Numerical Methods in Fracture Mechanics.
- 4) Dr. K. Lingamurthy, Professor, Department of Nuclear Engg, North Carolina State University, USA. This lecture is arranged under ASM-IIM Collaboration.  
13-7-87 — Deformation, Creep and Formability of textured HCP Metals.

- 5) Dr. O. P. Gupta, Professor, Mechanical Engg, IIT Kharagpur  
28-7-87 — Thrust areas in Welding Research.
- 6) Dr. T. S. Sudharshan, Technical Director, Materials Modification Inc., Virginia USA -  
Programme under ASM-IIM Collaboration  
3-8-87 — Developments in surface Technologies Electrosark deposition.
- 7) Prof Dr. J. Schlipf, Aachen, West Germany delivered the following lectures.  
27-10-87 — Propagation deformation bands.  
29-10-87 — Structure Parameters and stress esponents in study rate creep.  
2-11-87 — Solid solution hardening.  
3-11-87 — Internal Friction.
- 8) Prof. Micheal Brain Ives, Mc. Master under ALM-IIM collobarafion delivered a lecture on  
10-11-87 on a topic related to Metallurgical Engineering.



## PHYSICS

### A. New projects approved during the year

The following New Projects have been sanctioned during the year :

<i>Title of the Project</i>	<i>Agency</i>	<i>Co-ordinators</i>
1) High $T_c$ News Letter	DST	Dr. R. Srinivasan
2) Synthesis and characterisation of lithium intercalation compounds for solid state batteries	DAE	Dr. VRK Murthy
3) Microwave conduction of High $T_c$ superconductors	DST	Dr. VRK Murthy
4) Copper in conductivity glass	CSIR	Dr. K. Hariharan
5) Automatic Lens Design for Space Application	ISRO	Dr. D. K. Sharma Dr. R. S. Sirohi
6) Study of Implementation of Hologram Interferometry and Speckle Methods to Problems of ISRO Interest-Crack Detection	ISRO	Dr. R. S. Sirohi Dr. M. P. Kothiyal Dr. D. K. Sharma Dr. V. V. Rao
7) Development of materials for hydrogen storage applications	Dept. of Non-Conventional Energy Sources	Dr. K. V. S. Rama Rao Dr. YVGS Murti
8) Superconductivity R & D/Applications Programmes	Programme Management Board, Dept. of Science and Technology	Dr. R. Srinivasan

### B. Short term courses and conferences held

The following Short term courses and conferences were organised during the year.

1. Two short-term courses for Liquid Nitrogen plant operators by Dr. R. Srinivasan and Dr. G. Rangarajan
2. QIP short-term course on "Current Development in Spinel Ferrites and Garnets for Microwave Devices and Electronic components" by Dr. VRK Murthy.
3. 4th International Workshop on the Physics of Semiconductor Devices 10th to 15th December 1987.
4. 2nd National Conference on "Defects in Insulating Solids" 25th to 27th Feb. 1988.

### C. Distinguished visitors to the Department

The following distinguished Physicists from abroad visited the department during the year delivered lectures, interacted with the faculty of the Department.

1. Dr. Mukul Saran, National Research Council Ottawa, Canada.
2. Prof. R. Sooryakumar, The Ohio State University, USA.
3. Prof. (Mrs) Nalini Easwar, Department of Physics, Amherst College, Massachusetts University, USA.
4. Dr. Simon George, Professor, Department of Physics and Astronomy, Long Beach.
5. Dr. Silvester Takacs, Electro-Chemical Institute, Electro-Physical Research Centre, Slovak Acad. of Sciences Bratislava, CSSR, Czechoslovakia.
6. Dr. Alfons Weber, Chief, Molecular Spectroscopy Division, National Bureau of Standards, Washington, USA.
7. Dr. V. Yu. Aristov, Institute of Surface Physics, USSR Academy of Sciences, Moscow.
8. Dr. K. Thiyagarajan, Dept. of Physics, IIT, Delhi.
9. Dr. A. Sidorenko, Institute of Applied Physics, USSR.
10. Prof. K. Linga Murthy, University of North Carolina Raleigh, USA.
11. Prof. Wolfgang Kundt, University of Bonn, FRG.
12. Prof. Taraprasad Das, State University of New York, Albany, New York USA.
13. Prof. Walter Eric Spear, Laboratory of Physics, University of Dundee, Dundee, U.K.
14. Dr. Devendra Gupta, Thomas J. Watson, Research, Center, (IBM) Yorktown.
15. Dr. J. Niemeyer, Head, Thin Film Division Physical Technische, Bundesanstalt, Braunschweig, Federal Republic of Germany.
16. Prof. Gerhard Grau, Director, Institute for High Techniques and Quantum Electronics, FRG
17. Dr. Edward Hulcius, Institute of Physics, Czechoslovak Acad. of Sciences, Czechoslovakia.
18. Dr. S. M. Bhat, Professor of Physics, Dept. of Physics and Astronomy, University of Maryland, College Park, Maryland, USA.

### D. Invited Lectures by Faculty

The following faculty members of this department delivered invited lectures at other Universities.

1. Dr. R. Srinivasan, Professor delivered the "CV Raman memorial lecture" at the Madurai Kamaraj University, Madurai. and a lecture at the Nuclear Physics, Solid State Physics Symposium, at the BARC, Bombay.
2. Dr. B. M. Sivaram, Professor, delivered lectures at the Solid State Physics Laboratory, New Delhi and at the National Workshop on Laser Spectroscopy and Laser Applications, Varanasi.
3. Dr. K. V. Reddy, Asst. Professor delivered a lecture at the IBM J. Watson Research Centre, Yorktown Heights, U.S.A.

4. Dr. B.S.V. Gopalam Asst. Professor, delivered lectures at the SV University, University of Madras, Gurunanak Dev University, Rajasthan University, Mathrusri Engg. College and Andhra University.
5. Dr. J. Majhi, Asst. Professor, delivered two lectures at the University of Pune.

#### E. Visits abroad by faculty

The following faculty members of the Department had been abroad for advanced Research at Universities during the year.

<i>Faculty</i>	<i>University abroad</i>
1. Dr. G. Rangarajan Professor	Universitat Hamburg, FRG
2. Dr. YVGS Murti Professor	Clemson University Clemson, USA.
3. Dr. R. Ramji Rao Professor	Da La Matiere Condensee University of Geneva Switzerland.
4. Dr. V. Balakrishnan Professor	Limburgs Universitair Centrum, Belgium

#### F. Papers presented at International Conferences

The following faculty members have attended International Conferences abroad :

<i>Faculty member</i>	<i>Conference attended</i>
1. Prof. S. B. S. Sastry	" Radiation Effects in Insulators ", France.
2. Prof. R. Srinivasan	" High T <sub>C</sub> Superconductors " at ICTP, Trieste.
3. Dr. B. S. V. Gopalam	" The Physics of Superlattices and Quantum Well Structures " Florida.
4. -do-	" CS-CS-7 International Conference on Computer Systems - Fabrication of Opto-electronic Devices by MOCVD technique " Bucharest.
5. Dr. J. Majhi	" Workshop on Materials Science and Physics of non-conventional Energy Sources ", Italy.
6. Dr. V. Ramachandran	" International Conference on High T <sub>C</sub> Superconductors and Materials and Mechanisms of Superconductivity " Switzerland.
7. Dr. K. Hariharan	" 6th International Conference on Solid State Instruments ", Germany.
8. -do-	" 38th International Inter-Chemical Society Meeting ", Netherlands.

### G. New equipments/facilities added

The following items of equipment/facilities have been fabricated/added to the laboratories of the Department for improving the R and D facilities.

1. PLN 1088 Nitrogen Liquifier
2. Model 1410 Standard Helium Liquefier
3. Vacuum coating unit and vacuum meter
4. R. F. Induction furnace
5. Barcher 10" Magnet with power supply
6. Hydrogen estimation facility (pressure reduction)
7. Microbalance absorption
8. X-Y-T reducer
9. Signal Analyser
10. Distributed Feedback Laser Devices
11. Nd : Glass Laser
12. CO<sub>2</sub> Laser
13. Set up to study Dielectric properties 77K-500K
14. B. H. Loop measurement Set-up microprocessor attached
15. Two furnaces with temperature controls (1200°)
16. A Microwave generator at 'X' Band and a photomultiplier power supply are designed and fabricated.

### H. Ph.D. Research Projects completed during the year :

#### Thesis title and name of the scholar

#### Guide

- |   |   |
|---|---|
| 1. Crystal structure analysis of some compounds by X-ray diffraction - Kumari T. M. Vimala.   | Dr. S. Swaminathan  |
| 2. Colour Centres in crystals of KCl doped with Gadolinium - Sri C. Vijayan   | Dr. YVGS Murti  |
| 3. Studies on the aging characteristics of discontinuous metal films of Cu, Ag and Al-Sri M.S. Murali Sastry.   | Dr. V. Sivaramakrishnan<br>Dr. V. Damodara Das                            |
| 4. Electrical and Magnetic Properties of Lithium-Titanium Ferrites—Kumari R. Manjula  | Dr. J. Sobhanadri<br>Dr. VRK Murthy                                       |
| 5. Hydrogen absorption studies in Ti <sub>3</sub> Cu and proton magnetic resonance studies in Ti <sub>3</sub> Sb-H and Ti <sub>3</sub> Cu-H systems—Kumari N. Rajalakshmi | Dr. KVS Rama Rao  |
| 6. Growth and characterisation of MBE grown lead tin telluride epitaxial films—Sri K. Ponnuraju   | Dr. J. Sobhanadri   |
| 7. Beta phase Instability in Niobium Titanium Alloys —Sri Y. Hariharan  | Dr. R. Sriniv san<br>Dr. T. S. Radhakrishnan<br>(External Research Guide) |
| 8. Crystal Structure analysis of some cobalt and nickel complexes—Kumari Akella Radha   | Dr. Mrs. M. Seshasayee  |

## **OTHER REPORTS**

**Indo German Programme**

**Central Library**

**Central Workshop**

**Institute Hospital**

**Placement Office**

**Alumni Association**

**Weaker Section Students & Foreign Students**

**Institute Gymkhana**

**National Cadet Corps**

**National Service Scheme**

**Hostel Management**

**Central Supplies Unit**

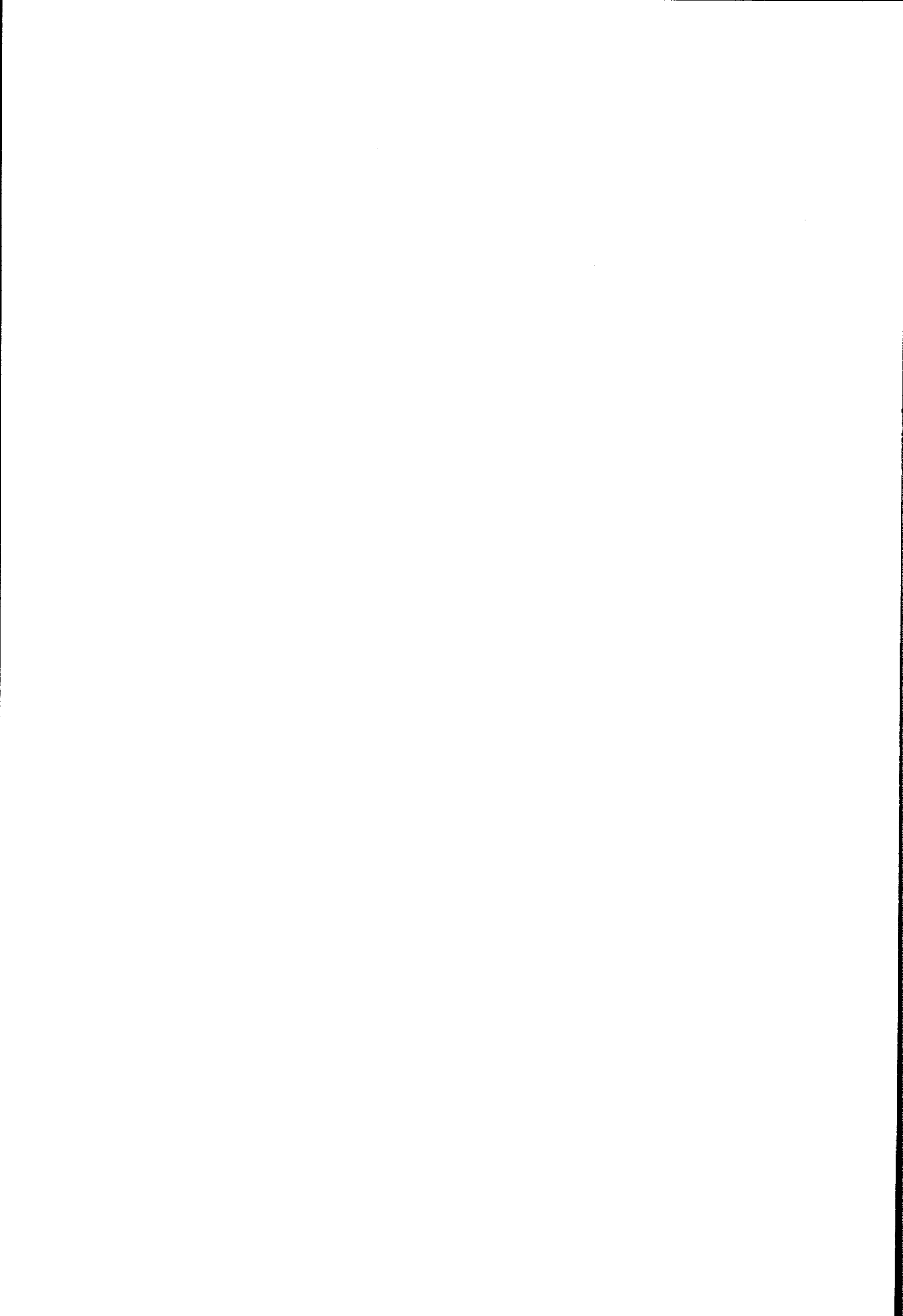
**Construction of Buildings**

**Administration**

**Names of Faculty Members**

**Budget Proposals**

**Statement of Accounts 1986-87**



## INDO GERMAN PROGRAMME

### No. of Staff Members Permitted to Visit FRG

Faculty	Short term ...	10
	Long term ...	—
Scientific staff	Short term ...	—
	Long term ...	1
Technical	Short term ...	2
	Long term ...	—

## CENTRAL LIBRARY

The significant activities of the Central Library during the period April 1987 to March 1988 are enumerated below :

### **A. Administration, Reprography and Bindery Division (ARB)**

#### **Library Building :**

After a long wait of over 15 years when the Library Building had already taken in its optimal size of publications, the Stack IV to the Library was taken for construction. The steel racks required for housing the publications in Stack IV have also been acquired which will be assembled and used in the next few months when the Stack would be handed over.

