

**TWENTY SEVENTH  
ANNUAL REPORT**

**1985 - 86**



**INDIAN INSTITUTE OF TECHNOLOGY  
MADRAS**

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MADRAS

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## THE VISITOR

GIANI ZAIL SINGH

*The President of India*

### The Board of Governors

*Chairman*

Sri A. Sivasailam

Chairman, The Amalgamations Limited, Madras.

*Ex-Officio*

Prof. L. S. Srinath

Director

Indian Institute of Technology, Madras.

#### *Nominees of State Governments*

Sri D. K. Satyanarayana Setty  
Director of Technical Education  
Government of Karnataka, Bangalore

Sri V. Srinivasan  
Director of Technical Education  
Government of Tamil Nadu, Madras.

Dr. P. J. George  
Director of Technical Education  
Government of Kerala  
Trivandrum

Dr. M. G. G. Naidu  
Director of Technical Education  
Government of Andhra Pradesh  
Hyderabad.

#### *Nominees of the Council*

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

Dr. V. S. Arunachalam  
Scientific Advisor to Defence Minister  
Ministry of Defence  
New Delhi.

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

Sri Mantosh Sondhi  
Chairman, Board of Directors,  
M/s Ashok Leyland  
E-3/6 Gangaram Hospital Marg  
New Delhi.

#### *Nominees of the Senate*

Prof. K. S. Sankaran  
Department of Civil Engineering  
I. I. T., Madras (Upto 31-12-85)

Prof. V. G. K. Murti  
Department of Electrical Engineering  
I. I. T., Madras (Upto 31-12-85)

Dr. V. Sivaramakrishnan (From 1-1-86)  
Department of Physics  
I. I. T., Madras

Dr. R. Vasudevan (From 1-1-86)  
Department of Metallurgical  
Engineering, I. I. T., Madras

*Secretary*

Sri S. Santanagopalan (Upto 23-1-86)

Registrar

Dr. N. V. C. Swamy (From 24-1-86)  
Dean of Administration & Registrar

**The Finance Committee**

*Chairman*

Sri A. Sivasailam

Chairman, The Amalgamations Limited  
Madras

*Members*

Sri S. D. Awale  
Dy. Educational Adviser (Tech.)  
Ministry of Human Resource Development  
Government 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. P. J. George  
Director of Technical Education  
Government of Kerala  
Trivandrum

Prof. L. S. Srinath  
Director

Indian Institute of Technology  
Madras

*Secretary*

Sri S. Santanagopalan (Upto 23-1-86)  
Registrar

Dr. N. V. C. Swamy (From 24-1-86)  
Dean of Administration & Registrar

## **The Buildings and Works Committee**

### *Chairman*

**Sri A. Sivasilam**  
Chairman  
The Amalgamations Limited  
Madras

### *Members*

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

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

**Prof. K. Elango**  
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. Murty**  
Estate Officer  
I.I.T., Madras

### *Secretary*

**Sri S. Santanagopalan (Upto 23-1-86)**  
Registrar  
**Dr. N. V. C. Swamy (From 24-1-86)**  
Dean of Administration & Registrar

## SENATE

### *Chairman*

L. S. Srinath (Director)

### *Members*

M. K. Achuthan	V. Mahadeva Iyer
R. S. Alwar	Manfred Dutschke
S. Ambirajan	R. Nagarajan
K. Ananthapadmanabhan	M. S. Narasimhan
G. Aravamudan	Y. Narayana Rao
B. V. Aswathanarayana Rao	R. Natarajan
M. S. Ananth	Nainan P. Kurian
P. Achuthan	V. S. Nazir Ahmed
V. Balakrishnan	R. Narayan
K. Balaraman	K. A. V. Pandalai
D. K. Banerjee	M. A. Parameswaran
K. A. Bhaskaran	K. R. Parthasarathy
T. K. Bose	H. S. Paul
N. V. Chandrasekhara Swamy	C. N. Pillai
K. A. Damodaran	D. Prithviraj
Dipak Choudhury	P. K. Philip
Ch. Durga Prasada Rao	K. M. Patil
K. Elango	V. Paramasivam
C. Ganapathy	R. Parthasarathy
T. P. Ganesan	O. Prabakhar
K. V. Gopalakrishnan	V. M. Radhakrishna
T. Gopichand	H. C. Radhakrishna
N. Ganesan	S. Radhakrishna
P. V. Indiresan	R. Radhakrishnan
S. Jambunathan	V. Radhakrishnan
D. Johnson Victor	K. Radhakrishna Rao
V. B. Johri	J. P. Raina
C. Kalidas	N. Rajagopalan
R. Kalyanakrishnan	N. R. Rajappa
C. S. Krishnamoorthy	V. S. Raju
M. V. Krishnamoorthy	S. R. Ramadas
A. V. Krishna Rao	V. Ramakrishnan
V. M. Krishnasastri	L. N. Ramamurthy
A. Kuppurajulu	V. Ramamurthi
J. C. Kuriacose	H. Raman
K. Lakshminarayana	M. Ramanujam
H. N. Mahabala	B. Ramaswamy
P. T. Manoharan	G. V. N. Rayudu
H. Md. Roshan	A. Rama Mohana Rao
V. G. K. Murti	K. V. S. Rama Rao
Y. V. G. S. Murti	T. V. Ramakrishna
C. R. Muthukrishnan	M. Ramakrishna Udupa
Megha Singh	G. Rangarajan



J. Rajaram  
R. Rajagopalan  
R. Ramji Rao  
K. S. Sankaran  
L. V. K. V. Sarma  
V. V. Sastry  
C. A. Sastry  
M. Satyanarayana  
K. N. Seetharamu  
V. Seshadri  
R. S. Sirohi  
J. Sobhanadri  
A. K. Sreekanth  
P. S. Srinivasan  
R. Srinivasan  
R. S. Srinivasan  
S. K. Srinivasan  
T. M. Srinivasan  
V. Srinivasan  
K. Srinivasaraghavan  
P. Srinivasa Rao  
S. Subramanian

#### **NOMINEES**

S. Krishnan  
Dept. of Aeronautical Engg.

T. Venkataram  
Dept. of Chemical Engg.

D. R. G. Achar  
Dept of Metallurgical Engg.

Kamala Krithivasan  
Dept. of Computer Science & Engg.

C. Ramachandran  
Dept. of Humanities & Soc. Sciences.

C. K. Narayanaswamy  
Dept. of Physics.

N. Subramanian  
R. Subramanian  
Surjit Singh  
G. Subramaniam  
V. Sriramulu  
V. Sivaramakrishnan  
G. V. Subba Rao  
C. S. Swamy  
H. Suresh Rao  
P. Sankaran  
P. Subbarami Reddy  
L. V. L. N. Sarma  
U. N. Srivastava  
S. B. S. Sastry  
Y. B. G. Varma  
R. Vasudevan  
M. A. Veluswami  
M. Venugopal  
N. Venkatrayulu  
T. K. Varadan  
V. Venkat Rao  
B. Yegnanarayana

#### **INVITEES**

B. S. Prabhu  
Dept. of Applied Mechanics.

K. K. Balasubramanian,  
Dept. of Chemistry.

P. Kalyanasundaram,  
Dept. of Chemical Engg.

V. Subba Rao,  
Dept. of Mathematics.

T. Rajagopalan,  
Dept. of Mech. Engg.

G. Sridhara Rao,  
Dept. of Elec. Engg.

#### **SECRETARY**

S. Santanagopalan (Registrar) upto 23-1-86  
N. V. C. Swamy from 24-1-86  
Dean of Admn. & Registrar.



# REPORT BY THE DIRECTOR

for the period

APRIL 1985 to MARCH 1986

Significant progress has been made by the Institute during the year under review. The report highlights some of the important activities of the Institute in the areas of Science and Technology through the capabilities of its teaching, research and technical personnel

## Student Strength

There were 1038 Undergraduate students and 1188 Postgraduate students and research scholars at the Institute.

## Awards to Faculty

1. Prof. V. Ramamurti, Machine Dynamics Laboratory of the Department of Applied Mechanics got 'VASVIK RESEARCH AWARD' FOR 1983 in the discipline Mechanical Sciences & Technology.
2. Prof. Surjit Singh was elected as Fellow of Indian Academy of Sciences, (F, A.Sc.) Bangalore (1986).
3. Prof C. A. Sastry, Chemical Engineering Department was invited to be a Member of National Committee of SCOPE (Scientific Committee on Problems of Environment) of International Council of Scientific Unions (ICSU).
4. Prof. R. Narayan, Chemistry Department, has been invited to be a member of the Editorial Board of the Journal of Electrochemical Society of India.

## Awards to Students

1. In the recently held All India Chemical Engineering Students' Congress at the University of Roorkee, four of our final year B.Tech. Chemical Engineering students participated and were awarded two first and one third prizes in paper presentation and one second prize in the panel discussion. IIT Madras was placed THIRD among the twentyfive colleges that participated in the Congress.
2. The talk entitled 'Computer Aided Design' by Sri K. Janardhana, I M. Tech. Aero. Engg. student was awarded Judges' Special Prize at the Student Seminar held at MIT, Madras, on 19th April 1985.
3. Sri Vinayak Hegde, Research Scholar, Precision Engineering and Instrumentation Laboratory of Mechanical Engineering Department, has won the First Prize for his 'Technical Seminar' on the subject "Sensors — The Robotic Aid to Perceive", conducted by Instrument Technology Association on 19th February 1986 at MIT Chromepet, Madras.
4. Sri A. V. S. Bhaskar, Research Scholar, Precision Engineering and Instrumentation Laboratory of Mechanical Engineering Department, has won the First Prize for his paper titled 'Micora — A Low Cost Inspection Robot' at the Seminar conducted by the Society of Mechanical Engineers of the College of Engineering, Guindy, Madras on 14th March 1986.

5. During the Student Seminar held at MIT Madras on 20th March 1986, Sri Amar Rajasekar, final year B. Tech. (Aero.) received Third Prize and Sri Anil Kumar Narayanan, I M. Tech. (Aero.) was awarded Judges Special Prize. The Seminar is an annual feature in which students from city colleges talk on topics of Aerospace interest.
6. The following students have won prizes and certificates of merit in the written Quiz Competition conducted by the Royal Society of Chemistry (London), Madras Section :

Sri Brian Lopez	II M.Sc.	I Prize
Sri S. Rajagopal	II M.Sc.	II Prize
Sri P. Vinod Menon	I M.Sc.	III Prize
Miss Sridevi Narayan	I M.Sc.	Certificate of Merit
Miss S. Jayashree	I M.Sc.	-do-
Sri Raj Ganesh Viswanathan	II M.Sc.	-do-
Miss N. Vijayashree	II M.Sc.	-do-
Sri S. Narayanan	I M.Sc.	-do-

#### NEW FACILITIES

The following were donated to the Biomedical Engineering Laboratory of the Department of Applied Mechanics by the Alexander Von Humbolt Foundation :

- i) Apple Computer with 64 KB capacity
- ii) Electromagnetic Flowmeter System

A new VAX 11/730 Computer has been installed in the Civil Engineering Department and is operative. This is essentially for use by the Students and Research Scholars as well as faculty members of Civil Engineering Department in tackling their research problems. The computer has a graphic terminal also attached to it.