#### **Staff :**

Sanction has been accorded for filling up of a few vacancies of the posts of Professional Assistants and action for recruitment is underway.

#### **Reprography :**

The Reprographic Services are being augmented with a microfiche Reader-Printer for which orders have been placed. Volumes III and IV of the Abstracts of Ph.D. Theses have been compiled, printed and bound within the Library. With these volumes the Library has published abstracts for all the theses of Ph.Ds submitted from the Institute's inception till the last convocation.

#### **Bindery :**

The Library Bindery continues to meet the immediate requirements of the Library as well as those of different Departments and Centres of the Institute. The external Binders are also retained for clearing the ever increasing work load in the Library Bindery.

As against Rs. 46 lakhs and Rs. 7 lakhs towards Recurring and Non-Recurring grant of the Library respectively a sum of Rs. 60.73 lakhs and Rs. 5.35 lakhs have been spent during the year by diversion of additional funds towards the end.

### **B. Acquisition and Processing Division (A & P) :**

Publications worth Rs. 20.5 lakhs have been added to the collection during 1987-88. The increase in intake was due to a windfall of Rs. 5 lakhs in March '88 besides various Projects' funds for procurement of books. The Division rose to the occasion and assimilated the additional funds in record time without compromising on audit requirements.

### **C. Circulation, Reference and Maintenance Division (CRM) :**

The membership of the Library has been opened to all the alumni of the Institute on application for a nominal fee. Similarly, Honorary Membership for life has been extended to retired academic staff of the Institute. The Corporate Membership of the Library has been largely taken over by Industrial Associateship, leaving a few academic institutions to the direct care of the Central Library. The membership of Library due to Industrial Associateship has risen to a total of 122.



The services of alerting the researchers to the technical articles in Non-Core journals are being continued. The assistance to readers outside the normal working hours by Batch Leaders is being offered on request. Similarly the Stack Assistants in each of the three Stacks continue to trace out publications not immediately available on shelves as recorded in the Stack Registers by clientele are being attended to and the readers are informed of their availability.

Periodically Video and other Audio-Visual demonstrations on technical subjects were held as part of User Education programs. Whenever groups of Library Science Students of outside Institutions visited the Library, the Audio-Visual demonstrations were also conducted.

The Book Banks for General and Weaker Sections continued to be used by the students as before.

#### D. Periodicals and Serials Division (P & S) :

With the completion of protracted exercise of correspondence/consultation with all the Departments and Centres of the Institute for their journals requirements for the next five years the lists of periodicals were ultimately finalised. This massive review has resulted in cutting out 119 less used Periodicals and ordering of 450 new titles effective 1988 with an additional grant of Rs. 8 lakhs.

Journals upto 1986 were collected, listed, bound and made available to readers.

All documents received for translation were promptly got translated and sent to parties who requested for them.

#### E. General

The staff members mentioned below attended Seminars / Conferences / Workshops noted against their names respectively :

Shri V. S. Nazir Ahmed, Librarian attended a short course on Computer-Aided Library and Information Systems and use of CDS/ISIS Retrieval Systems held at Burdwan University, Burdwan during 21st to 26th September 1987 conducted under the auspices of IASLIC, Calcutta.

He has also attended a Seminar on 'Information Personnel Development' (DRTC Silver Jubilee Seminar-1987) during the period 16-12-1987 to 20-12-1987 under the auspices of the Indian Statistical Institute, Bangalore.

Shri P. Venkatesan and Shri N. Satyamurthi, Assistant Librarians (SG) have attended and participated in the 16th All India Conference of IASLIC held at Shri Venkateswara University, Tirupati.

Following are basic statistics of Library Performance during the years mentioned below them:—

1986—87		1987—88
<b>Library Membership</b>		
3,525	Institute Members (Staff & Students)	3,712
68	Outside Members—Individual	70
2	Outside Members—Corporate	2
95	Outside Members—Industrial Associateship	122
293	Consultation permits	283

**Circulation :**

1,05,475	Number of Readers visited	<b>94,109</b>
1,30,517	Number of Volumes issued	<b>1,13,901</b>

**To Individuals :- Subjectwise :**

43,095	Science	<b>32,062</b>
53,908	Technology	<b>50,002</b>
15,906	Humanities	<b>20,640</b>
3,937	Text Book Reference	<b>2,711</b>
9,009	Periodicals	<b>8,223</b>

**To Departments :-**

8,662	To Departments	<b>9,594</b>
7,012	Departmental Loan	<b>8,300</b>
1,650	Permanent Loan	<b>1,294</b>

**In Book Banks :-**

	<b>General</b>	<b>Weaker Section</b>
Collection	1,286	4,900
Issued	1,020	1,500

**Number of Reservation For Books :**

8,710	Registered	<b>5,512</b>
4,591	Fulfilled	<b>4,313</b>

**Amount of Overdues and other Charges Realised**

1,33,715	Amount of Overdues and othe charges realised	<b>87,225</b>
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**Inter-Library Loans**

112	Borrowed for Institute Members	<b>62</b>
245	Lent out from Institute Library	<b>28</b>

### Audio-Visual Activities

37	No. of Audio-Visual software available	52
13	No. of Video cassettes available	43
57	No. of Audio-Visual programmes conducted	19
376	No. of persons attended	121

### Acquisition of Books & Back Volumes :

3,706	Books	5,701
2,096	Bound Volumes of Periodicals	2,754
265	Pamphlets and Reports	319
—	Microfilms/Microfiche	2
43	Institute Ph.D Theses	60
6,110	Total Intake during the year	8,835
2,27,496	Total Accessions at the end of March 1988	2,36,365

### Current Periodicals :

1,243	By Subscription	1,406
195	By Exchange/Gift	195
4	Translations arranged	9

### Reprographic Services :

1,49,217	Xerox Copies made	1,29,353
350	Gestafax (Electronic Stencil)	117
1,090	Rotamasters prepared and printed	1,238

### Binding :

995	No. of Books and Journals bound in Library Bindery + (Spot Bound)	851
3,169	No. of Books and Journals bound through External Binders	2,756
1,200	No. of other publications (Reports, Lecture Notes etc.) bound in Library Bindery	2,621
		900

## CENTRAL WORKSHOP

In the year 1987-88, Workshop received 705 work orders from Departments in connection with Projects, Research and Maintenance work in addition to the regular training programme for the students of B. Tech.

Advanced Workshop Course was conducted during the Summer (April to May) to the B. Tech. students and 24 students were trained.

During the above period IC & SR work was also undertaken and completed.

### Some of the IC & SR work undertaken during 1987-88.

- 1) Splitting machine blades and guide plates - an import substitution to M/s. Cortica Manufacturing (India) Pvt. Ltd, Madras-71.
- 2) Precision gears and pinions for Muir head Transmitter drum drive and Engraving optical gratings on discs for The Hindu, Madras-2.
- 3) Stainless steel nozzle for Shri A.M.M. Murugappa Chettiar Research Centre, Tharamani, Madras.
- 4) Calibration of pressure gauges for Heavy Vehicles Factory, Avadi.

The Transport system of the Institute is also controlled and maintained by the Central Workshop.

## INSTITUTE HOSPITAL

The Institute Hospital is a 30 bedded hospital rendering medical aid to a population of nearly 10,000 (Students and Staff) on an average of 300 patients are daily treated in the out-patient Department. The Hospital offers out-patient and in-patient services for Medical, Surgical, Obstetrics, Gynaecological, Paediatric, Psychiatric, ENT and Ophthalmic treatment.

Dr. A. Ganesan, M.D. is the Chief Medical Officer.

The following Medical Officers are rendering their services in their respective lines.

1. Dr. N. A. Jayavelan, M.B.B.S. Resident Medical Officer
2. Dr. Sumati Khangaonkar,  
M.B.B.S., D.A.O. Anaesthetist
3. Dr. Lalithakumari, M.B.B.S., D.G.O. Gynaecologist
4. Dr. S. Aruna, B.Sc., M.B.B.S. Medical Officer
5. Dr. N. K. Sekaran, M.B.B.S. (Junior Medical Officer)
6. Dr. S. Kameswaran, M.S., Ph.D.,  
F.R.C.S. (Ed.) ENT Consultant  
F.R.C.S. (Glax) (Part-time)  
F.R.C.S. (D.L.O.)
7. Dr. S. Devaji Rao, M.S., M.N.A.M.S. Consultant Surgeon (Part-time)
8. Dr. R. Sathyanathan, M.D., D.P.M. Consultant Psychiatrist (Part-time)
9. Dr. R. Thara, M.D., D.P.M. Consultant Psychiatrist (Part-time)
10. Dr. S. Rathnamala, M.B.B.S., D.O. Eye Specialist (Part-time)

Sri L. Palaniappan is the Lay Secretary and is assisting the Chief Medical Officer in administration work of the Hospital to which "Medical Reimbursement Unit" is also attached.

Ambulance service is available round the clock and one Medical Officer is posted for call-duty and is available for all the 24 hours of a day to attend to emergency cases in the Hospital.

Laboratory tests are undertaken for Bacteriological and few Bio-chemical investigations. 2 ECG machines are available with the Hospital. Some major operations for conditions like Hernia and Peptic Ulcer are undertaken in our modernised operation Theatre.

From April 1987 to March 1988, 207 doses against Polio and 350 doses of Triple Antigen (against Diphtheria, Pertusis and Tetanus) as 3 primary doses a month apart and a single booster doses at appropriate intervals were given.

Regarding incentive scheme for promotion of small family norms introduced by Government of India, Family Planning Operations are conducted at this Hospital.

**Statistics :**

**April 1987 to March 1988**

1. Total No. of out-patients	1,03,335
2. Total No. of in-patients	476
3. Emergencies attended	3,573
4. Dressing	22,680
5. Injections	28,080
6. Delivery	11
7. Pathology	
a) Urine	3,615
b) Motion	2,410
c) Blood	4,527
8. Bio-Chemistry :	
a) Blood Sugar	1,086
b) Urea	124

## PLACEMENT OFFICE

The placement Office, designated with the responsibility to procure placements and arrange inplant training in various industrial establishments for students of this Institute, was very active during the academic year 1987-88. Towards this end, this office maintained a very close interaction with industrial establishments in private as well as public sectors. It liaised with as many as over 150 companies during the year. As a result, about 85 companies visited this office to hold campus-interviews. The placement office was able to get jobs in the Indian industries for almost all the students who were serious about making their career immediately on completion of their academic programme at the Institute.

During the year that passed, a number of steps were taken to serve the student community more effectively :-

1. Each of the student was provided with complete details relating to career opportunities available in the country in different disciplines much before the placement session began so that they could plan their future programme of action with knowledge and fore - thought.
2. All the final year students were given complete brief about the modus operandi adopted by various companies in recruiting their personnel.

For the benefit of the M. Tech. students who are passing out in December, the placement office started the campus recruitment programmes in September itself. Because of the early commencement of the campus interviews, most of the Post-Graduates who used the services of this office could get employment well in time.

On the recommendations of the students Placement Committee, the students were offered one firm job and one 'Dream Job'. The student-representatives helped the Placement Office in monitoring the implementation of this scheme.

In so far as training was concerned, this office continued to make energetic efforts to get training facilities for our students who made a request to this effect. The office also wrote letters to a number of companies and the response from them was as good as was in previous years.

## ALUMNI ASSOCIATION

The Alumni Association had been very active this year. The following are some of its important activities

1. The Alumni Associations' drive in collecting the addresses of its alumni to bring out an Alumni Directory is in full swing. Advertisements in leading newspapers had been placed. The response is encouraging.
2. The Annual Rendezvous '88 organised in January 1988 was a great success. It was very well attended by a large number of alumni and present students. The debate on the topic 'Engineering graduates pursuing management education betray Engineering' drew lot of response and brought about a togetherness of the alumni.
3. The IIT Madras Alumni Association of North America had donated 13 Pc's to IIT Madras Alumni Association, Madras. The Alumni Association have obtained all necessary certificates to receive the gift without any further delay. The Association is thankful to IIT Madras, North America Alumni Association for their thoughtful and generous gift.
4. The Alumni Association organised a meeting of the students seeking admission to postgraduate diploma program of IIM. The discussion was very fruitful and the question answer session was conducted by an ex faculty member at IIM Bangalore.

The Alumni Association hosted a farewell tea to the out going students and provided them with musical entertainment conducted by alumni of IIT Madras drawn from different places.



## WEAKER SECTION AND FOREIGN STUDENTS

### B. Tech :

22½% of the seats are reserved for the students belonging to SC/ST community. At present they are admitted through the Joint Entrance Examination with a relaxation. These students have to get only 2/3 of the marks obtained by the last student of the general category to get qualified for admission. 21 SC/ST students joined the B. Tech. degree course during the academic year 1987-88. Students admitted against the SC/ST reservation quota are given the following benefits :

1. Travelling allowance (IInd class train fare / ordinary bus fare) from the place of residence to Madras to join the B. Tech. degree course.
2. Free messing (basic menu) and pocket allowance of Rs. 70/- p.m. irrespective of their parent's/gaurdian's income.
3. Free tuition.
4. Free lodging.
5. Exclusive use of Weaker Section (SC/ST) Book Bank.
6. Drawing instrument (Mini-drafter) free of cost.
7. Help in getting placements.
8. Financial help for needy students through part-time job through Guidance and counselling Unit, if available.

### M. Tech. :

22½% of the seats are reservad for the students of S/C ST community. At present these students are admitted through GATE examination. 38 SC/ST students joined M.Tech. degree course during the academic year 1987 88. Students admitted against the SC/ST reservation quota are given the following benefits :

1. Exclusive use of Weaker Section (SC/ST) Book Bank.
2. Help in getting placements.
3. Financial help for needy students through part - time jobs through Guidance and Counselling Unit, if available.
4. Scholarship of Rs. 1,000/- p.m. as given to all students

### Preparatory Course :

The Preparatory course for one academic year duration was started during the year 1983-84. The course is meant exclusively for SC/ST students. Selection for this course is made from the SC/ST students who dit not get admission through the Joint Entrance Examination. After successfully completing the Preparatory course at IIT, they will be eligible to join B. Tech. degree course and they are not require d to write JEE again. 9 students joined the Preparatory course during the academic year 1987-88. Students admitted to the Preparatory course are given the following benefits :

1. Travelling allowance (IInd Class train fare/ordinary bus fare) from the place of residence to Madras to join the Preparatory course.
2. Free messing (basic menu) and pocket allowance of Rs. 70/- p.m. irrespective of their parent's/Gaurdian's income.
3. Free tuition.
4. Free lodgings.
5. Exclusive use of weaker Section (SC/ST) Book Bank.

**Foreign Students :**

At present 25 foreign students are studying at this Institute. (B. Tech : 21 + M. Tech : 1 + Ph. D: 3 = 25) During the academic year 1987-88, 6 foreign students joined B. Tech. degree course, 2 foreign students joined M. Tech. degree course (1 discontinued).

**Adviser :**

A faculty member is appointed as Adviser to look after the needs of the Weaker Section (SC/ST) and Foreign Students.

## INSTITUTE GYMKHANA

### Sports Events:

#### 1. The Inter IIT Sports Meet :

The Inter I. I. T. Sports meet this year was organised and conducted by Indian Institute of Technology, Bombay in December 1987. Both Men and Women teams practised hard and underwent a rigorous coaching camp. The Institute got Three golds in Basketball, Wt. lifting, Cricket and silver in Volley Ball, Hockey, Foot Ball, Shuttle, Tennis and came second overall. There was significant improvement over the previous years' performance and this gives us quite a good deal of hope for the future.

#### 2. Sportfest 1987 :

The Sportfest - Inter Collegiate level Tournaments in various games was conducted in August 1987. The Institute Team participated in all the Tournaments and gave good performance.

#### 3. All India Gerhard Fischer and Kokila Rajaiah Basketball Tournaments :

The above Tournaments for Men and Women attracted 20 and 14 teams respectively. P.S.G. Arts College, Coimbatore won the Trophy and Loyola College, Madras were the runner-up in the Men section. S.I.E.S. Bombay, were the Winners and Mount Carmel, Bangalore were the runner-up in the women section. The Tournaments were keenly contested as usual. Our Students organised and conducted the events like professionals. The events lasted for a week in January '87 and it was a feast for the sports-loving community of our Campus.

#### 4. All India Philips and Trinity Inter Collegiate Flood-Lit Volley Ball Tournaments :

The Gymkhana conducted the above Volleyball tournaments for Men and Women in the Student Activities Centre during the Second week of January '88. The Phillips Trophy was instituted by Peico Electronics and Electrical Limited and the Trinity Shield was donated by Prof: J.C. Kuriacose family. The auditorium gave the spectators a panoramic view of the game. 15 Men teams and 12 Women teams comprising both outstation and local teams were invited to participate. P.R.N.S.S. College, Mattanoor, Kerala won the Men's event and the St. Xaviers College Palayamkottai, were the runner - up. Lady Sivasamy Iyer School, for Women from Madras were the champions and the Madras Seva Sadan Girls School claimed the runner - up position in the women section. All the teams enjoyed their participation in the Tournament and considered their experience as though they were participating in an international event.

#### 5. The Student Activities Centre (SAC Building) :

The Student Activities Centre, a multi purpose flood-lit auditorium with wooden flooring is being put to use to the maximum. Our students are profiting a lot through this added facility. Some of the important events that were held here are as follows :

- (a) All India Philips and Trinity Inter Collegiate Flood-lit Volleyball Tournaments.
- (b) Inter Collegiate Table Tennis and Chess tournaments.
- (c) Three - a - side Basketball Tournament.
- (d) Institute Volleyball and Basketball Teams practice.
- (e) During the Inter I-I-T Coaching Camp, whenever the coaching and practices were affected due to rains, all the teams had their turns of coaching sessions in the SAC building.

## **6. Open Bridge Tournament :**

In the above Bridge Tournament organised in April 88, a number of teams from the various parts of the city participated. This tournament has found a permanent place in our Sports Programme.

7. In order to secure maximum participation from the students and staff, the following competitions were also organised by the Institute Gymkhana.

- a) **Annual Road Race.**
- b) **Open Cycle Race.**
- c) **3-a-side Basketball.**
- d) **3-a side Volleyball.**
- e) **4-a-side Hockey.**
- f) **6-a-side Football.**
- g) **Skating Hockey.**
- h) **Institute Chess Competition.**

8. The Inter Hostel Competition is one of the important programmes of the Gymkhana to ensure larger participation of the student body in Sports and Games. Competitions were held in 20 disciplines.

9. The National Sports Organisation programme for the 1 Year B, Tech students and the Physical Training and Games programmes for the H. A. L. Management and Design trainees were effectively organised by the Sports Officers of the Gymkhana.

## **Cultural Events ;**

### **LIT-SOC Rally (LSR)**

This Rally, held in July / August 1987 was intended to concentrate on the first years joining the Institute and expose fresher talent. The events of this rally were Skits, JAM, Tintoretto, Password, Quiz, Fine Arts and Elocution. The response was very decent.

## **2. Madras Open Events :**

As a prelude to Mardi Gras this year we had an inter - collegiate (Madras city Colleges) literary competition during the last week of October, fully sponsored by SOLIDAIRE. The festival on the whole attracted a reasonable crowd of participants. The winners were awarded cash prizes and certificates. Students from all the major Colleges of the city participated in this Literary festival. However, as usual there was lack of response from the students of I.I.T. as Spectators.

## **3. Institute open Events and Inter Hostel Competition :**

These events carried cash prizes and along with Intra - mural certificates. The events were spread out carefully over the two semesters.

#### 4. Out - Station Festivals :

The Institute cultural Team participated in the following outstation cultural Festivals and scored many distinctions :

- a. VIBRATIONS (IISc B'lore) : Our team did extremely well.  
Ist in Quiz, classical Music, Pot pourri & Debate  
IInd in JAM, & Dumb Charades  
IIIrd in Painting.  
overall SECOND POSITION
- b. FESTEMBER (REC TRICHY) : Our Team did moderately well.  
I in J.A.M.  
II in Debate & Classical Music  
III in Quiz, Pot Pourri  
Over all FIFTH POSITION.
- c. MOOD INDIGO (IIT BOMBAY) : Moderate performance.

#### 5. The following notable trophies/shields were won during the year.

- a) GD Memorial Rolling Trophy for Debate. Our team Members were V. Krishnan & S. Shivshankar.
- b) Seva Chakra Trophy for Quiz. Our team Members were S. Sudhakar & Vivekananda Rao.

#### Mardi Gras '88 :

The festival, has over the years, gained a reputation of being a trend - setter. The Mardigras this year was conducted from 22nd to 26th January 1988. Efforts were made to focus Indian Classical Culture in the Festival this year also.

There was very good response from outstation students this year. (130 members in all) Competitions were held for the following events: Western Music, JAM, Creative Writing, Painting and Carving. Elocution, Tintoretto, Classical Music, Debate, Password, Paper College and Pot Painting, Light Music. Flower Carpet, Dumb Charades, Skits, Quiz, Dramatics, Clay modelling and Cartooning, Music Quiz, Treasure Hunt, Sketching, Rangoli, Extempore etc.

The following Professional Shows were arranged for MARDIGRAS '88 :

1. Maharajapuram Santhanam : Vocal
2. R. K. Singhahit Singh & Cha Sija : Manipuri Dance
3. Illena Citaristi : Odissi & Chahu Dance
4. Pt. Ram Narayan : Saranji
5. The Epidemics : Indian Classical followed by Jazz performed  
L. Shankar on Double Violin (Ten-string Stereophone)  
Caroline on the Key Board  
Vikku Vinayakram on the Ghatam (Electronic)  
Zakir Hussain on the Tabla.

#### 4 (TN) AIR SQN (TECH) NCC IIT MADRAS

The aim of NCC Training are three fold :

- a) Development of leadership, comradeship, spirit of sportsmanship and the ideal of service.
- b) To create a force of **discipline manpower** which in a national emergency could be of assistance to the country.
- c) To provide training for students with a view to developing in them officer-like qualities, thus also enabling them to obtain commission in the Armed Forces.

To achieve the above objectives, this 4 (TN) Air Sqn (Tech) NCC provides two broad types of training. One is the institutional training and the second aspect is the Camp training. The institutional training covers general subjects like drill, weapon training, civil defence, health/hygiene, lessons in leadership fitness and attain basic knowledge of small arms. Besides, air subjects like history of air power, principle of flight, air armaments, Radio/Radar are taught to make the Air Wing cadets "Air Minded". Aeromodelling is another favourite subject with the Air cadets. Air cadets of this technical unit can take on to gliding also during their training with NCC.

The camp training involves collective training, where the cadets rough it out in the open. Here the cadets gain the art of "Esprit-de-corps" while working in a team. The annual training camps are held in the months of May / June and December / January incorporated with social service activities. The air wing cadets can also avail the opportunity of attending Vayu Sainik Camp and Attachment Camp.

In addition, NCC offers ample opportunity to imbibe in the cadets a sense of adventure, team work and discipline by providing opportunity in various adventure training programmes. It calls for quick reflexes and toughness and enables the cadets to discover their own capabilities by overcoming mental and physical challenges. The Adventure training includes Para-Jumping, Parasailing, hand-gliding, water-skiing, horse riding, rock climbing, mountaineering, trekking, sailing. Micro light flying, sky diving are fast becoming part of NCC Air wing activities.

Thus, 4 (TN) Air Sqn (Tech) NCC located within the IIT campus helps to instill a high sense of discipline, moral and a spirit of adventure in life of IIT students and induce in them the qualities of leadership.

## NATIONAL SERVICE SCHEME

The N. S. S. programme continued as in the earlier years with several new commitments taken up and successfully completed. The highlight of the students' activities during this period was the visit of the study team of four N. S. S. volunteers along with an adviser to a backward district in Thally Thaluk of Dharmapuri District. The volunteers did a survey of few villages along with the economic profile of families living in these villages and met the industrialists at Ranipet for establishing contacts for making footwear for industrial workers. This was a positive input to the villagers who now look forward to continued employment due to industrial backup.

Four blood donation camps were conducted during the above period. Further, 35 ladies in neighbouring village were provided training in tailoring and certificates were distributed after their successful completion of the programme.

A youth week was organized during January 1988 with programme as follows :

13th January 1988 : CULTURAL DAY MUSIC BY IIT YOUTH QUARK 5-00 — 6-00 p.m.

15th January 1988 : N. S. S. DAY  
Interested Participants Meet :  
Narmada Lawn : 5-00 p.m.

16th January 1988 : PHYSICAL FITNESS DAY  
Sports and physical fitness : Stadium. 5-00 p.m.

18th January 1988 : SKILL DEVELOPMENT DAY  
Photo/Drawing Competition Theme 'YOUTH' Prizes to be awarded  
Venue : Caveri Hostel Common Room 5-00 — 7-00 p.m.

19th January 1988 : AWARENESS DAY  
Film on Environment : CLT 5-00 p.m.

Thus the N. S. S. activities for this year has kept the volunteers busy and created awareness among the youth in educational institutions towards available opportunities in social activities.

## HOSTEL MANAGEMENT

As a residential institution, all the students admitted to IIT, Madras are required to reside within the campus. There are about 2300 single room accommodation distributed in eleven men's hostels and one ladies hostel.

Each hostel is administered by a Warden and an assistant Warden. The Warden is assisted by hostel council, constituting student secretaries in day to day functioning of the hostel. The hostel management is a centrally administered body and is overall in-charge of functioning of all the hostels and Central Supplies Unit. There are about 250 hostel staff and they are responsible to the management through the respective Wardens of the hostels. The Chairman council of Wardens is the Chairman of the hostel management.



## CENTRAL SUPPLIES UNIT

The Central Supplies Unit is administered by a Warden. It procures under the milk supply scheme, the milk from the nearby villages and from Tamilnadu Cooperative Milk Producers Federation, distributes to the student hostels to the residents of the campus and to the staff of the Institute residing around the campus. Under the provisions supply scheme, the unit procures the items of major consumption to hostels and distributes to them. It also procures non - perishable vegetables and supplies to the individual hostels.

## CONSTRUCTION OF BUILDINGS

During the period April '87 to March '88 the following works have been taken up for execution and completed.

<i>Sl.No.</i>	<i>Name of work</i>	<i>Amount</i>
1.	'D' type quarters (For Faculty members 12 flats).	— Rs. 15-00 Lakhs.
2.	Computer Centre Building.	— Rs. 90-00 ..
3.	Improvement to Restaurant (Akshaya).	— Rs. 0-60 ..
4.	Security Rest Hall.	— Rs. 1-49 ..
5.	Deep bore wells.	— Rs. 3-50 ..
6.	Extension to Mechanical Testing Laboratory (Metallurgical Engineering Department).	— Rs. 12-00 ..
7.	Providing compressor motor and supply lines for bore walls.	— Rs. 0-74 ..
8.	Constuction of IV stack for Central Library.	— Rs. 7-00 ..

Besides the above the following works have been taken up for execution.

1.	Construction of 3rd floor over south wing of Ocean Engineering Centre.	— Rs. 4-46 Lakhs.
2.	Extension of Electronics Lab (ESB Middle wing)	— Rs. 8-50 ..
3.	Under ground sump of 2 lakh gallons capacity.	— Rs. 9-20 ..
4.	Extension of Low Temperature Lab.	— Rs. 8-00 ..
5.	Extension to CSD (Fossap Project).	— Rs. 21-00 ..
6.	Deepening the lake.	— Rs. 6-10 ..
7.	Building for Production Engineering Lab.	— Rs. 26-00 ..
8.	Extension to BSB.	— Rs. 7-50 ..
9.	Extension to Bio-medical Lab.	— Rs. 1-24 ..
10.	Building for Hydrogen generator plant.	— Rs. 0-64 ..
11.	Extension of Chemical Kinetics lab (West wing in First floor).	— Rs. 3-28 ..
12.	Resurfacing of the Delhi Avenue Road.	— Rs. 8-00 ..
13.	Extension to Fluid Mechanics Lab.	— Rs. 3-82 ..
14.	Additions and alterations for 'F' type quarters (One Block of 12 flats)	— Rs. 4-48 ..
15.	Improvement to staff canteen.	— Rs. 0-92 ..
16.	Construction of V Stack	— Rs. 8-00 ..