Perthometer for roughness measurement, Ferrograph for wear particle analysis and an Aurelac 16 bit micro computer system have been added to the facilities of the Department of Mechanical Engineering.

1 PAR Potentiostat/Galvanostat has been procured to measure current-voltage characteristics of semiconducting materials by the Material Science Research Centre.

#### 22nd Convocation

The Twentysecond Convocation of the Institute was held on 26th July 1985 in the Students' Activities Centre. Dr. E. C. G. Sudarshan, Director, The Institute of Mathematical Sciences, Madras, who was the Chief Guest delivered the Convocation address.

Dr. G. N. Ramachandran, INSA Albert Einstein Professor, Indian Institute of Science, Bangalore, was conferred the Degree of Doctor of Science (Honoris Causa) at the Convocation.

At this Convocation 444 B.Tech., 177 M.Tech., 39 M.Sc., 53 M.S. and 76 Ph.D. degrees were awarded.

## Industrial Consultancy and Sponsored Research

The following were the major areas of activities of the Centre for IC & SR during 1985-86.

CONSULTANCY (Figures in brackets are for 1984-85)	NO. OF ASSIGNMENTS/ PROJECTS 470 (461)	EARNINGS (Rs. in lakhs) 90.61 (63.4)
<b>SPONSORED RESEARCH</b>		
(Figures in brackets are for (1984-85)	28 (15)	233.7 (68.1)

### Entrepreneurial Development Programme :-

The Centre co-ordinated activities relating to Entrepreneurial Development programme as listed below :

- a) Orientation programme with an emphasis on motivational inputs and entrepreneurial traits were organised. Based on the performance in this programme 7 candidates have been admitted to the M. S. in (Entrepreneurship Programme).
- b) Our Entrepreneurial Development Camp for final year students was organised in December 1985.

These programmes were funded by DST and IDBI and supported by SBI, SIPCOT, ITCOT TIIC etc.

### Collaborative Research :—

The Centre continued to Co-ordinate the collaborative research programme

- 1) Indo-German joint research projects
- 2) Proposals were submitted for the following :
  - a) Improving facilities of the Building Sciences Technology Lab. with the support from Netherlands.
  - b) Setting up of ISRO-IIT (M) cell to take up research projects relating to space programme.

### Patents

The Institute has taken two patents on the following in the name of the Institute.

- a) Synthesis of condensed nitrogen heterocycles derived from indane — 1, 3 — diane
  - b) A device relating to cold glow plasma for the deposition and stitching of thin films.
- Six patent applications were filed by the Institute.

### Interaction with Industries

The Centre

- 1) (organised) workshop on 'New approaches on Technical Education and Training' held on December 13, 1985.
- 2) introduced a new scheme of Industrial Associateship to have a formal interactive programme with industry.
- 3) arranged visits of the faculty to industry for durations of 2 to 6 weeks in May-June 1985 under exchange programme.

## **Seminars/Conferences**

- 1) International Conference on Biomechanics and Clinical Kinesiology of Hand and Foot was organised during 16th — 18th December 1985 at IIT Madras by the Biomedical Engineering Division in collaboration with Central Leprosy Teaching and Research Institute Chengalpattu and Department of Anatomy, University of Leiden, Netherlands.
- 2) The Third International Workshop on Physics of Semiconductor Devices was held from 27-11-1985 to 2-12-1985. This was organised jointly by the Department of Physics and COSTED. Over 300 participants from 15 different countries took part.
- 3) During November-December 1985 an International Course on Physics of Materials was organised by the Department of Physics and the Asian Physical Society. About 25 participants from various Asian countries took part. The participants were post graduate teachers teaching at different universities. Courses / Seminars were conducted to acclimatise them in the latest advancements in the area of Material Science. The course was also co-sponsored by UNESCO/COSTED and the departments of the Government of India, such as DST.
- 4) An International Winter School on Crystallography was organised by the Department of Physics in collaboration with the Department of Biophysics, University of Madras, during 9-12-85 to 18-12-85 followed by a National Seminar on Crystallography from 12-12-85 to 21-12-85.

## **Quality Improvement Programme**

Under Quality Improvement Programme during the year 1985-86, 11 teachers from engineering colleges were admitted for M. Tech. programme and 11 teachers were admitted for Ph.D. Programme.

8 QIP Scholars were awarded M. Tech, degree and 7 QIP scholars were awarded Ph.D. degree during the year.

4 Short Term Courses were conducted during the year for the teachers of engineering college.

## **Publications**

“Concepts in Reliability Engineering” (2nd Edition) by L. S. Srinath, Publisher - Affiliated East-West Press (March 1985)

Chemical Engineering Education Development Centre has published the following :

1. Chemical Engineering Education and Research in Indian Universities (November 1985)
2. Teachers Manual for Physics I & II for the 4 year degree course in Engineering with the assistance of faculty and experts (January 1986).

The Centre is preparing Teachers Manual for various core subjects in Chemical Engineering for the four year degree course, with the assistance of faculty and experts from the various engineering institutions.

## **Introduction to IIT for SC/ST students**

The Institute conducted an 'Introduction to IIT' programme on 15th and 16th January 1986 for the benefit of the SC/ST students of the southern region studying in the 12th standard or its equivalent with Physics, Chemistry and Mathematics as elective subjects and who are interested in writing the Joint Entrance Examination, 1986. Circular letters were sent to the Principals/Headmasters/Headmistresses of all Junior Colleges/Higher Secondary Schools of the southern region. Based on the performance in the 10th standard we called 100 SC/ST students out of which about 70 students attended the programme. The students who attended this programme were reimbursed travelling expenditure (both ways) and were given free boarding and lodging at the IIT Hostels. During this programme the students were exposed to the various concessions available to the SC/ST students at the IITs and were shown round the Library and a few laboratories of interest.

## **MARDI GRAS '86**

Mardi Gras 86 was celebrated for 5 days from 22nd to 26th January 1986 with its main theme as the promotion of traditional and classical Indian culture.

### **Apprentice Training Programme**

The Central Electronics Centre has organised an Apprentice Training for a period of eight months commencing from 2nd January 1986 with an intake of seven candidates.

### **Placement**

The Placement Office has reported yet another successful year of service to the final year students in securing placements for them. Nearly 85 employers-both from public and private sectors have conducted campus interviews so far. Upto this moment, 70% of the students have secured employment through efforts made by the Placement Office.

In addition to securing jobs for the final year students, the Placement Office has also helped a number of pre-final students in securing practical training facilities at various industries during the summer and winter vacations.

### **Staff matters**

Prof. N. V. C. Swamy was appointed as Dean Administration with effect from 24-1-1986. Prof. Swamy is also in charge of the duties and functions of the Registrar.

Prof. D. Prithviraj, Department of Mechanical Engineering, was appointed as Dean of Staff Affairs for a period of six months with effect from 1st Feb '86.

### **Conclusion**

The Institute can take justifiable pride in the qualities of its students inasmuch as they demonstrate by the time they graduate and pass out, extraordinary level of high qualities, values and maturity. One question that comes to mind is how far is our Institute and its faculty members responsible for developing and promoting these highly desirable qualities in our students. The Institute does have an excellent curricula, there is no specific programme in it to develop these qualities and values. It is possible that these qualities are inherent in the IIT system which identifies and selects these students. This aspect of the system is highly important and should be preserved at all costs. In addition, it is also necessary to provide a total education rather than merely stressing the scientific and/or technical content only. The Institute is committed to the pursuit of excellence and to this end the parties in the process viz. the faculty, the students and other supporting staff are commended.

## DETAILS OF THE REPORT

Admission, Award of Degrees and Prizes

### Student Admission 1985-86

The number of students and scholars admitted to various courses (1985-86) is given in Table—1

Table-1

#### ADMISSION 1985-86

Sl. No.	Department	B. Tech.	M. Tech.	M.Sc.	MS	Ph.D.	Total
1.	Aeronautical Engineering	16	7	...	4	...	27
2.	Applied Mechanics	...	16	...	3	7	26
3.	Chemical Engineering	32	22	...	11	8	73
4.	Chemistry	...	...	20	...	11	31
5.	Civil Engineering	34	35	...	10	5	84
6.	Computer Science & Engg.	26	31	...	6	2	65
7.	Electrical Engineering	61	54	...	7	12	134
8.	Humanities & Soc. Sciences	...	13	...	1	5	19
9.	Mathematics	...	...	14	...	7	21
10.	Mechanical Engineering	60	65	...	8	12	145
11.	Metallurgical Engineering	24	15	...	7	5	51
12.	Naval Architecture	14	...	...	...	...	14
13.	Ocean Engineering	...	8	...	3	2	13
14.	Physics	...	7	15	...	9	31
Total		267	273	49	60	85	734

The total 734 includes the following :

Foreign Nationals	9	Sponsored Candidates	33
Scheduled Castes	35	External Registration	25
Scheduled Tribes	8	Project Staff	9
Women	56	Part-time (Staff)	4
QIP Scholars	22		



## Degrees Awarded

The number of degrees awarded at the Twenty Second Convocation of the Institute on 26th July 1985 is given below in Table 2. Prof. E.C.G. Sudarshan delivered the Convocation address.

**Table 2**  
**NUMBER OF DEGRESS AWARDED**

Sl. No.	Discipline	B.Sc. (TA)	B. Tech.	M. Tech.	M.Sc.	M.S.	Ph.D.	Total
1.	Aeronautical Engineering	...	14	2	...	6	...	22
2.	Applied Mechanics	...	...	5	...	10	2	17
3.	Chemical Engineering	...	55	20	...	4	5	84
4.	Chemistry	...	...	...	12	...	17	29
5.	Civil Engineering	...	71	21	...	6	7	105
6.	Computer Science & Engg.	...	...	28	...	2	1	31
7.	Electrical Engineering	...	125	32	...	7	7	171
8.	Humanities & Soc. Sciences	...	...	16	...	2	5	23
9.	Mathematics	...	...	...	12	...	3	15
10.	Mechanical Engineering	...	129	40	...	7	10	186
11.	Metallurgical Engineering	...	36	5	...	10	3	54
12.	Naval Architecture	...	14	...	...	...	...	14
13.	Ocean Engineering	...	...	5	...	2	3	10
14.	Physics	...	...	3	15	...	13	31
		1	...	...	...	...	...	1
<b>Total</b>		<b>1</b>	<b>444</b>	<b>177</b>	<b>39</b>	<b>56</b>	<b>76</b>	<b>793</b>

With this Convocation in July 1985 the number of degrees awarded so far by the Institute is :

B.Sc. (TA)	18	DIIT	245
B.Tech.	5427	M.S.	471
M.Tech.	3160	Ph.D.	894
M.Sc.	765		

**Grand Total : 10980**

## 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 course with the best Academic Record)

- (1) 1980 Batch-5 year B. Tech Shri. V.S. Mani B. Tech. (Mechanical Engg.)
- (2) 1981 Batch-4 year B. Tech. Shri B. Venkataramanan B. Tech. (Electrical Engg. Electronics)

### 2. GOVERNOR'S PRIZE :

(For all-round proficiency in B. Tech. degree courses/Curricular and Extra Curricular)

- (1) 1980 Batch-5 year B. Tech. Shri. D. Shyam Sunder B. Tech. (Chemical Engg )
- (2) 1981 Batch-4 year B. Tech. Shri A. Venugopal B. Tech. (Civil Engg.)