In addition to the above, many more minor works pertaining to the various departments have also been undertaken and completed.

## **ADMINISTRATION**

### **Director**

Dr. L. S. Srinath

### **Deputy Director**

Prof. N. V. C. Swamy

### **Deans**

Prof. V.G.K. Murti, Dean, Academic Research

Prof. Surjit Singh, Dean, Academic Courses

Prof. D. Prithviraj, Dean, Staff Affairs

Prof. R. Natarajan, Dean, Students

Prof. V. Radhakrishnan, Dean, Industrial Consultancy and Sponsored Research.

### **Heads of Departments**

Prof. K. A. Damodaran	: Aerospace Engineering
Prof. P. S. Srinivasan	: Applied Mechanics
Prof. N. Subramanian	: Chemical Engineering
Prof. C. Kalidas	: Chemistry
Prof. H. Raman	: Civil Engineering
Prof. B. Yegnanarayana	: Computer Science and Engineering
Prof. B. Ramaswami	: Electrical Engineering
Prof. S. Ambirajan	: Humanities & Social Sciences
Prof. P. Achuthan	: Mathematics
Prof. V. M. Krishna Sastri	: Mechanical Engineering
Prof. V. M. Radhakrishnan	: Metallurgical Engineering
Prof. V. Sivaramakrishnan	: Physics

### **Central Administration**

#### **Registrar**

Sri. V. Shanmugam

#### **Deputy Registrars (SG)**

Sri. W. Hanumesi Rao : General Administration

Sri. M. Gopalan : Academic

#### **Finance & Accounts Officer (SG)**

Sri. A. V. Karunakaran Nambiar

**Stores & Purchase Officer**

Sri. A. Thirunavukarasu

**Internal Audit Officer**

Sri. R. Srinivasan

**Chief Security Officer**

Sri. T. S. Ramamoorthy

**Assistant Registrars (SG)**

Sri. D. Thiagarajan : Administration

Sri. G. R. Raghunatha Rao : Academic

**Assistant Registrars**

Kum. G. Saroja : Academic

Sri. K. Sekar : Administration

**Asst. Finance & Accounts Officer (SG)**

Sri. R. Kannan

**Asst. Stores & Purchase Officer (SG)**

Sri. M. C. James

**Asst. Stores & Purchase Officer**

Sri. M. Manickam

**Secretary (SG) To Director**

Sri. V. V. Natarajan

**Secretar To Director**

Sri. G. Natarajan

**Engineering Unit**

**Executive Engineer**

Sri. N. Malayalam

**Estate Officer**

Sri. V. N. Murthy

**Assistant Engineers (SG)**

Sri D. Ramanathan

Sri. Abraham Varghese

Sri. M. Doorvasulu Reddy

**Horticultural Superintendent (SG)**

Sri. P. Manickavasagam

## NAMES OF FACULTY MEMBERS, DEPARTMENT-WISE

### Aerospace Engineering

#### Professors

1. Dr. K.A.V. Pandalai Retired Wef 29-2-88
2. Dr. A.K. Sreekanth
3. Dr. T.K. Bose
7. Dr. T.K. Varadan
4. Sri. K. Balaraman (Head) From 1-6-88
5. Dr. K.A. Damodaran (Head) till 31-5-88
6. Dr. G. Subramanian
7. Dr. S. Krishnan

#### Assistant Professors

1. Dr. R.M. Siddaveere Gowda
2. Dr. E.G. Tulapurkara
3. Dr. S.S. Gokhale
4. Dr. A. Krishnan
5. Dr. S. Santhakumar

#### Lecturer

Sri. S. C. Rajan

Senior Scientific Officer Grade 1

Sri Job Kurian

### Applied Mechanics

#### Professors

1. Dr. N.V. Chandrasekaraswamy
2. Dr. B.V. Aswathanaraya Rao
3. Dr. R.S. Alwar
4. Dr. V. Ramamurti
5. Dr. P.S. Srinivasan
6. Dr. R.S. Srinivasan (Head)
7. Dr. T.M. Srinivasan
8. Dr. K.M. Patil
9. Dr. Megha Singh
10. Dr. N. Ganesan
11. Dr. B. Srinivasa Prabhu
12. Dr. V. Ramjee

**Assistant Professors**

1. Dr. S. Venkatesan Retd. on 31-10-87 & reemployed from 1-11-87
2. Dr. M. Balakrishnan
3. Dr. B H. Lakshmana Gowda
4. Dr. P.A. Aswathanarayana
5. Dr. S. Narayanan
6. Dr. J. Ramachandran
7. Dr. S. Radhakrishnan
8. Dr. P. Krishna Iyer

**Lecturer**

Dr. J. Lakshminarasimhan

**Senior Scientific Officer Grade II**

1. Sri S. Swarnamani
2. Smt. Sujatha Chandramohan
3. Sri G. Thomas

**Technical Officer**

Sri V. Ganesh

**Chemical Engineering**

**Professors**

1. Dr. T. Gopichand
2. Dr. M. Satyanarayana
3. Dr. Y.B.G. Varma
4. Dr. M. Ramanujam
5. Dr. N. Subramanian (Head)
6. Dr. C.A. Sastry
7. Dr. M.S. Ananth
8. Dr. Ch. Durga Prasada Rao

**Associate Professors**

1. Dr. T. Venkatram
2. Dr. G.S. Davies
3. Dr. A. Baradarajan
4. Dr. C. Chandra Prasad

**Assistant Professors**

1. Dr. K. Remananda Rao
2. Dr. R. Subramaniam
3. Dr. S. Subba Rao
4. Dr. N.R. Neelakantan
5. Dr. R. Vedaraman
6. Dr. D.V. Seetharamamurthy
7. Dr. T.K. Ramanujam
8. Dr. K. Krishnaiah
9. Dr. V. Ravichandran
10. Dr. Tapobrata Panda
11. Dr. V. Sriramachandra Rao

**Lecturer**

Shri S.K. Rakshit

**Technical Officer (SG)**

Sri. B.V. Sreeramulu

### Technical Officers

1. Sri. S. Shanmugam
2. Sri. V. Raman
3. Sri. C. Lalitha Prasad

### Chemistry

#### Professors

1. Dr. J.C. Kuriacose
2. Dr. V. Srinivasan
3. Dr. G. Aravamudhan
4. Dr. C. Narayana Pillai
5. Dr. P.T. Manoharan
6. Dr. C. Kalidas (Head)
7. Dr. S.R. Ramadas
8. Dr. V. Ramakrishnan
9. Dr. T.V. Ramakrishna
10. Dr. M. Ramakrishna Udupa
11. Dr. C.S. Swamy
12. Dr. J. Rajaram
13. Dr. V. Mahadeva Iyer
14. Dr. R. Narayan
15. Dr. M.S. Gopinathan

#### Assistant Professors

1. Dr. M. Srinivasan
2. Dr. K.K. Balasubramanian
3. Dr. B. Viswanathan
4. V.R. Satyanarayana Rao
5. Dr. D.V. Raman
6. Dr. (Mrs.) T.S. Chandra
7. Dr. R. Ramasamy
8. Dr. C. S. Venkatachalam
9. Dr. S. Vancheesan
10. Dr. T.K. Varadarajan
11. Dr. N. Balasubramanian

#### Lecturers

1. Dr. R.P. Viswanath
2. Dr. N. Sundaram
3. Dr. (Smt.) K. Lalitha
4. Dr. M.N. Sudheendra Rao

#### Senior Scientific Officer Grade II

1. Dr. M.S. Subramanian
2. Dr. T. Subrahmanian

### Civil Engineering

#### Professors

1. Dr. K.S. Sankaran Rtd. Wef 30-6-87
2. Dr. P. Srinivasa Rao
3. Dr. D. Johnson Victor
4. Dr. L.N. Ramamurthy
5. Dr. H. Raman (Head.)
6. Dr. T.P. Ganesan
7. Dr. C.S. Krishnamurthy
8. Dr. R. Radhakrishnan
9. Dr. N. Rajagopalan
10. Dr. K. Elango
11. Dr. Nainan P. Kurian
12. Dr. V. Paramasivam
13. Dr. H. Suresh Rao
14. Dr. P. Kalyanasundaram
15. Dr. P.K. Aravindan
16. Dr. V. Kalyanaraman

### **Assistant Professors**

- |                           |                            |
|---------------------------|----------------------------|
| 1. Dr. H. Achyutha        | 4. Dr. B. S. Thandaveswara |
| 2. Dr. N. R. Krishnaswamy | 5. Dr. M. S. Mathews       |
| 3. Dr. V. R. Rengaraju    | 6. Sri K. Gopalakrishna    |
|                           | 7. Dr. S. B. Pattnaik      |

### **Lecturers**

- |                  |                 |
|------------------|-----------------|
| 1. Sri S. Rajeev | 2. Sri S. Mohan |
|------------------|-----------------|

### **Senior Scientific Officer Grade II**

- |                         |                            |
|-------------------------|----------------------------|
| 1. Sri M. Subbi Reddy   | 4. Sri K. Ananthanarayanan |
| 2. Sri R. Ambalavanan   | 5. Sri V. Tamizharasan     |
| 3. Sri A. Ramachandriah | 6. Dr. K. Srinivasan       |

### **Technical Officers**

- |                  |                          |
|------------------|--------------------------|
| 1. Sri V. Raman  | 3. Sri P. R. Kothandaram |
| 2. Sri M. Innaci |                          |

### **Senior Scientific Officer Grade I**

Dr. N. Indrasenan

### **Chief Techno Economic Officer**

Sri D. Hariharan

### **Electrical Engineering**

#### **Professors**

- |   |                              |
|---|------------------------------|
| 1. Dr. M. Venugopal                         | 11. Dr. K. Radhakrishna Rao  |
| 2. Dr. V. G. K. Murti                       | 12. Dr. P. Sankaran          |
| 3. Dr. M. K. Achuthan                       | 13. Dr. P. Subbarami Reddy   |
| 4. Dr. D. K. Banerjee                       | 14. Dr. V. Venkata Rao       |
| 5. Dr. B. Ramaswamy (Head) 1-11-87          | 15. Dr. M. Mukunda Rao       |
| 6. Dr. V. Seshadri                          | 16. Dr. K. N. Bhat           |
| 7. Dr. A. Kuppurajulu                       | 17. Dr. G. Sridhara Rao      |
| 8. Dr. Y. Narayana Rao (Head) till 31-10-87 | 18. Dr. S. S. Yegnanarayanan |
| 9. Dr. J. P. Raina                          | 19. Dr. Vedam Subrahmaniam   |
| 10. Dr. V. V. Sastry                        |                              |

### **Associate Professor**

Dr. C. Dattatreyan



### Assistant Professors

1. Dr. T.A. Ramalinga Bhat
2. Dr. T.J. Vitto
3. Dr. Antony Reddy
4. Dr. C. Eswaran
5. Dr. M.V. Chalapathy Rao
6. Dr. R. Parimelazagan
7. Dr. P.A. Janakiraman
8. Dr. B.S. Bhanumathy
9. Dr. Ashok Jhun Jhunwala
10. Dr. C. Venkateshaiah
11. Dr. P. Sashidhara Rao
12. Dr. K. Ramar
13. Dr. G.T. Manohar
14. Dr. Bhaskar Ramamoorthy

### Lecturers

1. Sri. Varadharajan Subrahmanian
2. Sri. M. Krishnamurthi
3. Sri. P.C. Majhee
4. Sri. G. Govardhanagiri Rao
5. Dr. V. Jagadeesh Kumar

### Senior Design Engineer

1. Sri. R. Ramachandran
2. Sri. P. Rama Seshagari Rao

### Senior Scientific Officer Grade II

Sri. S. Karmalkar

### Technical Officers (SG)

1. Sri. A.S. Satheesan
2. Sri P.S. Kalyanasundaram

### Technical Officers

1. Sri. C. Srikumara Menon
2. Sri. R. Balasubramanian
3. Sri. T.V. Gopal
4. Sri. M. Nejmin Hariffin
5. Sri. D. Sadasiviah
6. Sri. K.N. Jothi
7. Sri C. R. Ramaswamy
8. Sri. P. Prabhakar Rao
9. Sri. J. Srinivasan
10. Sri. B. Sankaran

### Humanities & Social Sciences

#### Professors

1. Dr. S. Ramani (On deputation to NITIE)
2. Dr. S. Ambirajan (Head)
3. Dr. A.V. Krishna Rao
4. Dr. Dipak Chaudhuri
5. Dr. L.V.N. Sarma
6. Dr. R. Rajagopalan
7. Dr. Manfred Dutschke -(Relived from Service at his request wef 25-4-88 AN)

### Assistant Professors

1. Dr. C. Ramachandran
2. Sri. V.S. Kumar
3. Dr. R.N. Anantharaman
4. Dr. T.T. Narendran
5. Dr. L.S. Ganesh

### Lecturers

1. Dr. (Smt) Elizabeth Nainan Kurian
2. Sri. M. Durgaprasada Rao
3. Dr. (Kumari) Evangeline Manickam
4. Sri. S. Mohan
5. Dr. B. Subramanian
6. Dr. (Kumari) R. Malathi
7. Sri. G. Rajendran

### Senior Scientific Officer Grade II

Sri. S. Jayachandran

## **Mathematics**

### **Professors**

1. Dr. S.K. Srinivasan
2. Dr. L.V.K.V. Sarma
3. Dr. H.S. Paul
4. Dr. K.R. Parthasarathi
5. Dr. R. Subramanian
6. Dr. V.B. Johri
7. Dr. U.N. Srivastava
8. Dr. P. Achuthan (Head)

### **Associate Professors**

1. Dr. V. Subba Rao
2. Dr. C.M. Purushotham
3. Dr. P. Bhattacharya

### **Assistant Professors**

1. Dr. D.S. Subramanyam
2. Dr. Y. Nagendra
3. Dr. (Smt) S. Kalpagam
4. Dr. Avudainayagam
5. Dr. Surendranath Majhi
6. Dr. P.R. Parthasarathy
7. Dr. S.N. Venkatarangan
8. Dr. C.V. Raghava Rao