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

#### B. TECH COURSE : (5 year B. Tech)

Civil Engineering

Shri. Gill Roy Eapen P.

Metallurgical Engineering

Shri. Subramshu S. Bhattacharya

Naval Architecture

Shri. Balachandar R. S.

Electrical Engineering (Electronics)  
(Philips India Prize)

Shri. Tukanan Verghese Verghese

Electrical Engineering (Power)  
(Siemens Prize)

Shri. Srinivas Devadas

Shri. Maithy Atanu Amalendu

Mechanical Engineering  
(Banco Foundation Prize)

Shri. Mani V. S.

Chemical Engineering  
(Reliance Heat Transfer (P) Limited Prize)

Shri. Ram Prasad N.

Aeronautical Engineering  
(HAL Prize)

Shri. Akella Narasimha Prasad

#### B. TECH. COURSE (4 year B. Tech)

Civil Engineering

Shri Kumar Das Shiva

Metallurgical Engineering

Shri Sathyanarayanan R.

Naval Architecture

Shri. Krishna Kumar R.

Electrical Engineering (Power)  
(Siemens Prize)

Shri. Murari S.

Electrical Engineering (Electronics)  
(Philips India Prize)

Shri. Venkataramanan B.

Mechanical Engineering  
(Banco Foundation Prize)

Shri. Prabhu D. R.

Chemical Engineering  
(Reliance Heat Transfer (P) Ltd. Price)

Shri. Varadarajan G. S.

Aeronautical Engineering  
(HAL Prize)

Shri. Ganapathiraju Natarajan

**M. TECH. COURSE :**

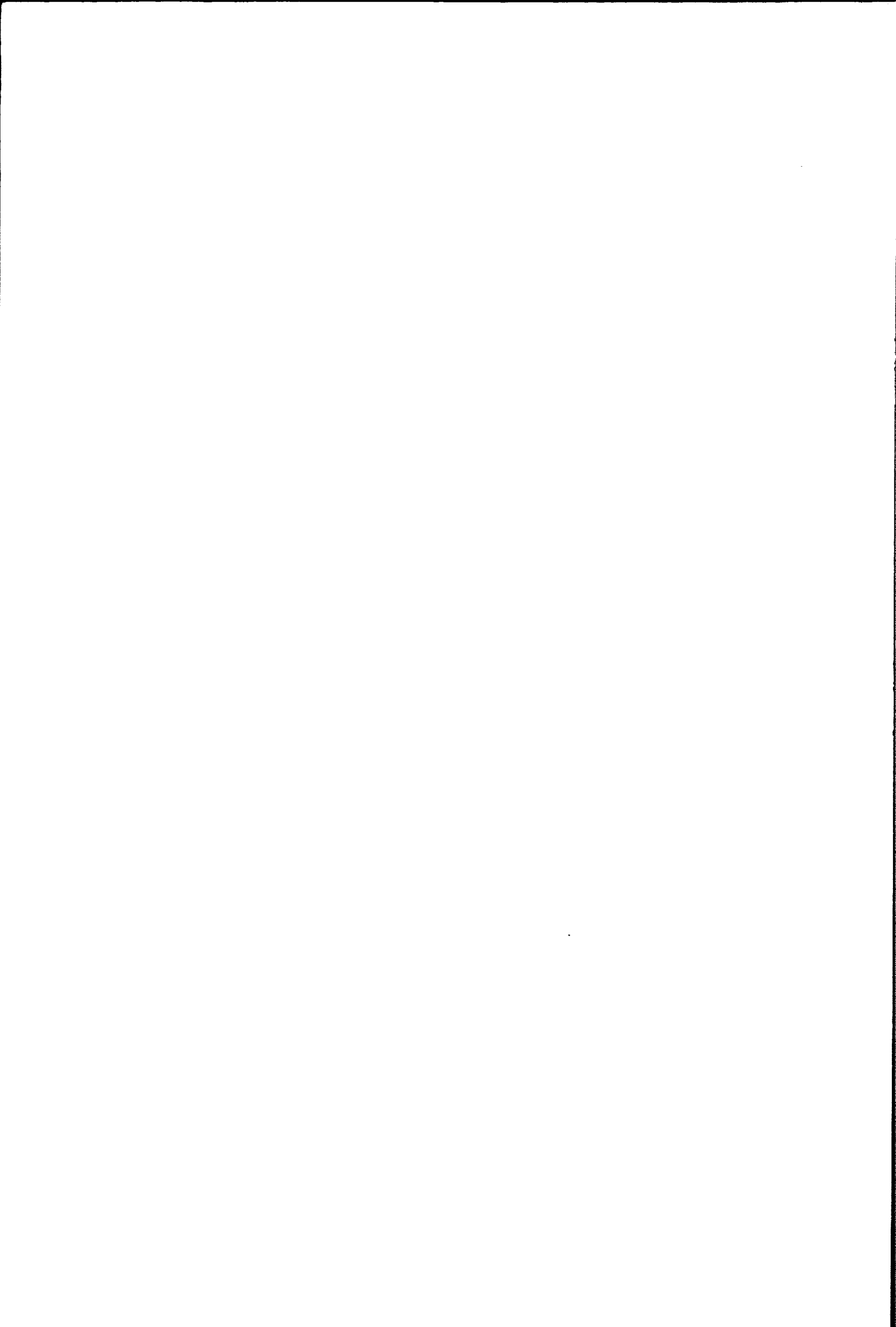
Civil Engineering  
Maintenance Engineering and Management  
Industrial Metallurgy  
Industrial Tribology  
Ocean Engineering  
Electrical Engineering  
(Siemens Prizes)  
Mechanical Engineering  
(Prof. B. Sengupto Prize)  
Mechanical Engineering  
(Production Engineering)  
(Dr. S. Vaidyanathan Memorial Prize)  
Chemical Engineering  
(Dr. K. Subbaraju Memorial Prize)  
Industrial Management  
(K. V. Arunkumar Memorial Prize)  
Computer Science & Engineering  
(CMC Prize)

Shri. Surej K.R.  
Shri. Arunachalam G.  
Shri. Balusamy V.  
Shri. Venkata Suresh Babu  
Shri. Vissavajhala Srinivasa Radhakrishna Murthy  
Shri. Lakshmi Narayana P.V.  
  
Shri. Bhaskar Kannan  
  
Shri. Laxmidhar Vinayak Rao Gaopande  
Shri. Marimuthu C.  
  
Shri. Dipankar Sengupta  
  
Shri. Dorai S.  
  
Shri. Patkar Sudhir Prabhakar

**M.Sc. COURSE :**

Chemistry  
(V. Ratna Rao Memorial Prize)  
Mathematics  
Physics

Shri. Ramesh G.  
  
Miss. Sitalakshmi R.  
Shri. Muralithar S.



## **RESEARCH CENTRES**

Centre for Bioscience & Biotechnology

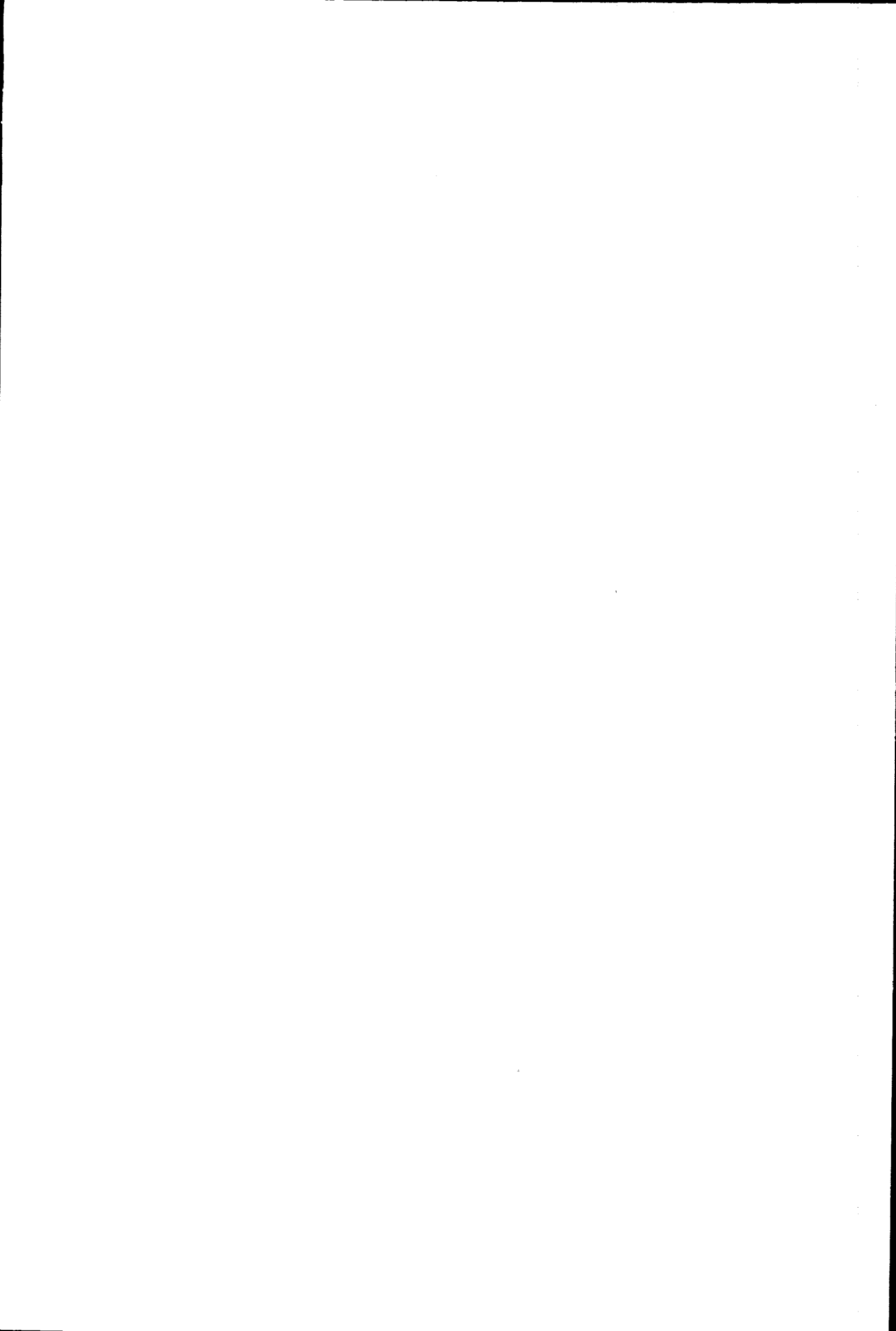
Centre for Systems and Devices

Energy Research Centre

Fibre Reinforced Plastics Research Centre

Materials Science Research Centre

Ocean Engineering Centre



## CENTRE FOR BIOSCIENCE AND BIOTECHNOLOGY

### 1. Courses Offered

- |  |                     |
|--|---------------------|
| 1. Biochemical Engineering I and II            | M.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. Medical Instrumentation I and II            | M.S./Ph.D.          |
| 9. Quantitative Physiology                     | B.Tech              |
| 10. Applied microbiology and biochemistry      | M.Tech              |
| 11. Biomedical Laser Instrumentation           | M.S./Ph.D.          |
| 12. Biofluid Mechanics                         | M.S./Ph.D.          |
| 13. Biochemical mechanisms & methodology       | M.Sc./Ph.D.         |
| 14. Advance Biochemistry & Biotechnology       | M.Sc./Ph.D.         |
| 15. Enzyme Engineering                         | M.Tech. Chem. Engg. |