### **Lecturer**

1. Dr. P.V. Subramanyam
2. Dr. A. Rangan
3. Dr. S.G. Kamath
4. Dr. S.H. Kulkarni

### **Senior Scientific Officer Grade I**

Dr. K. Swaminathan

## **Mechanical Engineering**

### **Professors**

1. Dr. H.C. Radhakrishna
2. Dr. D. Prithviraj
3. Dr. M.A. Parameswaran
4. Dr. G.V.N. Ravudu
5. Dr. V.M. Krishna Sastry (Head)
6. Dr. V. Radhakrishnan
7. Dr. R. Natarajan
8. Dr. K. Lakshminarayana
9. Dr. K.A. Bhaskaran
10. Dr. K.V. Gopalakrishnan
11. Dr. K.N. Seetharamu
12. Dr. V. Sriramulu
13. Dr. A. Rammohan Rao
14. Dr. N. Venkatrayulu
15. Dr. P.K. Philip
16. Dr. M.A. Veluswami
17. Dr. S. Srinivasa Murthy
18. Dr. V. Ganesan
19. Dr. R. Raman

**Associate Professor**

Dr. T. Rajagopalan

**Assitant Professors**

- |                                |                              |
|--------------------------------|------------------------------|
| 1. Dr. P. Srinivasa Rao        | 11. Dr. K.R. Govinda Mallan  |
| 2. Dr. M. Madhusudhana Rao     | 12. Dr. K. Narayanaswamy     |
| 3. Dr. R. Krishnamurti         | 13. Dr. K.V. Chalapathi Rao  |
| 4. Dr. M.S. Shanmugam          | 14. Dr. T. Nagarajan         |
| 5. Dr. A. Venkatesh            | 15. Dr. K.N. Gopalan         |
| 6. Dr. Vijay R. Ragavan        | 16. Dr. V. Balabaskaran      |
| 7. Dr. B. Nagalingam           | 17. Dr. A.K. Kolar           |
| 8. Dr. U.S.P. Shet             | 18. Dr. K. Ramakotiswara Rao |
| 9. Dr. K. Gopinath             | 19. Dr. G. Muthuveerappan    |
| 10. Dr. O.V. Krishnaiah Chetty | 20. Dr. S. Kumaraswamy       |
|                                | 21. Dr. Y.G. Srinivasa       |

**Lecturers**

- |                                 |                           |
|---------------------------------|---------------------------|
| 1. Sri. K.S. Padiyar            | 8. Dr. N. Sivaprasad      |
| 2. Sri. V.N. Rajan              | 9. Dr. N. Sitaram         |
| 3. Sri. D V. Ramalingeswara Rao | 10. Dr. M. Govardhan      |
| 4. Sri. K.V. Thyagarajan        | 11. Dr. M.M. Mayuran      |
| 5. Dr. G. Kuppusamy             | 12. Dr. L. Vijayaraghavan |
| 6. Dr. V. Jayaprakash           | 13. Dr. B. Ramamurthy     |
| 7. Sri. S. Krishnamurthy        | 14. Sri. N. Ramesh Babu   |

**Senior Design Engineer**

- |                         |                             |
|-------------------------|-----------------------------|
| 1. Sri. M. Singaperumal | 2. Sri. S.D. Kalendar Saheb |
|-------------------------|-----------------------------|

**Senior Maintenance Engineer**

Sri. A. Arun

**Technical Officer (SG)**

Sri. U. R. Das

### Technical Officers

1. Sri. M. Velayudhan
2. Sri. S. Krishnaswamy
3. Sri. B.N. Somasekhara
4. Sri. V. Sankaran
5. Sri. A.K. Madhavakrishna n
6. Sri. R. Srinivasan

### Metallurgical Engineering

#### Professors

1. Dr. K. Srinivasa Raghavan
2. Dr. R. Vasudevan
3. Dr. H. Md Roshan
4. Dr. K. Ananthapadmanabhan
5. Dr. V.M. Radhakrishnan
6. Dr O. Prabhakar 20-6-88 (Head)

#### Associate Professor

Dr. D. R. G. Achar

#### Assistant Professors

1. Dr. K J. Lakshminarayana Iyer
2. Dr. C V. Gokularathnam
3. Dr. S.K. Seshadri
4. Dr. P. Venugopal
5. Dr. S. Ramakrishna Iyer
6. Dr. S.D. Pathak
7. Sri. R.K. Srikanta Kumaraswamy

#### Lecturers

1. Dr. S. Raghavan
2. Dr. V. Jagasivamani
3. Dr. P. Kesavan Nair
4. Dr. K. Prasad Rao
5. Dr. Ganpath Ram Sharma

### Senior Scientific Officers Grade II

1. Sri. S. Annamalai
2. Sri. S. Kumaran

### Technical Officers (SG)

1. Sri. B. Raghunatha Rao
2. Sri. V.K. Vidyasagar

### PHYSICS

#### Professors

1. Dr. R. Srinivasan
2. Dr. S. Radhakrishna
3. Dr. Y.V.G.S. Murthi (Head) till 19-7-87
4. Dr. J. Sobhanadri
5. Dr. V. Balakrishnan
6. Dr. K.V.S. Rama Rao
7. Dr. V. Sivaramakrishnan (Head) 20-7-87
8. Dr. G. Rangarajan
9. Dr. R. Ramji Rao
10. Dr. S.B.S. Sastri
11. Dr. B.M. Sivaram
12. Dr. R.S. Sirohi

#### Associate Professor

Dr. C. K. Narayanaswamy

### **Assistant Professors**

1. Dr. A.V. Narasimham
2. Dr. K. Viswanatha Reddi
3. Dr. (Smt) Maha Seshasayee
4. Dr. T.A. Prasada Rao
5. Dr. B.S.V.S. Ramachandracharyulu
6. Dr. V. Damodara Das
7. Dr. V. Ramachandran
8. Dr. S. Srinivasan
9. Dr. K. Srinivasan
10. Dr. B.S.V. Gopalam
11. Dr. V. Ramakrishnamurthy
12. Dr. P.C. Deshmukh
13. Dr. Sriraman Srinivasan
14. Dr. B. Subramanyam
15. Dr. Jagabandu Majhee
16. Dr. M. P. Kothiyal

### **Lecturers**

1. Dr. G. Sreenivasamurthy
2. Dr. D. V. Subrahmanya Murthy
3. Dr. K. Hariharan
4. Dr. A. Subrahmanyam
5. Dr. T.S. Natarajan
6. Dr. V. Venkateswara Rao
7. Dr. (Kumari) T.M. Vimala

### **Senior Scientific Officer Grade I**

Dr. Y. Syamasundar Rao

### **Senior Scientific Officers Grade II**

1. Sri K. Sarangapani
2. Dr. V. Sankaranarayanan

### **Chief Design Engineer**

1. Sri T.S. Chenna Basavan
2. Dr. D.K. Sharma

### **Technical Officer (SG)**

Sri U.D. Venkatarangaiah

### **Technical Officer**

Sri A.P. Venugopal  
Sri N. Krishnamohan

### **Computer Science and Engineering**

#### **Professors**

1. Dr. H.N. Mahabala
2. Dr. C.R. Muthukrishnan
3. Dr. R. Kalyana Krishnan
4. Dr. R. Nagarajan
5. Dr. B. Yegnanarayana (Head)

### **Assistant Professors**

1. Dr. (Smt.) Kamala Krithivasan
2. Dr. N. Parameswaran
3. Dr. S.V. Raghavan
4. Dr. S. Raman
5. Dr. C. Pandurangan

### **Manager (Operations)**

Sri P. Seshasayi

### **Lecturer**

Sri R. Sundar

**Centre For Systems & Devices**

Dr. M. S. Narasimhan (Prof)

**Centre For Rural Development**

Dr. T. Karunakaran, CTEO

**Senior Systems Programmer**

Sri. M. Kothanda Ramanujam

**Systems Engineer (Operations)**

Sri. R. Deenadayalu

**Shift Engineer**

Sri. K. G. Sundararajan

**Programmers Grade I**

1. Smt. Vatsala Krishnan
2. Dr. Smt. Vijayalaxmi Sirohi

**Senior Scientific Officers Grade II**

1. Sri. S. K. Ramesh
2. Sri. T. Ramalingam

**Ocean Engineering Centre**

**Professors**

1. Dr. V. Satyanarayana Raju
2. Dr. C. Ganapathy Chettiar (Head)
3. Dr. P. V. Indiresan
4. Dr. M. Ravindran
5. Dr. S. Narasimha Rao

**Associate Professor**

Dr. K. Muthukrishnaiah

**Principal Scientific Officer**

Dr. M. R. Pranesh

**Assistant Professors**

1. Dr. C. P. Vendhan
2. Dr. K. Ganesh Babu
3. Dr. S. P. Subramanian
4. Sri. R. L. Roy Chaudhury
5. Sri. P. Sambandam
6. Dr. R. Mahadevan
7. Dr. V. Sundar
8. Dr. V. G. Idichandy

**Senior Scientific Officers Grade I**

1. Sri. S. Meenakshisundaram
2. Dr. K. Rajagopalan
3. Sri. R. Natarajan

**Senior Scientific Officers Grade II**

- |                               |                       |
|-------------------------------|-----------------------|
| 1. Sri. S. K. Battacharya     | 5. Sri. Sajjan Thomas |
| 2. Dr. R. Sundaravadivelu     | 6. Sri. C. K. Vijayan |
| 3. Dr. S. R. Gandhi           | 7. Sri. J. S. Mani    |
| 4. Sri. V. Ananthasubramanian |                       |

**Regional Sophisticated Instrumentation Centre**

**Professors**

- |                        |                              |
|------------------------|------------------------------|
| 1. Dr. Surjit Singh    | 3. Dr. S. Subramanian (Head) |
| 2. Dr. P. T. Manoharan |                              |

**Assistant Professors**

- |                          |                            |
|--------------------------|----------------------------|
| 1. Dr. S. P. Venkateshan | 2. Dr. T. K. K. Srinivasan |
|--------------------------|----------------------------|

**Senior Scientific Officers Grade II**

- |                    |                        |
|--------------------|------------------------|
| 1. Sri. M. S. Moni | 2. Sri. G. Palaniswamy |
|--------------------|------------------------|

**Central Electronic Centre**

**Chief Instrumentation Engineer**

Sri. T. N. Ranganathan

**Senior Instrumentation Engineer**

Sri. R. Rangachari

**Scientific Officer Grade II**

Sri. K. R. Venkatachalam

**Technical Officers**

- |                  |                      |
|------------------|----------------------|
| 1. Sri. K. Raman | 2. Sri. M. Kumaravel |
|------------------|----------------------|

**Materials Science Research Centre**

**Professor**

Dr. G. V. Subba Rao

**Senior Scientific Officer Grade II**

Dr. U. V. Varada Raju

**Technical Officers**

- |                           |                           |
|---------------------------|---------------------------|
| 1. Sri. V. S. Subramanian | 2. Sri. K. Chandrasekaran |
|---------------------------|---------------------------|

**Fibre-Re-Inforced Plastic Research Centre**

**Chief Design Engineer**

Dr. N. Gopalakrishna Nair

**Assistant Professor**

Dr. R. Palaninathan

**Senior Design Engineer**

Sri. S. K. Malhotra

Sri. B. Jagadish Chandra Babu

**Technical Officer**

Sri. G. R. Santhana Krishnan

**Centre For Industrial Consultancy And Sponsored Research**

**Chief Techno Economic Officer**

Dr. D. Balakrishnan

**Senior Techno Economic Officers**

1. Dr. C. Sivaprasada Rao

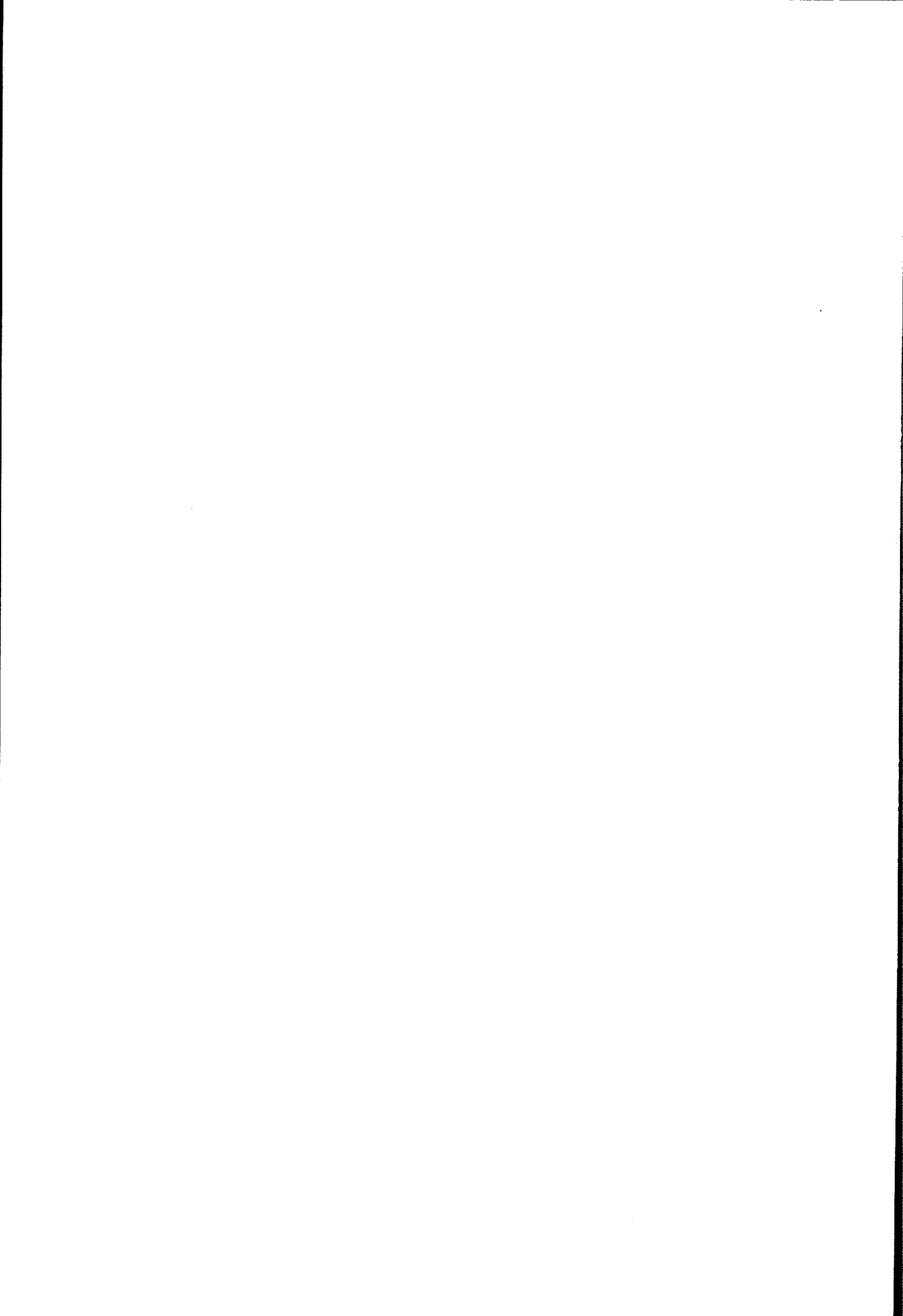
2. Sri. Y. G. Narasimha



## BUDGET PROPOSALS

1987-88 & 1988-89

Description	Budget Estimates for 1987-88		(Rupees In Lakhs)	
	(as proposed)	as allocated by Board of Governors	Revised Estimates 1987-88 as per Finance Committee	Budget Estimates 1988-89 (as proposed)
(1)	(2)	(3)	(4)	(5)
NON-PLAN				
RECURRING	1,234.09	1,247.93	1,323.42	1,413.78
NON-RECURRING	100.00	10.00	10.00	10.00
TOTAL NON-PLAN	1,334.09	1,257.93	1,333.42	1,423.78
PLAN				
RECURRING	23.50	13.60	29.50	92.50
NON-RECURRING	330.96	401.47	663.32	811.15
TOTAL PLAN	354.46	415.07	692.82	903.65
INCOME	144.26	144.26	153.20	153.20



**Statement of Accounts**  
**1986 - 87**

**INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT**

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**EXPENDITURE**

---

	Rs.	Rs.
<b>Educational Expenses :-</b>		
<b>Pay of Teaching Staff :-</b>		
Department of		
Chemistry	18 05,119	
Physics	19,17,918	
Mathematics	11,29,825	
Humanities & Social Sciences	7,08,218	
Civil Engineering	17,38,951	
Mechanical Engineering	26,97,528	
Electrical Engineering	29,41,463	
Chemical Engineering	12,14,919	
Metallurgical Engineering	10,79,221	
Applied Mechanics	12,48,635	
Aerospace Engineering	8 26,195	
Ocean Engineering	9,66,364	
Computer Science & Engg.	3,00,444	
	<hr/>	1,85,74,800

C/o

---

1,85,74,800

**TECHNOLOGY, MADRAS-600 036.**

**FOR THE YEAR ENDED 31st MARCH 1987**

<b>INCOME</b>		Rs.	Rs.
<b>Grant from Govt. of India</b>			
(On Revenue Account)		8,25,64,000	
<b>Less : 1985-86 Transfer</b>		36,40,000	
		<u>7,89,24,000</u>	
<b>Add : 1986-87 Outstanding adjustment</b>		1,01,00,000	
		<u>8,90,24,000</u>	
<b>General Income</b>			
Tuition Fees		5,17,087	
Hostel Seat Rent		2,53,939	
Gymkhana Fees	46,680		
Medical Fees	16,062		
		<u>62,742</u>	
Students Amenities Fund		35,463	
Fine		8,553	
Examination Fees		66,500	
Degree in Absentia		3,399	
Application Fees from Students		17,51,941	
Application Fees for Appointment		2,162	
Admission Fees		31,360	
Grade Card		4,373	
		<u>27,37,519</u>	
			<u>9,17,61,519</u>
	<b>C/o</b>		

**INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNTS**

EXPENDITURE		
	Rs.	Rs
B/f		1,85,74,800
<b>Pay of Non-Teaching Staff :</b>		
Department of Chemistry	5,28,028	
Physics	10,19,444	
Mathematics	98,237	
Humanities & Social Sciences	1,88,446	
Civil Engineering	10,32,904	
Mechanical Engineering	16,08,666	
Electrical Engineering	12,86,466	
Chemical Engineering	6,48,269	
Metallurgical Engineering	7,38,598	
Applied Mechanics	5,73,410	
Aerospace Engineering	4,46,579	
Ocean Engineering	3,28,640	
Computer Science & Engg.	4,13,092	
	-----	89,10,779
<b>Pay and Allowances :</b>		
Centres - Officers	9,73,949	
Centres - Others	10,14,978	
	-----	19,88,927
Central Electronic Centre (Pay & Allowances)		2,79,427
Air-Conditioning Unit (Pay & Allowances)		2,37,129
<b>Pay and Allowances :</b>		
Indo-German Projects		1,78,019
	C/o	----- 3,01,69,081

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1986-87

INCOME

	Rs.	Rs.
B/f		9,17,61,519
<b>Miscellaneous Receipts:</b>		
Institute Bus Collections	5,39,189	
Hire Charges on Institute Vehicles	17,969	
Licence Fees	13,95,390	
Electricity, Water & Service Charges	7,45,934	
Lawns & Gardens (Auction Sale of Trees Usufructs)	69,170	
Income from Computer Centre	9,37,932	
Other Receipts	71,86,602	
	<u>          </u>	1,08,92,186

C/o

10,26,53,705

INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE		Rs.	Rs.
	B/f.		3,01,69,081
<b>Department Expenses :</b>			
Chemistry		4,99,128	
Physics		5,97,372	
Mathematics		41,079	
Humanities & Social Sciences		36,471	
Civil Engineering		3,17,256	
Mechanical Engineering		5,67,148	
Electrical Engineering		7,35,837	
Chemical Engineering		3,33,116	
Metallurgical Engineering		6,00,256	
Applied Mechanics		3,08,820	
Aerospace Engineering		2,25,800	
Ocean Engineering		2,14,773	
Computer Science & Engg.		21,50,668	
		-----	66,27,724
<b>Library :</b>			
<b>Pay &amp; Allowances :</b>			
Officers		2,65,835	
Establishment		12,36,177	
Contingencies - Operating Cost	2,90,205		
Binding Charges	40,126		
Journal of General Interest	3,779		
NMR Charges	30,726		
		-----	
		3,64,836	
		-----	18,66,848
	C/o		3,86,63,653



TECHNOLOGY, MADRAS-600 036

FOR THE YEAR ENDED 31st MARCH 1987

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INCOME

---

	Rs.	Rs.
B/f		10,26,53,705

C/o

-----  
10,26,53,705

---

INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE		
	Rs.	Rs.
B/f.		3,86,63,653
<b>Workshops :</b>		
Pay and Allowances of Workshop Superintendents	4,71,366	
Pay and Allowances of Other Staff	23,50,914	
Working Expenses (Instruments, Tools and other Consumables)	2,40,709	
	-----	30,62,989
Stipend to Apprentices		1,22,022
<b>Centres / Central Services Working Expenses :</b>		
Fibre-Reinforced Plastic Research Centre		78,834
Material Science Research Centre		1,91,799
Bio-Sciences and Bio-Technology		65,537
Engineering Design Centre		44,366
Central Electronic Centre		94,176
Regional Sophisticated Instrumentation Centre		1,76,816
Central Glass Blowing Section		26,507
Central Photographic Section		32,324
Air-Conditioning Unit		2,67,046
Central Gas Supply Unit		9,906
Rural Development Research Activities		53,410
Indo-German Project		1,95,839
		-----
C/o		4,30,85,224

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1987

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INCOME

---

	Rs.	Rs.
B/f		10,26,53,705

C/o.

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10,26,53,705

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INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE		Rs.	Rs.
	B/f.		4,30,85,224
<b>Institute Scholarships :</b>			
Post Graduate & Research		68,66,894	
Under Graduate		4,70,407	
		-----	73,37,301
<b>N.C.C. / N.S.S.</b>			
Pay and Allowances		83,377	
Other Expenditure		36,311	
		-----	1,19,688
<b>Athletic and Gymkhana :</b>			
Pay and Allowances			2,33,135
Contribution to Gymkhana Management			5,99,788
<b>Others Items :</b>			
Part-time Lecturers			4,800
Visiting Professors			34,020
Technical Bulletins & Journals			1,47,268
Symposia and Seminars			39,641
Inplant Training/Courses/Visits			92,533
Continuing Education Programme organised by the Institute			21,471
Guidance and Counselling Unit			11,465
Special Coaching Programme for SC/ST Students			1,669
			-----
	C/o.		5,17,28,003

**TECHNOLOGY, MADRAS-600 036.**

**FOR THE YEAR ENDED 31st MARCH 1987**

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**INCOME**

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**Rs.**

**B/f.**

**10,26,53,705**

**C/o**

**10,26,53,705**

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**INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT**

EXPENDITURE		
	Rs.	Rs.
B/f		5,17,28,003
Quality Improvement Programme		11,877
Director's Discretionary Fund for Research		21,160
H.A.L. Trainees		1,00,000
Memership Fees to Outside bodies		26,003
Remuneration to External Examiners		77,377
Joint Entrance Examination		7,52,804
Graduate Aptitude Test in Engineering (GATE)		8,51,986
Convocation		99,490
Prizes for Academic Distinction		9,071
Contribution towards Institute participation in Programme of National Conference		24,705
 <b>Hostels :</b>		
Allowances to Wardens		42,150
Subsidy to Hostels		33,48,190
Security to Hostels		2,16,253
Subsidy towards Salaries of TH Employees		6,020
 <b>Central Administration :</b>		
Pay and Allowances - Officers	21,09,955	
Pay and Allowances - Establishment	55,81,447	
	76,91,402	
C/o,		6,50,06,491

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1987

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INCOME

---

B/f.

Rs.

10,26,53,705

C/o

---

10,26,53,705

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INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE

	Rs.	Rs.
B/f		6,50,06,491
<b>Contingencies :</b>		
Postage	3,66,726	
Entertainment	51,767	
Telephone	7,60,027	
Liveries	3,41,642	
Stationery	6,94,506	
Printing	2,37,149	
Advertisement	4,52,411	
Sundries (Misc. Expenses)	3,07,657	
G. H. Provisions	85,525	
	-----	32,97,410
<b>Other Items :</b>		
Director's Discretionary Payment		13,684
<b>Stores :</b>		
General Stores	15,757	
Pay & Allowances—Officers	1,75,688	
Pay & Allowances—Estt.	4,20,613	
	-----	6,12,058
<b>Security :</b>		
Other Charges		3,50,918
<b>Lawns and Gardens :</b>		
Pay and Allowances of Horticultural Superintendent	36,972	
Pay and Allowances—Others	1,54,003	
	-----	1,90,975
		-----
C/o.		6,94,71,536



TECHNOLOGY, MADRAS-600 036

FOR THE YEAR ENDED 31st MARCH 1987

---

INCOME

---

	Rs.
B/f.	10,26,53,705

C/o.

---

10,26,53,705

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INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE		Rs.	Rs.
	B/F.		6,94,71,536
Power			43,14,280
Mosquito Control			6,307
Water			20,39,919
Oil and Petrol			2,40,906
<b>Repairs and Maintenance :</b>			
a) Furniture		3,36,863	
b) Typewrites & Duplicators		95,713	
c) Motor Vehicles		2,55,215	
		6,87,791	6,87,791
Duty Insurance and Road Taxes			84,960
<b>Works and Maintenance :</b>			
Pay & Allowances—Officers		1,98,958	
Pay & Allowances—Establishment		53,61,257	
Other Charges		30,15,179	
		85,75,394	85,75,394
Property Tax			1,94,126
<b>Hospital :</b>			
Pay & Allowances—Medical Officers		2,74,724	
Pay & Allowances—Establishment		4,63,253	
Purchase of Medicines		6,26,216	
		13,64,193	13,64,193
	C/o.		8,69,79,412

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1987

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INCOME	
	Rs.
B/F.	10,26,53,705

---

c/o

10,26,53,705

INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE		Rs.	Rs.
	B/f.		8,69,72,412
Subsidy to Vana Vani School			1,62,279
Audit Charges			1,35,875
Legal Expenses			79,579
Reimbursement of Stamp Duty			84,647
 <b>Travelling Expenses :</b>			
Board of Governors		12,955	
Staff Selection Committee and other Committees		52,665	
Candidates called for Interview for appointments		34,955	
External Examiners		1,18,246	
		-----	2,18,821
	C/o.		----- 8,76,60,613

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1986-87

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INCOME

---

	Rs.	Rs.
B/f.		10,26,53,705

C/o.

---

10,26,53,705

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INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT

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EXPENDITURE		
	Rs.	Rs.
B/f.		8,76,50,613
Leave Salary and Pension Contribution on account of Personnel on foreign Services		76 633
Employees Welfare Scheme		946
Campus Amenities		11,851
G. P. F., Contributions, etc.		80,66,726
Hostel Contingencies		1,271
Excess of Income over Expenditure		68,35,665
		-----
Total		10,26,53,705

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*Finance & Accounts Officer*  
Indian Institute of Technology  
Madras-600 036

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1987

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INCOME

---

	Rs.	Rs.
B/f.		10,26,53,705

Total

10,26,53,705

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*Registrar*  
Indian Institute of Technology  
Madras-600 036

*Director*  
Indian Institute of Technology  
Madras-600 036

INDIAN INSTITUTE OF  
BALANCE SHEET

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CAPITAL FUND AND LIABILITIES

---

	Rs.	Rs.
<b>CAPITAL :</b>		
Value of Land per contra		1,12,17,262
Block value of German aid per contra equipment	10,14,32,739	
Technical books and journals per contra	15,56,230	
	-----	10,29,88,969
Value of aid Alexander Von Humboldt Foundation	10,83,000	
Value of aid from German Volks Wagon Foundation	2,99,860	
	-----	13,82,860
<b>COMPUTER SYSTEMS</b>		
<b>PER CONTRA :</b>		
As per last Balance Sheet		1,54,50,458
Capital Fund and balance of Income & Expenditure a/c. as on 31—3—1986	31,22,73,999	
<b>Add :</b> Capital Grant during 86—87	2,67,51,000	
<b>Add :</b> Capital Receipts	65,424	
<b>Add :</b> Excess of Income over expenditure during 86-87	68,35,665	
	-----	
	34,59,26,088	
<b>Less :</b> Value of equip, written off	30,584	34,58,95,504

C/o.

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47,69,35,053



TECHNOLOGY, MADRAS-600 036.