### 2. Distinguished Visitors to the Centre

1. Prof. Venkatasubramanian — Rudgers University, USA.
2. Prof. A. Fiechter — Inst. of Bio. Tech, Eurich.
3. Prof. J. Nicolet — Univ. of Berne.
4. Prof. J. Anderson — Uppasala, Sweden.
5. Prof. Mathias Uhlen — Royal Inst. of Tech., Stockholm.

### 3. Research Work is Undertaken on The Following Projects

- |   |  |
|---|--|
| 1. Biomethanation Process                               | Dr. K. Lalitha   |
| 2. Bioreactors for fermentation studies                 | Dr. A. Baradarajan   |
| 3. Lignocellulose bioconversion to useful products      | Dr. T. S. Chandra  |
| 4. Structural studies on proteins and Viruses           | Dr. Mahasheshasayee &<br>Dr. T. S. Chandra                   |
| 5. Enzyme kinetics and immobilised biocatalytic systems | Dr. A. Baradarajan<br>Dr. K. Lalitha &<br>Prof. C. A. Sastry |
| 6. Biorheology  | Dr. Megha Singh  |
| 7. Biomedical laser technology                          | Dr. Megha Singh  |
| 8. Biological waste Treatment                           | Prof. C. A. Sastry   |
| 9. Whole cell immobilization for bioconversion          | Dr. A. Baradarajan.  |

Studies on immobilisation of different enzymes like Urease, amyloglucosidase using sodium alginate, alumina Chitosan, Chitin etc. using adsorption, entrapment, covalent cross linking and binding techniques and their use in fixed bed, fluidized bed and trickle bed reactors for bioconversion are in progress.

Work is in progress for the detection of abnormal tissues in human beings by lasers and ultrasonics. Fermentation of waste agro industrial raw materials to products like ranthane gum, an extracellular microbial polysaccharide used in food and oil industry is under study.

The biotransformation of hydrocortisone to prednisolone and side chain cleavage of cholesterol and 16 DFA Conversions and heterosteroids are under

## **ASSISTANCE TO INDUSTRY**

### **Retainer Consultancy :**

1. M/s. Lakshmi Starch Bombay
2. M/s. Harihar Polyfibres, Kumarapatnam
3. M/s. Seshasayee Paper and Board Ltd., Erode.

### **Consultancy :**

1. General Leathers, Madras.
2. Britannia Industries Ltd., Madras.
3. Nalli Starch and Glucose Industries.
4. M.D.P.L., Ranipet.

## **Sponsored Projects :**

### **Completed Projects :**

1. DST--Lasers in medicine
2. CSTR--Fluid dynamic aspects of blood flow and arterial diseases.
3. DST--Decentralized energy systems.
4. PONDS--Two phase digester for large scale biogas generation.
5. CSIR--Hermortheology.

## **On-Going Projects :**

1. ICAR--Microbial technology studies on lignocellulose utilization for chemical feed.
2. CSIR--Microcirculation
3. CSIR--Influence of magnetic field on erythrocyte mobility.

## **Major Equipment Purchased :**

1. Thermadyne Laminar flow chamber
2. Fraction Collector
3. Remmodel C-24 Table-top centrifuge
4. Volatile acid determination apparatus
5. Remi model R-23 Revolutionary Research centrifuge
6. Digital micl single pan balance
7. Metro incubator
8. Peristaltic pumps
9. Electric automatic anta cloning



## BRIEF INDICATIONS OF DEVELOPMENTAL PROGRAMMES LIKELY TO COME UP IN THE NEAR FUTURE :

### 1. Bioconversion using different techniques

- a) Production of enzymes of industrial and commercial importance
- b) Immobilisation of commercially useful enzymes
- c) Developing bioreactors for optimizing biocovertions like starch to glucose, glucose to fructose, steroids etc.; arriving at design criteria using computeraided design processes.
- d) Immobilisation of cells and enzymes together for bioconversion.

### 2. Laser applications in medicine and biology

- a) Cardiac monitoring by laser speckle
- b) Tissue characterisation for tumor detection and therapy
- c) Determination of erythrocyte sedimentation profiles in various diseases for diagnosis
- d) Characterisation and separation of disease-infected erythrocytes.

## PUBLICATIONS

1. Sastry, C.A "Water supply and sanitation problems in developing countries" *Indust. Safety Chronicle*, July-Sept 1985. p. 35
2. Sastry, C. A. "Effluent treatment in textile, leather and alcohol industries" *Ind. J. Env. Protection* 5; 94, 1985
3. Sastry, C. A. "Environmental pollution control problems in developing countries, " *Industry Safety Chronicle*, April-July 7, 1985
4. Sundara Murthy, S. and Sastry, C. A. "Treatment of waste waters from milk dairies—Case studies" *National Safety Chronicle*, Oct.-Dec. 1985, p. 37
5. Sastry, C.A. "Factors influencing biogas generation and operation and maintenance". *Indian J. Energy Heat Mass Transfer*, 1, P. 237 1985.
6. T. M. Vatsala and Megha Singh "Effects of onion in induced atherosclerosis in rabbits. II. Aortic proteins and nucleic acids" *Curr. Sci.* 54; 18. 1985.
7. Megha Singh, and P. Kanakaraj "Hypocholesterolemic effect of onion extract on cholesterol enriched erythrocytes" *Ind. J. Exptl. Biol.* 23; 456, 1985.
8. Megha Singh, T. Chitra, A. William and T. M. Srinivasan "Optical characterisation of tissues and measured by He-ne laser and their application to tumor diagnostics" *Inov. Tecu. Biol. Med.* 6,612, 1985.
9. A. William and Megha Singh "Characterisation of healthy and diseased tissues by He-Ne laser reflectometry" In. *Biomedical Engineering* (Sauer, B.W., ed.) Pergamon Press, N. Y. 1985, pp. 47-48.
10. S. Swarnamani, R. Sridharan and Megha Singh "Ultrasonic properties of rhinosporidium tissues" In. *Biomedical Engineering* (Sauer, B.W., ed.) Pergamon Press, N.Y. 1985, pp. 49-52.
11. A. Periaswamy and Megha Singh "Reconstruction of cardiac displacement pattern on the chest wall by laser speckle interferometry" *IEEE Trans. Medical Imaging* 4, 52, 1985.
12. G. Ramachandran, A. Periaswamy and Megha Singh "Laser speckle displacement cardiography" In. *Proc. IEEE/VII Ann. Conf. EMBS*, 1985, pp 1192-1195.

## CENTRE FOR SYSTEMS & DEVICES

### 1. Invited Lectures by Staff

Dr. P. R. Vaya gave an invited talk on "Semiconductor Devices and Techniques" at Meenakshi College for Women, Madras-600 024.

### 2. Seminars attended

1. Dr. P. R. VAYA attended a Winter School on Growth, Properties and Characterisation of Epi-electronics Mat., at ICTP, ITALY from Jan 12-24, 1986.
2. 4-National Seminars.

### 3. R and D in Progress

The following sponsored research projects are in progress with the faculty member holding the Chief Investigatorship

1. 'Compatibility Problems of Shipboard and Airborne Antennas' - Sponsored by DRDO.
2. 'Design and Development of a Microprocessor Based Near field Scanning System for Determination of Far-field Patterns' - Sponsored by DRDO.
3. 'Analytical and Experimental Techniques on the Characteristics of Prime-focus and Offset Paraboloids' - Sponsored by DRDO.
4. 'Analytical Technique for off-frequency and off beam Characterisation of the Radar and Communication Antennas above 1GHz' - Sponsored by DOE.
5. 'Digital Distribution Free Doppler Processor' - Sponsored by DRDO.
6. 'High Resolution Spectral Estimation Techniques for Radar' - Sponsored by DRDO.
7. 'DSP for a 60-Channel Transmultiplexer, (Consultancy), TRC.
8. R and D on IR Detectors by 'Molecular Beam Epitaxy Technique' - Sponsored by DRDO.

### 4. Publications :

1. M. S. Narasimhan and S. Ravishankar. 'Probe Uncompensated Near field to Far-field Transformation for Scanning Over an Arbitrary Surface', IEEE Transactions Antennas and Propagation, Vol. AP-33, No. 4, pp. 467-472, April 1985.
2. K. M. M. Prabhu, 'Optimum Binary Windows for Discrete Fourier Transform', Conf. Record, pp. 756-759. IEEE Intl. Conf. on Acoustics, Speech and Signal Processing, Tampa, Florida, March 1985.
3. N. Venkateswaran and K. M. M. Prabhu. 'Test ability of PA<sup>3</sup> Architectures', Conf. Record, pp. 20-23. Intl. Conf. on Circuits and Systems, Beijing, China. June 1985.
4. N. Venkateswaran and K. M. M. Prabhu, 'Programming Techniques for PA<sup>3</sup> Architectures', Conf. Record, pp. 1376-1379, IEEE Intl. Conf. on Acoustics, Speech and Signal Processing, Tampa, Florida, March 1985.