AS ON 31—3—1987

PROPERTY AND ASSETS

	Rs.	Rs.	Rs.
<b>Land :</b>			
Value of Land gifted by the Tamil Nadu Govt.			1,12,17,262
<b>BUILDINGS :</b>			
Cost of Completed buildings as on 31—3—1986	12,76,07,486		
Add : Buildings completed during the year	59,13,061		
		13,35,20,547	
Building under construction as on 31—3—1986	47,96,870		
Add : Expenditure for the year	82,60,535		
	1,30,57,405		
<b>Less : Transferred to completed building account</b>	59,13,061	71,44,344	14,06,64,891
Diesel Generators			2,14,232

C/o

15,20,96,385

INDIAN INSTITUTE OF

BALANCE SHEET

CAPITAL FUND AND LIABILITIES

	Rs.	Rs.	Rs.
B/f			47,69,35,053
Cost of Projector etc. (Gymkhana) per contra			49,811
Endowment Fund (Governor's Prize etc.)			3,95,350
<b>Deposits :</b>			
EMD/ICC & Other Deposits	4,88,72,578		
Refund of Customs Duty (Projects)	1,89,847		
	-----	4,90,62,425	
<b>New Plan Schemes Emerging Technolog approved by</b>			
<b>Government of India</b>			
Opening Balance	53,81,744		
<b>Add :</b> Receipts 1986-87	1,25,86,000		
	1,79,67,744		
<b>Less :</b> Payments for the year	94,79,784	84,87,960	
	-----	-----	5,75,50,385
<b>Sundry Creditors :</b>			
On works accounts	14,75,924		
For the supplies made for service rendered Department/Sections	2,89,971		
	-----		17,65,895
			-----
C/o.			53,66.96,494

TECHNOLOGY, MADRAS-600 036.

AS ON 31-3-1987

PROPERTY AND ASSETS

	Rs.	Rs.
B/f.		15,20,96 385
Equipment Furniture & Fittings at cost as per B/S. as at 31-3-86	9,83,34,878	
Add : Additions during the year	1,28,68,751	
	<u>11,12,03,629</u>	
Less : Cost of Equip. written off during the year	30,092	
	<u>11,11,73,537</u>	
<b>Computer acquired thro' German Food Aid fund under the Indo-German</b>		
<b>Agreement :</b>		
At cost as per B/S. as on 31-3-1987		1,54 50,458
Block Value of Equip. from Alexander Von Humboldt foundn. as on 31-3-1987	10,83 000	
Block Value of Refrigerator and components from German Volks Wagon Foundation	2,99,860	
	<u>13,82,860</u>	
Block Value of Equip. from W.G. as on 31-3-86	10,09,36,849	
Add : Additions during the year	4,95,890	
	<u>10,14,32,739</u>	

C/o

38,15,35,979

INDIAN INSTITUTE OF  
BALANCE SHEET

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CAPITAL FUND AND LIABILITIES

---

	Rs.	Rs.
B/f.		53,66,96,494
<b>Outstanding Expenses :</b>		
<b>Payable :</b>		
a) Pay and Allowances	35,24,437	
b) Scholarships	3,83,853	
c) Other Allowances-Medical	78,000	
d) Wages to NMR Labourers Dept./Sections	45,233	
e) Audit Fees	75,000	
f) Stipend to Apprentices	15,300	
g) Computer Centre remuneration to staff	10,000	
h) Power	4,10,624	
	45,42,447	45,42,447
Computer Receipts received in advance		15,953
<b>Grant-in-aid from American Chemical Society (per contra)</b>		
Balance as per last year balance sheet		1,10,934

C/o.

54,13,65,828

TECHNOLOGY, MADRAS-600 036.

AS ON 31—3—1987

PROPERTY AND ASSETS

	Rs.	Rs.
B/f.		38,15,35,979
Customs Duty and Clearance Charges on Equipment from W. G. as per B/S, as on 31—3—1986	2,97,78,630	
Add : Customs Duty paid during the year	9,81,167	
	<u>          </u>	3,07,59,797
Motor vehicles at cost as per Balance Sheet as on 31—3—86	20,63,085	
Add : Additions during the year	2,20,939	
	<u>          </u>	22,84,024
Library Books & Scientific journals at cost as on 31—3—1986	2,50,34,607	
Add : Additions during the year	39,52,421	
	<u>          </u>	
	2,89,87,028	
Less : Value of Books written off	—	
	<u>          </u>	2,89,87,028
Block Value of Technical Books from W. G. as per B/S as on 31—3—86	15,56,230	
Add : Additions during the year	—	
	<u>          </u>	15,56,230
Typewriters & Duplicators at cost as per B/s as on 31—3—86	11,30,050	
Add : Additions during the year	3,30,556	
	<u>          </u>	14,60,606

C/o

44,65,83,664

INDIAN INSTITUTE OF  
BALANCE SHEET

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CAPITAL FUND AND LIABILITIES

---

	Rs.	Rs.	Rs.
	B/f		54,13,65,828
Unpaid items as on 31—3—87 as per undisbursed pay register		54,791	
New Plan Schemes—Engineering Technology approved by Government of India (per contra) 31—3—87		86,80,436	

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C/o

55,01,01,055

TECHNOLOGY, MADRAS-600 036.

AS ON 31-3-1987

PROPERTY AND ASSETS

	Rs.	Rs.
B/f.		44,65,83,664
Tools and Plants as on 31-3-1986	5,09,332	
Add : Additions during the year	11,555	
	<u>          </u>	5,20,887
Cycles at cost as per balance sheet as on 31-3-86	68,425	
Less : Cost of Cycles written off during the year	491	
	<u>          </u>	67,934
<b>Investment Accounts :</b>		
Endowment Fund Governor's Prize etc. as on 31-3-87		3,95,350
<b>Stock as on 31-3-87</b>		
Consumable Stores with Departments		64,32,384
Construction materials with Engineering Unit Works A/c.		38,52,649
Guest House Provisions		76
Stationery Articles		4,55,999
Consumable stores with Central Stores Tyres and Tubes, spare parts, Liveries etc,		60,856
Unesco Coupons		50,138
Diesel Oil		21,732
		<u>          </u>
C/o.		45,84,41,669

INDIAN INSTITUTE OF  
BALANCE SHEET

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CAPITAL FUND AND LIABILITIES

---

	B/f.	Rs.	Rs.
			55,01,01,055
<b>Industrial Research and Development Fund A/c.</b>			
Balance as on 1-4-86 (as per separate statement of account)	78,21,366		
<b>Add :</b> Receipt for the year	20,83,509		
	99,04,875		
<b>Less :</b> Payment during the year	12,59,284		
	86,45,591		86,45,591
<b>Gymkhana Management A/c</b>			
Opening Balance as on 1-4-86 as per the separate Statement of account	1,07,780		
<b>Add :</b> Receipts of the year	8,93,164		
	10,00,944		
<b>Less :</b> Payments during the year	9,00,247		
	1,00,697		1,00,697
			55,88,47,343
	C/o		



**TECHNOLOGY, MADRAS-600 036.**

AS ON 31-3-1987

**PROPERTY AND ASSETS**

	Rs.	Rs.
B/f		45,84,41,669
Projector and Tape Recorders (Gymkhana Assets) at cost as per last year Balance Sheet		49,811
Grant receivable from Govt.		1,01,00,000
Furniture Hire charges recoverable		521
Licence Fees etc. recoverable		11,735
Fees Recoverable		48,785
Leave salary recoverable from parent departments		59,975
P. F. contribution and interest recoverable		2,16,392
Income receivable from the Computer Centre		3,74,006
Hire charge of Institute Vehicles etc. recoverable		5,970
Pre-paid Taxes		33,650
Stamps on hand		33,470
<b>Equipments procured from Grant-in-aid received from the American Chemical Society :</b>		
Balance carried over from last year		1,10,934
<b>Equipments procured from Grant-in aid received from G. O. I. New Plan Schemes</b>		
Opening balance	21,97,986	
Add : Adjustment	76,722	
	<u>22,74,708</u>	
Add : Addition during the year	64,05,728	
	<u>86,80,436</u>	
Deposit with Telephones		10,800
Deposits with Firms		24,666
		<u>47,82,02,820</u>

C/o

INDIAN INSTITUTE OF  
BALANCE SHEET

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CAPITAL FUND AND LIABILITIES

---

	Rs.	Rs.
B/f		55,88,47,343
<b>Guest House A/c.</b>		
<b>(Taramani House and Guest House)</b>		
Amount transferred from erstwhile T. H. A/c on account of taking over of T. H. by Institute	49,812	
<b>Add : Receipts</b>	3,39,845	
	3,89,657	
<b>Less : Payments</b>	3,76,040	13,617

C/o

55,88,60,960

TECHNOLOGY, MADRAS-600 036.

AS ON 31-3-1987

PROPERTY AND ASSETS

	Rs.	Rs.	Rs.
B/f.			47,82,02,820
Works Advance			22,48,710
Central Supplies Unit Advance Recoverable			5,00,000
Other (General)			1,07,10,698
Deposit with Tamil Nadu Electricity Board			4,39,780
Collector of Customs A/c No. I and air Cargo Complex	O/B 7,64,931		
Advance paid	20,00,000		
Add : Adjustment	1,57,000		
	<u>29,21,931</u>		
Less : Transferred to Customs Duty (Projects)	22,89,572		
	<u>6,32,359</u>		
Collector of Customs A/c No. No. II	2,02,828		
Less : Adjustment	1,57,000		
	<u>45,828</u>		
Customs Duty on projects	27,93,973		
Add : Payments during the year	22,89,571		
	<u>50,83,544</u>		
Less : Recoveries	44,81,829		
	<u>6,01,715</u>		

C/o

49,33,81,910

INDIAN INSTITUTE OF  
BALANCE SHEET

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CAPITAL FUND AND LIABILITIES

---

	Rs
B/f	55,88,60,960

Total	<u>55,88,60,960</u>
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*Finance & Accounts Officer*  
Indian Institute of Technology  
Madras-600 036

TECHNOLOGY, MADRAS-600 036.

AS ON 31-3-1987

PROPERTY AND ASSETS

	Rs.	Rs.	Rs.
	B/f.		49,33,81,910
<b>Unpaid Balance per Contra with State Bank of India</b>			
Cash on hand UPD.	54,791		
Imprest	500		
	-----	55,291	
Cash on hand (other than 'C' Account)	2,85,152		
With SB of India (Other than IRDF account)	5,63,40,310		
With IIT P.O. savings Bank A/c.	38,392		
	-----	5,66,63,854	
With SBI, IRD Fund A/c.		86,45,591	
With SBI Gymkhana Management A/c.		1,00,697	
With SBI, Guest Houses A/c.		13,617	
		-----	6,54,79,050
EMD/Caution and other deposits.		4,90,62,425	
New Plan Schemes		84,87,960	
		-----	
		5,75,50,385	
<b>Less : Drawn from refundable deposits</b>		8,86,531	
		-----	
		5,66,63,854	
		-----	
<b>Total</b>			----- 55,88,60,960

*Registrar*  
Indian Institute of Technology  
Madras-600 036

*Director*  
Indian Institute of Technology  
Madras-66

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

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RECEIPTS

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	Rs.
Opening Balance	3,30,31,091
<b>Receipts on Capital Account</b>	
Grant from Government of India on Capital Account	2,67,51,000
<b>Other Capital Receipts</b>	
Sale Proceeds of Institute Vehicles	65,424

C/o

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5,98,47,515

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TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1986-87

PAYMENTS

	Rs.	Rs.
<b>On Capital Account :</b>		
i) Building and Works		90,36,714
ii) a) Furniture, Equipments and Fittings :		
<b>Departments :</b>		
1 Chemistry	8,70,411	
2 Physics	1,49,733	
3 Mathematics	49,271	
4 Humanities & Social Sciences	50,516	
5 Civil Engineering	1,54,500	
6 Mechanical Engineering	6,22,073	
7 Electrical Engineering	21,27,313	
8 Chemical Engineering	1,25,162	
9 Metallurgical Engineering	2,01,263	
10 Applied Machanics	1,19,390	
11 Aerospace Engineering	1,42,385	
12 Ocean Engineering	2,29,266	
13 Computer Science & Engineering	96,899	
	-----	49,38,182
b) Research Centres, Central Services :		
1 Fibre-Reinforced Plastic Research Centre	79,550	
2 Bio-Sciences and Bio-Technology	1,00,235	
3 Material Science Research Centre	29,259	
4 Engineering Design Centre	48,302	
5 Central Electronic Centre	1,61,727	
	-----	4,19,073

C/o

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1,39,74,896

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

RECEIPTS		Rs.	Rs.
	B/f.		8,98,47,515
<b>Grant From Government of India :</b>			
	On Revenue Account		8,25,64,000
<b>Receipts From Academic Section :</b>			
	Tuition Fees	5,19,712	
	Hostel Seat Rent	2,55,056	
	Gymkhana Fee	46,680	
	Students Amenties Fund	35,613	
	Medical Fees	16,386	
	Fines	8,533	
	Examination Fees	28,500	
	Degree in Absentia	3,399	
	Admission Fees	31,360	
	Thesis Fees	38,000	
	Grade Card	4,373	
		-----	9,87,632
	Application Fees From Students		17,51,941
	Recredit of contribution and interest due to change over to G.P.F. Scheme		9,91,907
	Institute Bus Collection	5,40,608	
	Hire Charges on Institute Vehicles	15,899	
		-----	5,56,507
<b>Receipts From Buildings :</b>			
	Licence Fees	14,65,618	
	Electricity, Water and Service Charges	7,65,257	
		-----	22,30,875
			-----
	C/o		14,89,30,377



TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1986—87

PAYMENTS		
	Rs.	Rs.
B/f	4,19,073	1,39,74,896
6 Regional Sophisticated Instrumentation Centre	22,474	
7 Central Photographic Section	4,800	
8 Air Conditioning Unit	89,050	
9 Central X-Ray Diffraction Lab	1,79,163	
	<u>          </u>	7,14,560
c) Central Workshops		62,489
d) Indo-German Collaboration programme (Equipment) etc.		2,46,425
e) Replacement of Obsolete Equipment		52,16,494
<b>Library :</b>		
a) Books	6,28,343	
b) Journals & Back Volumes	33,82,963	
c) Equipment	2,41,675	
d) Film Media Resources	3,620	
	<u>          </u>	42,56,601
Customs Duty on West German Equipment	8,65,610	
Clearance Charges on West German Equipment	1,12,607	
	<u>          </u>	9,78,217
<b>Furniture And Fittings :</b>		
Office, Library etc.	6,61,978	
Utensils of Hostel	23,425	
	<u>          </u>	6,85,403
		<u>          </u>
C/o		2,61,35,085

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

RECEIPTS

B/f	Rs.	Rs.
		14,89,30,377
Usufructs and Receipts from Sewage Farm		69,170
Receipts from Computer Centre		12,84,308
Overhead Charges from Consultancy Service		3,33,456
<b>Other Receipts:</b>		
Application fee for posts in Institute	2,162	
Library Overdue Collection	65,973	
Institute Day and Association Fees	4,850	
Migration Certificate	213	
Department dues/Breakages	807	
Industrial Association Membership	1,98,150	
Short term and other Courses	24,658	
Hire charges for Gowns	1,994	
Subscription to Journal of Mathematical & Physical Sciences & Sale proceeds of Institute Publication	96,528	
Interest on Conveyance Advance	28,393	
Interest on Deposit with TNEB	23,811	
Interest on Call Deposit with SBI	6,84,311	
Interest on Provident Fund Investments	51,36,025	
	<u>62,67,875</u>	
C/o		<u>15,06,17,311</u>

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1986-87

PAYMENTS

	Rs.	Rs.
B/f		2,61,35,085
<b>Others :</b>		
a) Hospital Equipment	98,739	
b) Motor Vehicles	2,10,187	
c) Cycles	—	
d) Office Equipment	2,33,856	
e) Telephone	38,700	
f) Fire Fighting Equipment	30,665	
		6,12,147
<b>Revenue Accounts :</b>		
<b>Academic Section Pay &amp; Allowances of Teaching Staff</b>		
Chemistry	18,02,470	
Physics	19,17,416	
Mathematics	11,28,724	
Humanities and Social Sciences	7,05,015	
Civil Engineering	17,30,884	
Mechanical Engineering	27,04,308	
Electrical Engineering	29,51,302	
Chemical Engineering	12,06,962	
Metallurgical Engineering	10,81,357	
Applied Mechanics	12,44,409	
Aerospace Engineering	8,16,841	
Ocean Engineering	9,58,237	
Computer Science & Engineering	2,95,443	
		1,85,43,368
C/o		4,52,90,600

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

RCEIPTS		Rs.	Rs.
	B/f.	62,67,875	15,06,17,311
Interest on House Building Advance		28,939	
Furniture Hire Charges		6,719	
Central Photographic Section		7,364	
Miscellaneous Receipts		1,82,451	
		64,93,348	
<b>Less : Adjustments</b>		6,30,468	
			58,62,880
<b>Recovery of Advances :</b>			
Motor Car and Other Conveyance		3,50,397	
Festival Advance		5,34,031	
Miscellaneous Advance	7,08,532		
<b>Add :</b>			
Refund of Electricity Board Deposit	56,520		
		7,65,052	
Flood Advance/Drought Advance		3,87,174	
House Building Advance		6,40,605	
Customs Duty		44,81,829	
			71,59,088
	C/o.		16,36,39,279

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1986-87

PAYMENTS

	Rs.	Rs.
B/f.		4,52,90,600
<b>II. Pay and Allowances of Non-Teaching Staff :</b>		
Chemistry	5,25,660	
Physics	10,13,136	
Mathematics	97,882	
Humanities & Social Sciences	1,90,522	
Civil Engineering	10,26,188	
Mechanical Engineering	15,98,210	
Electrical Engineering	12,84,061	
Chemical Engineerin	6,44,875	
Metallurgical Engineering	7,33,160	
Applied Mechanics	5,72,848	
Aeronospace Engineering	4,44,635	
Ocean Engineering	3,26,300	
Computer Science & Engineering	4,12,604	
		88,70,081
<b>Departmental Expenses :</b>		
Chemistry	5,33,992	
Physics	6,02,096,	
Mathematics	41,453	
Humanities & Social Sciences	36,011	
Civil Engineering	4,09,286	
C/o.	16,22,838	5,41,60,681

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

RECEIPTS		Rs.	Rs.
B/f.			16,36,39,279
<b>Deposits :</b>			
Contractors Deposit (Work)		10,76,978	
Suppliers Deposit (Instt.)		3,92,205	
External Scholarship		5,38,600	
C.S.I.R.		3,83,982	
Students Caution Deposits		31,997	
New Plan Schemes, etc. 'H' a/c		1,88,83,472	
Miscellaneous Deposits		28,80,819	
Q.I.P. & C.S.D. Scheme		13,74,841	
I.C.S.R. Projects		3,60,99,710	
R.S.I.C. Receipts		59,748	
Library Deposits		1,03,424	
Students aid and Welfare Fund } Receipts from students }		650	
Interest on Endowments		37,060	
Alumni Association		53,155	
		6,19,16,641	
	C/o.		22,55,55,920

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1986--87

PAYMENTS

	Rs.	Rs.
B/f	16,22,838	5,41,60,681
Mechanical Engineering	7,85,979	
Electrical Engineering	6,53,133	
Chemical Engineering	3,91,470	
Metallurgical Engineering	5,86,662	
Applied Mechanics	2,76,708	
Aerospace Engineering	2,51,963	
Ocean Engineering	3,15,808	
Computer Science and Engineering	23,90,598	72,75,159
<b>Library :</b>		
Pay & Allowances—Officers	2,60,052	
Pay & Allowances—Establishment	12,32,185	
Journal of General Interest	3,779	
Contingencies Operating Cost	3,01,544	
Binding Charges	40,126	
N.M.R. Charges	28,496	18,66,142
<b>Central Workshops :</b>		
Pay & Allowances—Officers	4,63,221	
Pay & Allowances—Establishment	23,41,805	
Working Expenses—Tools and Other Consumables	1,80,883	29,85,909
Indo-German Projects (Pay & Allown.)		1,81,221
		<u>6,64,69,112</u>

C/o.

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

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RECEIPTS

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	Rs.
B/f.	22,55,55,920

C/o.	<u>22,55,55,920</u>
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TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1986—87

PAYMENTS		
	Rs.	Rs.
B/f.		6,64,69,112
<b>Research Centre :</b>		
Pay and Allowances - Officers	9,78,955	
Pay and Allowances - Establishment	<u>10,06,763</u>	19,85,718
Central Electronic Centre-Pay and Allowance		2,78,448
Air-Conditioning Unit-Pay and Allowances		2,32,390
<b>Centres, Central Services Working Expenses :</b>		
Fibre Reinforced plastics Research Centre		93,623
Material Science Research Centre		2,04,867
Bio Sciences and Bio-Technology		68,843
Engineering Design Centre		75,261
Central Electronic Centre		1,45,050
Regional Sophisticated Instrumentation Centre		1,69,002
Central Glass Blowing Section		26,196
Central Photographic Section		33,010
Air-conditioning Unit		3,28,520
Central Gas Supplies Unit		9,905
Central X-Ray Diffraction Lab		50,947
Rural Development and Research Activities		52,568
Indo-German Project		1,95,839
<b>Institute Scholarships :</b>		
Post Graduate and Research	68,61,118	
Under Graduate	<u>4,10,249</u>	72,71,367
		<u>7,76,90,666</u>
C/o		

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

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RECEIPTS

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	Rs.
B/f.	22,55,55.920

C/o.	<u>22,55,55.920</u>
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TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1986-87

PAYMENTS

	Rs.	Rs.
B/f.		7,76,90,666
<b>Other items :</b>		
Part time Lecturers	4,800	
Visiting professors	34,020	
Technical Bulletins and Journals	1,57,811	
Symposia and Seminars	39,641	
Inplant Training/Courses/Visits	92,533	
Continuing Education Programme organised by the Institute	20,726	
Quality Improvement Programme	11,877	
Contribution towards Institute's participation in National Conferences	24,765	
Director's Discretionary Fund for Research	21,160	
Stipend for Apprentices	1,22,050	
H.A.L. Trainees	1,00,000	
Membership to outside Bodies	26,003	
Remuneration to external examiners	77,378	
Joint Entrance Examination	7,48,688	
Graduate Aptitude Test in Engineering (GATE)	8,49,148	
Convocation	81,435	
Prizes for Academic Dictinction	9,071	
		<u>24,21,046</u>
C/o.		<u>18,01,11,712</u>

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

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RECEIPTS

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	Rs.
B/f	22,55,55,920

C/o	<u>22,55,55,920</u>
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TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1986-87

PAYMENTS		
	Rs.	Rs.
B/f		8,01,11,712
<b>N.C.C. and N.S.S.</b>		
Pay and Allowances	82,050	
Other expenditure	36,311	1,18,361
	<u>          </u>	
<b>Central Administration</b>		
Pay and Allowances-Officers	20,70,926	
Pay and Allowances-Others	55,54,860	76,25,786
	<u>          </u>	
<b>Hostels</b>		
Security (Hostels)	2,16,253	
Allowances to Wardens	42,150	
Subsidy to Hostels	33,48,190	
Subsidy towards Salaries of Taramani House Employees	6,020	36,12,613
	<u>          </u>	
<b>Stores</b>		
Pay and Allowances-Officers	1,74,218	
Pay and Allowances-Others	4,20,246	5,94,464
	<u>          </u>	
General Stores		13,443
Security-Other Charges		3,76,837
<b>Lawns and Gardens :</b>		
Pay and Allowances of Horticultural Superintendent	36,810	
Other Expenses	1,54,003	1,90,813
	<u>          </u>	
C/o		<u>9,26,44,029</u>

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

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RECEIPTS

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	Rs.
B/f.	22,55,55,920

C/o

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22,55,55,920

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TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1986-87

PAYMENTS

	Rs.	Rs.
B/f.		9,26,44,029
<b>Services and Maintenance</b>		
Telephones	7,60,027	
Power	39,03,656	
Water	20,39,919	
Furniture-Repair and Maintenance	3,36,863	
Oil and Petrol	2,68,593	
Duty, Insurance and Taxes	93,037	
Repairs and Maintenance to Motor Vehicles and Cycles	2,25,053	
Property Tax	1,94,126	
		<u>78,21,274</u>
<b>Medical Dispensary</b>		
Pay and Allowances-(Medical Officers)	2,72,837	
Pay and Allowances (Establishment)	4,58,759	
Purchase of Medicines	6,35,511	
		<u>13,67,107</u>
<b>Athletic and Gymkhana</b>		
Pay and Allowances	2,15,653	
Contributions to Gymkhana Management A/c.	5,99,789	
		<u>8,15,442</u>
Mosquito Control	6,308	
Subsidy to Vana Vani School	1,62,279	
Campus Amenities	11,851	
Special Coaching Courses to Sc/St students	1,669	
Guidance and Counselling	11,466	
		<u>1,93,573</u>
		<u>10,28,41,425</u>
C/o		

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

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RECEIPTS

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B/f

Rs.

22,55,55,920

C/o

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22,55,55,920

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**TECHNOLOGY, MADRAS-600 036.**

**ACCOUNTS FOR THE YEAR 1986-87**

PAYMENTS		Rs.	Rs.
	B/f.		10,28,41,425
Directors Discretionary Fund		13,684	
Contribution to Employees		946	14,630
<b>Works &amp; Maintenance</b>			
Pay & Allowances - Officers		2,01,617	
Pay & Allowances - Other		53,61,052	
Other expenditure on Maintenance		34,31,021	89,93,690
<b>Administration-General Expenses</b>			
Postage		3,69,918	
Entertainment		51,781	
Liveries		1,17,872	
Stationary		7,09,317	
Printing		2,37,582	
Advertisement		3,52,744	
Guest House & Tharamani House		85,905	
Repairs to Office Equipment		89,456	
Audit Charges		1,08,875	
Legal Expenses		79,579	22,03,029
	C/or		11,40,52,774

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

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RECEIPTS

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B/f.

Rs.

22,55,55,920

C/o.

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22,55,55,920

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TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1986-87

PAYMENTS

	Rs.	Rs.
		11,40,52,774
<b>B/f</b>		
<b>Travelling Expenses :</b>		
Board of Governors	12,955	
Staff Committees, Selection Committees etc.	52,665	
Candidates called for interview	34,955	
External Examiners	1,18,246	2,18,821
Leave Salary & Pension contribution on account of personnel on Foreign Service		1,36,609
Reimbursement of Stamp Duty		84,646
Sundries		2,93,374
Hostel Contingencies		1,271
<b>Provident Fund/Gratuity/Pension</b>		
Pension/Commutation of pension	9,16,796	
Family Pension	1,49,994	
Institute Share of Contribution	67,05,431	
Gratuity	6,10,903	83,83,124
<b>Advances</b>		
Motor Car and other Coveyances	4,63,557	
Customs Duty-Non-Plan	20,00,000	
Festival Advances	4,92,480	
Other Miscellaneous Advances	15,59,558	
House Building Advance	16,29,366	61,44,961
		<u>12,93,15,580</u>
<b>C/o</b>		

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

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RECEIPTS

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	Rs.
B/f.	22,55,55,920

C/o.	<u>22,55,55,920</u>
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*Finance & Accounts Officer,*  
Indian Institute of Technology,  
Madras-600 036.

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1986-87

PAYMENTS

	Rs.	Rs.
B/f.		12,93,15,580
<b>Refund of Deposits :</b>		
Suppliers Deposits (Institute)	1,79,090	
Contractors Deposits (Works)	6,71,517	
External Scholarships	5,05,176	
C.S.I.R.	6,33,440	
Miscellaneous Deposits	20,30,226	
Students Caution Deposit	21,175	
Library Deposits	75,560	
Microprocessor Lab, Centres etc.,	1,21,64,809	
O.I.P. Programme organised by GOI/CSD	17,07,162	
Industrial Consultancy work and projects	2,13,19,848	
Endowments towards prizes etc.,	19,912	
Alumni Association	55,950	
N.C.E.R.T.	—	
Students Welfare Fund	—	
R.S.I.C. Payments	1,92,621	3,95,76,486
<b>Closing Balance :</b>		
Cash in Hand	2,85,151	
With State Bank of India	5,63,40,311	
Savings Bank Account	38,392	5,66,63,854
<b>Total</b>		<b>22,55,55,920</b>

*Registrar*  
Indian Institute of Technology  
Madras-600 036.

*Director*  
Indian Institute of Technology  
Madras-600 036.