5. K. M. M. Prabhu, 'A set of sum-cosine window functions', Intl. J. Electronics, Vol. 58 No. 6, pp. 696-974, 1985.
6. K. M. M. Prabhu and H. Renganathan, 'Optimum Binary Windows for Discrete Fourier Transforms', IEEE Trans. Acoustics Speech and Signal Processing, Vol. ASSP. 34, pp. 216-220, 1986.
7. P. R. Vaya, J. Majhi, B. S. V. Gopalam and C. Dattatreyan, 'Thickness Dependence of Hall Mobility of HWE Grown PbTe Films', Phys. Stat. Sol (a) 87, (1985), pp. 341-350.
8. P. R. Vaya, J. Majhi, B. S. V. Gopalam and C. Dattatreyan, 'Hall Mobility and Field Effect Mobility Studies on PbTe HWE Thin Films', Appl. of Sur.Sci 22/23 (1985) pp. 731-736.
9. K. R. Murali, J. Sobanadri and P. R. Vaya, 'Growth and Morphology of  $Zn_3P_2$  films grown by Hot Wall Epitaxy Technique J. Crystal Growth', 73 (1), (1985) pp. 196-198.
10. G. Eranna, 'Heat Flow Resistance Measurements of Silicon  $P^+ - n - N^+$  diodes', Microelectronics and Reliability 25, 4 (1985) pp. 709-712.
11. P. R. Vaya, 'Magnetoresistance of PbTe Films', Phys. Stat. Sol (a) 92 (1985) pp. 555-561.
12. P. R. Vaya, J. Majhi, B. S. V. Gopalam and C. Dattatreyan, 'Study on n-PbTe/p-Si Hetero-structure', Phys. Stat. Sol (a) 93, (1986) pp. 353-360.

## 5. Equipment Developed

### I.I.T/D.D.K. MULTISCRIPIT COLOUR COMPUTER

The computer system forms a network with the TV system to form a very powerful information management and distribution system for Indian Languages.

This is totally an indigenous development.

It is easy to use and is being used by Doordarshan Production staff at Madras.

## 6. Future Plans

1. R and D on Multilayers of GaAs and its Ternary alloys with special reference to Opto-electronic devices (Proposal under consideration with DST).
2. R and D on PIN diodes for X-Band application (Proposal under consideration with DRDO)

## ENERGY RESEARCH CENTRE

This centre coordinates the research activities of various departments in the area of energy, mainly with reference to alternate and nonconventional energy sources, and energy conservation. The Specific areas include solar energy, wind energy, ocean thermal and wave energy sources, biogas and hydrogen energy.

### A. SOLAR ENERGY

#### (i) Saturated Solar Ponds :

A mathematical model has been developed for salt gradient solar ponds based on mass and energy balances taking into account the variation of properties of the solution with temperature and concentration. These equations have been solved using finite difference technique. Solar pond models (0.4m x 0.4m x 0.5m) with heat extraction facility have been fabricated and are being instrumented. Sodium chloride, Magnesium chloride, Potassium nitrate and Calcium nitrate are the salts proposed to be used in these ponds. Experimental results obtained on these ponds will be used to validate the mathematical models.

#### (ii) Photovoltaic Refrigeration :

12 Photovoltaic modules each of 30W, 12V peak capacity have been installed. A refrigerator as per WHO specifications has been designed and is under fabrication. This is to be coupled to the output from the photo voltaic panels.

#### (iii) Solar Air Conditioning :

Open cycle refrigeration systems, solid desiccant vapour absorption system and dehumidification systems are being studied for solar cooling applications. In order to improve the performance of solar cooling systems and make them economically viable, cascaded refrigeration – heat pump systems have been developed and encouraging results have been obtained.

#### (iv) Thermal Energy Storage :

Detailed analytical studies on the finned heat exchangers for latent heat storage have led to the development of procedures for the design of these equipment. A refrigeration system with an in-built latent heat storage has been designed and is under fabrication.

### B. ALTERNATE FUELS FOR COMBUSTION ENGINES

A new type of engine, called the Surface Ignition Engine, is being developed and tested. Combustion chambers made of special high-strength ceramics are being used. Heating elements are mounted in the ceramic chamber and the fuel injection is made to partly impinge on these heating elements. This engine can use a wide variety of fuels including alcohols, gasoline etc. With conventional diesel oil also, the delay period and rate of pressure rise are considerably reduced.

In another work alcohol is being sprayed in the inducted air after the turbocharger to cool down the air and also to produce extra power. The performance of such an engine, including the mixture distribution, has been extensively studied.

Considerable work has been done on adiabatic diesel engines. In this work some critical engine components like the cylinder head, cylinder liner and the piston top are insulated by ceramic coating or air gap to reduce heat losses. The benefits are use of lower grade fuels and increased thermal efficiency.

As an off-shoot of the adiabatic work, the so-called regenerative engines are also being developed. In this engine instead of mere heat insulation the piston of the engine is modified to act as a heat reservoir absorbing heat during a part of the cycle and giving it back during another part. This way the heat lost to coolant can be minimised and the efficiency enhanced.

Hydrogen has been used to partially substitute diesel oil in diesel engines. Substitutions upto 50% on energy basis have been achieved.

Some non-adiabatic vegetable oils are also being tried out as diesel engine fuels. The main problems with these oils are their high viscosity and smoking tendency. Esterifying them with methyl or ethyl alcohols can be a solution to this problem. Tests have been carried out with several vegetable oils. It is planned to carry out tests with their esters also shortly.

The thermal efficiency of small two-stroke SI engine for two-wheelers is being improved by modifying port design and other measures.

The air turbulence and air swirl inside two-stroke SI engines is being studied with the help of hot wire anemometers. Several measures have been tested out for improving the scavenging efficiency of such engines.

### C. WIND ENERGY

Work on the Project Sponsored by the Department of Non-Conventional Energy Sources was continued with the objective of establishing the 1 KW Vertical Axis Wind Turbine at a few more locations in the country. During the same period, a new Project was sponsored by the Department of Non-Conventional Energy Sources to I. I. T., Madras and BHEL (R & D) for the import of the components of a 20 KW Vertical Axis Wind Turbine from Dornier System, West Germany. The objective was to assemble the machine in India and to install it at a suitable site.

### D. BIO-ENERGY

Studies in progress in Bioenergy and Biomass conversion related to the Kinetics of degradation of and biomethanation of *Leucaena leucocephala*, a potential non-woody biomass. Biodegradation of complex biological macromolecular to small molecular weight intermediates and subsequently to methane has been evaluated. Various stages during the degradative process have been identified. Bioconversion to methane is an essentially anaerobic process and requires the integrated action of many species of microbes through the Interspecies Hydrogen transfer mechanisms. Attempts are being made to identify the active factors in the leaves of *L. Leucocephala* which make it a novel and potential source of biomethanation. Some of the biochemical processes involved in methanogenesis are being studied.

The Department of Non-Conventional Energy Sources has sanctioned a project entitled "Kinetics of biomethanation of *L. Leucocephala* and studies on methanogens in mixed cultures to enable an in-depth analysis of the process of Biomethanation of *L. Leucocephala*, and the biochemical parameters of methanogens.

The Faculty in the Energy Research Centre have also continued their role as Technical Advisors to the Department of Non-Conventional Energy Sources well as to a few other governmental energy development agencies.

## FIBRE REINFORCED PLASTICS RESEARCH CENTRE

### Courses Offered :

The following elective courses were offered by the Centre staff during 1985-86.

1. Composite Materials — Undergraduate Elective
2. Composite Technology — Postgraduate Elective
3. Composite Structures — Postgraduate Elective

### Continuing Education Programme :

The Centre offered the following short term courses during the year 1985-86 :

No.	Title of Course	Duration	No. of participants
1.	Advanced Composite Technology	19- 9-85 to 22- 9-85	40
2.	Workshop on FRP Technology	28-10-85 to 9-11-85	26
3.	Workshop on FRP Technology	10-03-86 to 22-03-86	22

In addition, the faculty members of the Centre participated in six other courses and Seminars held within IIT and outside.

### Academic Research Programme ;

(In collaboration with other Departments of the Institute)

- |                             |   |   |
|-----------------------------|---|---|
| B. Tech. Projects completed | — | 7 |
| B. Tech. Projects on going  | — | 3 |
| M. Tech. Projects completed | — | 3 |
| M. S. Projects on going     | — | 3 |
| Ph.D. Projects on going     | — | 3 |

### Research and Development :

The following R & D projects were taken up during the year :

1. Analysis and Design of Heated Structures for Defence applications Phase I & Phase II
2. Process development of Reinforced Reaction Injection Moulding.
3. Studies on Polymer Concrete.
4. Development of Wear Resistant Composites
5. Studies on Metal Matrix Composites by Powder Metallurgy Technique.
6. Development of FRP High Voltage Disc Insulators.
7. Development of Finite Element Programme for Axisymmetric shells of revolution.

Research in the following areas have been initiated during the year :

1. Buckling Analysis of Layered Composite shells by finite element method.
2. FRP components development for automobile and rail coach applications by resin transfer moulding.
3. Use of Expert system for Aircraft Wing Design Decision making.
4. Study and development of Brittle matrix composites.
5. Design development and fabrication of FRP vibration mounting for PSLV.

**Sponsored Projects :**

The following two sponsored projects were completed during the year

- (i) Development of Metal-lined Filament Wound Pressure Vessels — A DRDO Project
- (ii) Development of Regional Test Facility for testing Resins, Fibres and Composites- A DST project.

**Consultancy Project :**

The Centre has taken up Rs. 5.6 lakhs worth consultancy projects during the year. This includes a project from DRDL Hyderabad for Rs. 3.75 lakhs and another project for Rs. 1.2 lakhs from ISRO.

**Assistance to Industry :**

With the financial assistance of DST, New Delhi, the Centre has set up a Regional Test Facility for testing fibres, resins, composites and products. The Centre provides testing services and advice and guidance to the FRP and user industries on quality control in composite production. The Centre has also continued its assistance to industry by offering technical advice and design consultancy.

**Research Publications :**

Three

**Visitors to the Centre :**

Professor Kurt C. Frish, Director, Polymer Institute, University of Detroit, Michigan, U.S.A. visited and delivered lectures.

**Other Activities :**

Dr. N.G. Nair has served as a member of the Expert Committee for Biogas holders organised by Department of Non-conventional Energy Sources under the Chairmanship of Dr. V.G. Bhide, Vice-Chancellor, University of Poona, A new FRP Biogas holder system has been designed and specifications prepared.

## MATERIALS SCIENCE RESEARCH CENTRE

### Research and Development :

Papers and Review articles published : 3

Invited Lectures delivered by the Faculty : 6

### Visitors to the centre :

The following Scientists have visited the Centre and delivered lectures.

(1) Prof. Balu Venkataraman, Head Chemical Physical Group, Tata Institute of Fundamental Research (TIFR), Bombay, Lecture delivered on 'Chemical Routes for Conversion of Solar Energy - An Overview' on 30th May, 1985.

(2) Dr. Jean Desilvestro, Institute Chimie Physique, Ecole Polytechnique Federale de Lausanne, Lausanne, Switzerland - Lecture delivered on 'Electron Transfer Processes at  $WO_3$  in the Dark and under Illumination' on 7th August 1985.

(3) Prof. German Germanovitch *Talutz*, Deputy Director, and Prof. Ernst Zugidovitch *Kurmaev*, Director of Lab. of X ray Spectroscopy. Institute of Metal Physics - Ural Science Centre, Academy of Science of USSR - Visited MSRC during October-November 1985.

(4) Prof. W. D. Schnsider, Univ. of Neuchatel, Institut de Physique and Materials Science, Neuchatel, Switzerland - Visited MSRC during November 1985.

(5) Prof. D. Dew-Hughes, Dept. of Engg. Science, Univ. of Oxford, Oxford, England - Lectures delivered on (a) 'Nb<sub>3</sub>Si and the Search for High T<sub>c</sub>' and (b) 'Radiation Damage in A 15 Superconductors' on 2nd December 85.

(6) Prof. G. B. Donaldson, Superconducting Devices Lab., Dept. of Applied Physics, Univ. of Strathclyde, Glasgow, England - Lectures delivered on (a) 'Squids and their Applications' and (b) 'Integrated Thin Film Superconducting Devices' on 17th December 1985.

(7) Prof. Garimalla V. S. Rayudu, Radiology & Nuclear Medicine, and Medical Physics Centre, Chicago, USA - Lecture delivered on 'Radiation Dosimetry in Nuclear Medicine' on 8th January, 1986.

### New Project Submitted :

To augment and strengthen the activities at Materials Science Research Centre (MSRC), a project is submitted to the Ministry of Human Resources Development, New Delhi.

### New Projects Sanctioned :

(i) DST Project on 'Studies on High Temperature, High Critical Field Superconducting Materials' (Part-B) to the tune of Rs. 13.7 lakhs.

(ii) CSIR Project on 'Solid State Studies on Ternary Oxide Pyrochlores', A<sub>2</sub>B<sub>2</sub>O<sub>7</sub> to the tune of Rs. 1.7 lakhs.

### New Facilities Created :

1 PAR Potentiostat/Galvanostat has been procured to measure current-voltage characteristics of semiconducting materials in PEC Cells.



## OCEAN ENGINEERING CENTRE

### Education Programme : Continuing Education Programme

Serving Teachers Programme Ph.D.

No. on rolls : 1

Serving Officers Programme M.S.

No. on rolls (Sponsored) : 2

Serving Officers Programme Ph.D.

No. on rolls : 2

### RESEARCH AND DEVELOPMENT :

#### Publications :

Total number published in journal/Conference : Nil

Technical Reports : 4

#### Academic Research :

##### Completed :

#### MASTER OF SCIENCE BY RESEARCH

1. Analysis of towcables. March 1985.
2. Computer simulation studies for shoreline-coastal Structure interaction. April 1985.
3. Optimal design programme for truss systems using gradient projection method. May 1985.
4. Laboratory studies using free fall penetrometer. July 1985.
5. Seabed slope stability analysis with particular reference to the Krishna-Godavari basin. August 1985.

#### DOCTOR OF PHILOSOPHY

1. Linear spectral analysis and fatigue of offshore steel jackets. May 1985.
2. Integrity monitoring of fixed offshore platform. Dec. 1985.

##### On-going :

#### MASTER OF SCIENCE BY RESEARCH

1. Studies with free fall penetrometer.
2. Studies on seabed anchors.
3. Side launching of ships.
4. Geological application of remote sensing techniques on land coast and offshore.
5. Computer aided ship lines.

#### DOCTOR OF PHILOSOPHY

1. Application of catastrophe theory to nonlinear oscillation of ships.
2. Installation operations of offshore steel jackets.
3. Liquefaction of soils.
4. Wave forces on pile groups.
5. Strength behaviour of marine clays under repetitive loading.

6. Geophysical evaluation techniques for geological formations.
7. Dynamic response of offshore guyed towers.
8. Behaviour of piles subjected to lateral loads.
9. Wells turbine characteristics in oscillatory flow.
10. Underwater propagation of Acoustic and elastoacoustic waves.
11. Investigation on Articulated towers of offshore construction.
12. Studies on action of waves on pipe lines.

#### ASSISTANCE TO INDUSTRY —ICC

Industrial Consultancy work has been carried out for various organisation from all over the country. The value of the projects is Rs. 23 lakhs.

#### Sponsored Project :

##### Completed

- |  |  |
|--|--|
| 1. Analysis of Ship Structures                         | — Department of Science and Technology New Delhi.          |
| 2. Analysis and Design of buoys                        | — Defence Research and Development Organisation New Delhi. |
| 3. Pile foundation in weak rocks                       | — Engineers India Limited New Delhi.                       |
| 4. Formulae for stress concentration in tubular joints | — Engineers India Limited New Delhi.                       |
| 5. Design of Underwater towed bodies                   | — Electronics Commission New Delhi.                        |

##### On-going

- |   |   |
|---|---|
| 1. Utilization and Regulation of waves  | — Department of Ocean Development New Delhi.              |
| 2. Ocean Thermal Energy System  | — Department of Nonconventional Energy Sources New Delhi. |
| 3. Articulated towers for offshore structures   | — Indo-German Project                                     |
| 4. Studies on instrumentation for integrity monitoring of offshore steel jackets  | — Oil and Natural Gas Commission.                         |
| 5. Studies on Wave induced transport near Paradeep Port   | — Central Board of Irrigation and Power                   |
| 6. Studies on the design of Cargo Ships with soil propulsion  | — Ministry of Surface Transport.                          |
| 7. Studies on the influence of after body form of tugs, trawlers and offshore supply vessels on the propulsion performance of ducted propellers | — Ministry of Surface Transport.                          |

#### Consultancy Services :

Expertise available in the following areas :

1. Testing of offshore and other structures
2. Analysis and Design of marine, offshore and other structures

3. Foundation analysis and design
4. Hydrodynamic testing of structures (fixed and floating)
5. Hydrodynamic calculations including wave mechanics aspects
6. Ship resistance and propulsion tests
7. Design of ships, crafts, vessels
8. Materials for ocean construction.

**Major Projects Completed/Ongoing :**

1. Design of satellite tracking ship
2. Structural analysis of a missile target tower fitted on a boat moored at sea and the stability of the system.
3. Mudslide and seabed stability prediction studies from supplied data of Krishna-Godavari basin.
4. Analysis and design of dolphins at Madras Port.
5. Static and dynamic analysis of Liquid Upper Stage of PSLV.
6. Hydrodynamic analysis of sloshing of liquid fuel in tanks during flight of rocket/missile.
7. Experimental studies on ducted propellers for tugs and fishing trawlers.
8. Experimental determination of response amplitude operators of naval ship.
9. Design, analysis, testing and fabrication of a deep tow system (lattice structure) for supporting an underwater photography system.
10. Interaction of structure and propulsion system of a liquid fuel missile and the prediction of the resulting instabilities.
11. Design of fertilizer berth at Paradeep port.
12. Computer package for ship design and calculations.
13. Load test on an instrumented offshore pile.
14. Test on twin screw hulls.
15. Structural analysis of critical components of a naval ship under design.
16. Studies on options of a wave absorbing.

**SHORT-TERM COURSES COMPLETED**

**Continuing Education Programme (for Engineers from Industry)**

1. Marine Concrete structures — June 1985.
2. Recent advances in structural Analysis by Finite element and Boundary element methods July 1985.
3. Wave action on coastal and offshore structures Dec. 1985.

**Quality Improvement Programme (for Educational Institutions)**

1. Analysis and Design of underwater structures — Dec. 1985.
2. Foundation of coastal and offshore structure — Dec. 1985.

**Inter-Institutional Programme (to meet the needs of Industry/Institution)**

1. Orientation Course on offshore structures for Engineers of ONGC — Nov. 1985.

### International Programmes

1. Intergovernmental Oceanographic Commission (UNESCO)/Department of Ocean Development (Govt. of India) sponsored training workshop on Ocean Engineering and Its Interface with Ocean Sciences — March 1986.

### Conferences

1. Workshop on wave studies and applications — Feb. 1986.

### Expert Assistance from Unido

Dr. P. Bogdanov, Director, Bulgarian Ship Hydrodynamic Centre, Varna and honoured Scientist, Bulgaria, visited the Centre from 30th September to 9th November 1983 and from 4th March 1985 for 4 weeks under the UNIDO Programme to work out the detailed requirements for commissioning and utilisation of the seakeeping tank. The terminal Report has been submitted for the consideration of UNIDO.

### FRG Assistance Programme :

Assistance Programme to Ocean Engineering from FRG includes the supply of instruments in the field of hydrodynamics, geotechnology and marine technology; training of three scientists from OEC for a total of 36 man months, visit of FRG Scientists to OEC for 35 man months and 3 short term visits of Indian and FRG Experts for total of three man months.

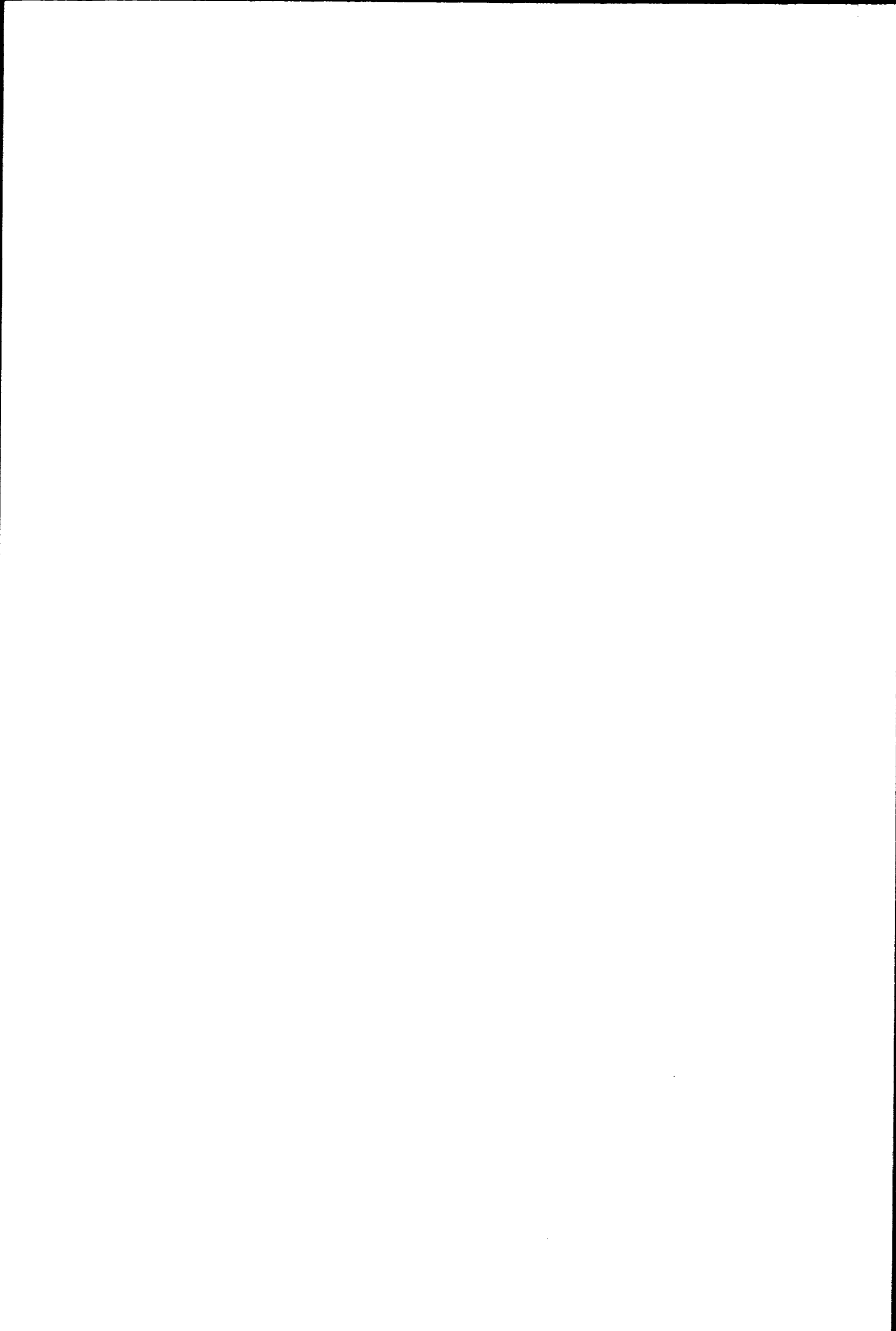
Under this programme the following major equipments and instruments have been received at OEC.

- |  |          |
|--|----------|
| 1. 'HBM' 6 Channel Carrier Frequency Amplifier         | — 1 No.  |
| 2. 'HBM' 2 Channel Carrier Frequency Amplifier         | — 2 Nos. |
| 3. "W + W" 4 Channel Stripchart Recorder               | — 3 Nos. |
| 4. 'HITACHI' Digital Storage Oscilloscope              | — 1 No.  |
| 5. 'APPLE' Computer with Printer and DOS               | — 3 Nos. |
| 6. 'SIEMENS' Computer with graphic Plotter and Monitor | — 1 No.  |
| 7. Vibrator Testing Equipment                          | — 1 No.  |
| 8. TV Equipment, VHS System                            | — 1 No.  |

**SCHOOLS FOR EDUCATIONAL DEVELOPMENT**

**Chemical Engineering Education Development Centre**

**Mechanical Engineering Education Development Centre**



## CHEMICAL ENGINEERING EDUCATION DEVELOPMENT CENTRE

### Compilation :

1. Chemical Engineering Education and Research in Indian Universities.

### Teacher's Manual

1. Physics I & II
2. Chemical Process Engineering Economics, Costing and Decision Making.
3. Process Dynamics and Control.

### Work in Progress

Other Teacher's Manuals for Core Subjects for Four Year Degree Course in Chemical Engineering.

## MECHANICAL ENGINEERING EDUCATION DEVELOPMENT CENTRE

The Mechanical Engineering Education Development Centre of this IIT has been actively engaged in the preparation of teaching resource materials. During the year under report the following monographs have been brought out :

Currently the following teacher materials are under preparation.

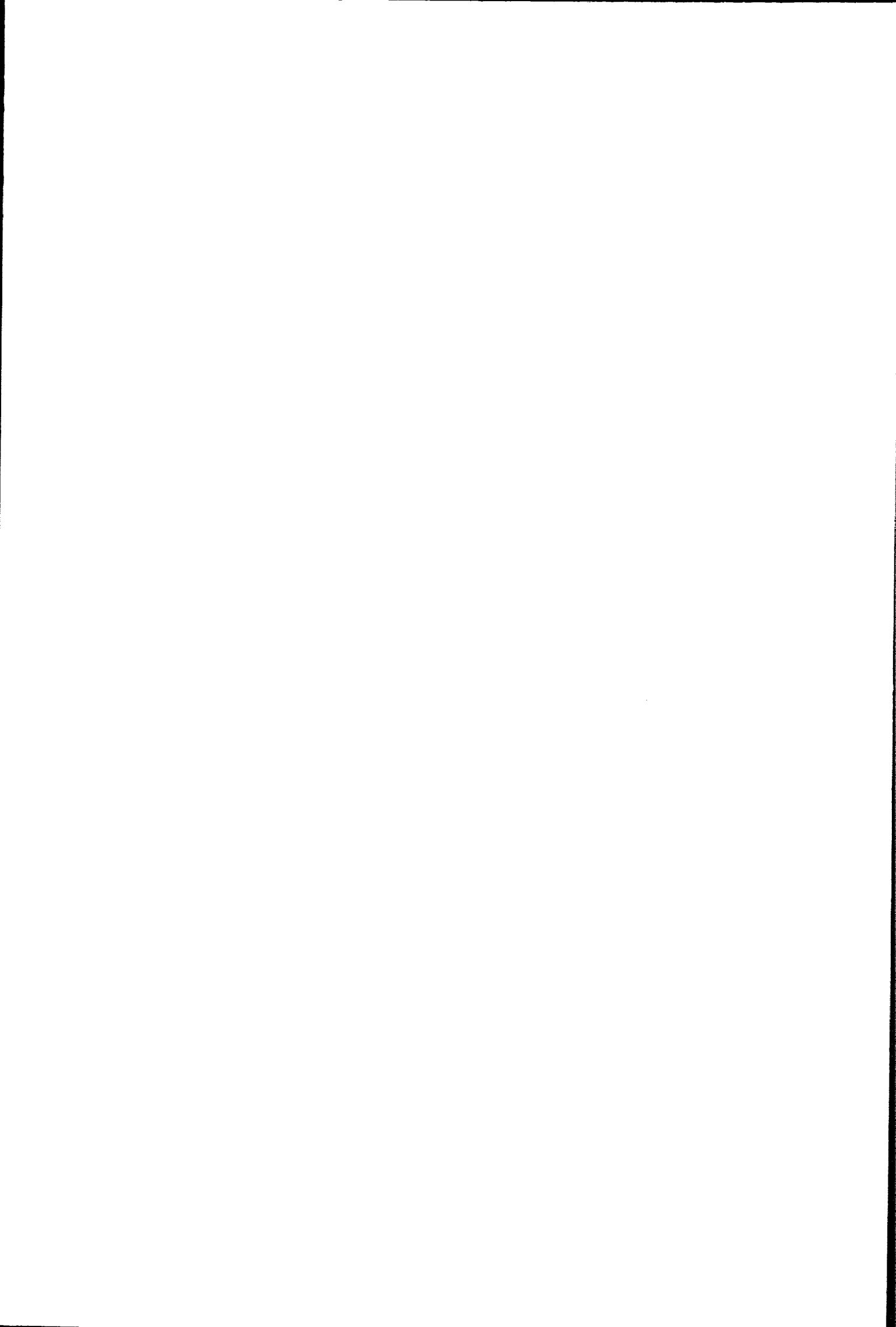
1. Bibliography on 'Thermo-Physical Properties'
2. New Standards in Engineering Drawing.
3. Standardization of Nomenclature

This Centre also organised a one day Workshop on 'Informal Methods in Formal Engineering Curricula' on November 2, 1985 at the request of ISTE, New Delhi.

1. Bibliography on 'Energy Conservation'
2. Bibliography on 'CAD/CAM'
3. Bibliography on 'Group Technology'
4. Lecture Notes on 'Computer Applications in Mechanical Engineering'
5. Product Directory

### Activities Planned for the future :

The activities planned for the future include preparation of bibliographies/teacher resource materials on Creative Engineering Design, Robotics, Unconventional Machining, and (Material Removal) Machining Theory and Applications.





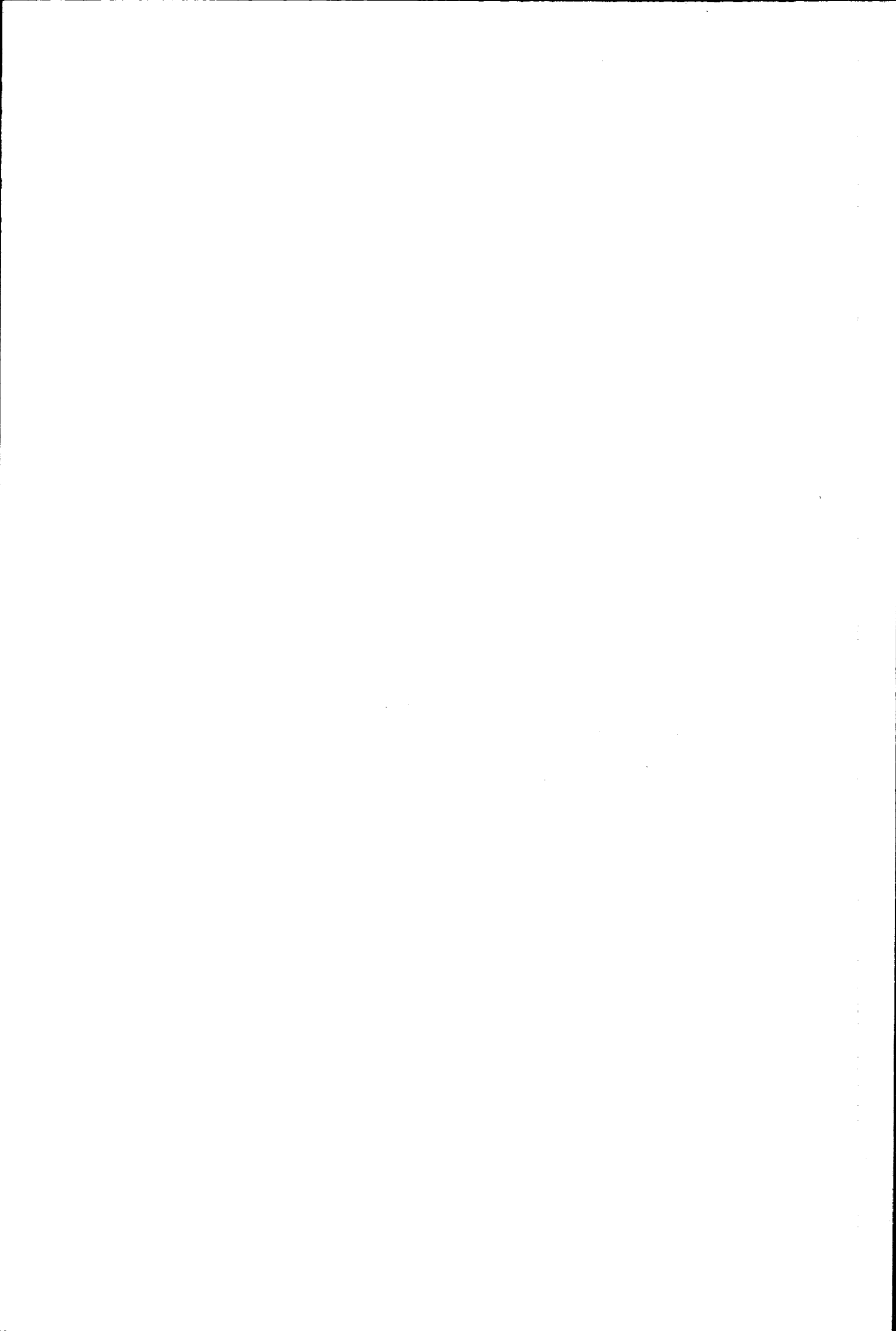
**SPECIAL FACILITIES FOR INTERACTION WITH  
OTHER INSTITUTIONS**

Central Electronics Centre

Centre for Industrial Consultancy & Sponsored Research

Engineering Design Centre

Regional Sophisticated Instrumentation Centre



## CENTRAL ELECTRONICS CENTRE

### I. Research and Development

1. Active Filters for the displacement measurement system in a centreless grinding machine -- Ph.D. project for Machine Tools Laboratory, Department of Mechanical Engineering.
2. To detect the darkest point in a photoelasticity strain pattern -- Ph.D project for Photo-Elasticity laboratory of Applied Mechanics Department.
3. Lathe Tool Dynamometer for Cutting Plastics -- M. S. Project for PEIL, Department of Mechanical Engineering.

### II. Assistance to Industry

1. Servicing of Atomic Spectrophotometer for Geological Survey and Mining Department, Industrial Estate, Guindy, Madras-600 032, work completed and earned Rs. 8,500/-.
2. Servicing, repair and calibration of Ocuscan 400 with Built-in and Hand Scanner for Medical Research Foundation Madras-600 006 and earned Rs. 5,000/-.
3. Repair and recalibration of XY Plotter M2-BO72 for Loyola College, Nungambakkam, Madras-600 034, and earned Rs. 2,700/-.
4. Repair, Servicing and calibration of Electrophysiological System for Medical Research Foundation, Madras-600 006, and earned Rs. 7,000/-.
5. Repair and servicing of Storm Regler for M/s. Kunal Machinery Mfrs. Pvt. Ltd., Ambattur, Madras and earned Rs. 1,800/-.
6. Conversion of Ignitron to Thyristor Contactor for M/s. Swiss Welded Mesh Co. Pvt. Ltd., Ambattur, Madras and earned Rs. 2,500/-.
7. Repair of PCB Logic board of SIMARD equipment for Madras Base of Fishery Survey of India, Madras-13, and earned Rs. 2,000/-.
8. Repair to Spectronic 20 for Annamalai University, Annamalainagar-608 002, -- work completed for Rs. 2,500/-.
9. Repairs of PC Boards and Power Supply Units for Madras Base of Fishery Survey of India, Madras13, and earned Rs. 15,000/-.
10. Repairs to the Sonary 600 with Model 632 Puler/Receiver and model 613-5M Time base for BDT Govt. College of Engineering, Davangere, Dept. of Technical Education, Karnataka -- work under Progress for Rs. 8000/-.

### III. New Major Equipment Added

S.No.	Name of Equipment	Qty.
1.	Oscilloscope 100 MHz 5 channel 12 trace, Kikusui make.	TWO
2.	Function Generator 0—10 KHz MRO—TEK make.	THREE
3.	XY Recorder—Anika make	ONE
4.	Double Cassette Recorder—Philips	ONE
5.	Cassette deck—Philips	ONE

6.	Dual Trace Oscilloscope 0—20 MHz Aplab make	THREE
7.	Digital Counter 1 GHz Philips	ONE
8.	Servo Stabilizer 5 KNA -- Automatic Electric	ONE
9.	Microprocessor—Micromax Trainer	TWO

#### IV. Apprentice Training Programme

The centre is conducting an Apprentice Training Programme for Electronics Technicians.

The number of candidates are Seven.

Duration of the Training : January 1986 to August 1986 (Eight months)

Stipend given to each candidate : Rs. 400/- per month.

## CENTRE FOR INDUSTRIAL CONSULTANCY AND SPONSORED RESEARCH

### Interaction with Industry

In the year 1985-86 the Centre for Industrial Consultancy and Sponsored Research organised a seminar on "New Approach to Technical Education and Training".

In this programme, the Association of Indian Engineering Industry and its member companies took active part.

Arrangements were made for five faculty members to spend their summer vacation in industry. The centre has formulated a new scheme of 'Industrial Associate ship' where by the industry develops a formal contact with the institute and provides for active collaborative programmes in the form of consultancy, seminars, conferences and also facilitate exchange of information on recent developments in technology.

The centre is also coordinating the activities of the Nodal Centre for National Technical Manpower Information System for upto date information regarding the Diploma holders and Engineering Graduates.

In the year 1985-86 Consultancy earnings of the Institute was Rs. 90.67 lakhs and the number of Consultancy assignments taken up was 470.

### Patents:

The following patents were taken in the name of the Institute during the year 1985-86.

1. Synthesis of condensed nitrogen heterocycles derived from indan-1, 3-dione.
2. A device relating to cold glow plasma for the deposition and etching of thin films.

### Patent applications were made for the following :

1. A compact and portable apparatus for welding metal wires and the like.
2. A Mist Eliminator.
3. A device to determine the coefficient of friction of Rollers or idlers.
4. An improved two stroke spark ignition Engine.
5. A method of manufacture of improved HSLA (High Strength Low Alloy) Steel.
6. Morse-Code.

### Publication :

The Annual report of the Centre for 1984-85 was published in May 1985.

The publication of quarterly 'RESEARCH AND CONSULTANCY AT IIT MADRAS' was continued and is being sent to a large number of Industries, Research Laboratories.

### Collaborative Research Projects :

The Centre continued to provide administrative support for the Indo-German joint research projects taken up during 1983 and also co-ordinates other activities relating to research projects sponsored by NSF etc.

### Entrepreneurship Development Programme :

The Centre continued to coordinate the programme in MS in Entrepreneurship and special lectures on various aspects relating to Entrepreneurial development were organised by this Centre. Also an awareness camp on Entrepreneurship was organised for the students of our institute.

### Know-How Transfer :

The know-how for manufacture of instruments relating to casting was transferred to an industry.

## SPONSORED PROJECTS

The following projects were sanctioned during the year under report for a total value of Rs. 233.7 lakhs

### Aeronautical Engineering

		Rs.
Nonlinear Analysis of Anisotropic Multi-layered structures using Finite Element Method	Prof. K. A. V. Pandalai Dr. T. K. Varadan	2,71,000

### Applied Mechanics

Studies on flow around three dimensional bluff bodies relevant to building and environmental Aerodynamics	Dr. B. H. Lakshmana Gowda Prof. N.V.C. Swamy	3,23,384
Development of 20 KWe Axis wind Energy Turbine	Prof. N.V.C. Swamy	3,00,000

### Chemical Engineering

Seagrass Ecosystem of Coromandal Coast	Prof. M. Satyanarayana Dr. (Miss) Rajeswari Mahalingam	12,31,000
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### Chemistry

Cyclophosphatiazenes - Phosphorus Sulphur and Nitrogen Containing Heterocycles: their Synthesis Structures and Reactions.	Dr. M. N. Sudheendra Rao Prof. G- Aravamudan	3,68,700
Electrochemical reduction of nitro substituted Vinylthiophenes	Dr. C. S. Venkatachalam	44,600
Fundamental studies on catalysts for Development of FCC Catalysts	Prof. J.C. Kuriacose Prof. V. Srinivasan Prof. C. N. Pillai Prof. C. S. Swamy Dr. B. Viswanathan	25,50,000
Kinetics of Biomethanation of Icaena Leucocephala and studies on methanogenic bacteria in mixed culture	Dr. (Mrs) K. Lalitha Dr. V. Mahadevan	8,69,000
Design and Development of Data acquisition system for instrumentation	Dr. S. P. Venkatesan Sri G. Palaniswamy	1,24,140
Characterisation of surface and catalytic properties of heteropoly acids	Dr. B. Viswanathan Dr. T. K. Varadarajan	69,600

### Computer Science & Engineering

Interactive voice Input/Output system for a computer	Prof. B. Yegnanarayana	27,63,000
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### Electrical Engineering

Fibre Optic control system for Railway Signalling	Prof. J. P. Raina Dr. Ashok Jhunjunwala	18,89,000
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Fibre optics systems application Promotion Programme (FOSAPP)	Prof. J. P. Raina Dr. Ashok Jhunjunwala	Rs. 15,00,000
<b>Mathematics</b>		
Numerical studies of Rotating visious flows past a body	Dr. C. V. Raghava Rao Dr. D. S. Subramanyan	22,160
<b>Mechanical Engineering</b>		
Research on flow through axil pumps	Prof. H. C. Radhakrishna Dr. V. Balabaskaran Sri S. Kumaraswamy	3,41,000
Studies on the Combustion phenomena in a solid propellant Rocket Ramjet Engine	Prof. R. Natarajan	3,25,000
Development of Pump turbines—Design and analysis of 'S' combered profiles for fully reversible aerial flow pump turbines	Prof. H. C. Radhakrishna Dr. P. Aswatha Narayana Dr. V. Balabaskaran	3,11,000
<b>Metallurgical Engineering</b>		
Computer aided design of gravity die casting dies	Dr. O. Prabhakar	10,48,160
<b>Physics</b>		
Development of High Power Solid State Laser Sources	Dr. T. A. Prasada Rao	15,41,000
Elastic and Thermal properties of materials (metals) through higher order Elastic constants and the Anderson — Gruneisen Parameters	Prof. R. Ramji Rao	21,400
Investigation of Magnetic properties of certain metal Hydrides	Prof. K. V. S. Rama Rao	27,600
Experimental studies of the physical properties	Prof. R. Srinivasan Prof. G. Rangarajan	17,30,000
Microprocessor based instrumentation for stirling nitrogen liquifier	Prof. G. Rangarajan Dr. T. S. Natarajan	2,95,410
<b>CSD</b>		
Development and fabrication of Engineered Version of Fibre Optic Communication System for internal Communication	Prof. J. P. Raina Dr. Ashok Jhunjunwala	32,20,000
<b>MSRC</b>		
Solid state studies and ternary oxide pyrochlores $A_2B_2O_7$	Prof. G. V. Subba Rao Dr. U. V. Varada Raju	61,000
Synthesis, characterisation and search for high temperature super-conductivity in metal excess ternary systems	Prof. G. V. Subba Rao Prof. G. Aravamudan	13,73,500

**OEC**

		Rs.
Studies on Integrity monitoring of fixed offshore platform	Sri V. G. Idichandy Prof. C Ganapathy	5,87,000
Studies on the Wave induced sediment transport near Paradeep Port	Dr. V. Sundar	1,65,000



## ENGINEERING DESIGN CENTRE

### Consultancy Services to Industries and R & D Organisations :

The centre interacts with industries and R & D Organisations through time bound projects. A few of the industries and R & D organisations for whom the consultancy services were extended are :

- i) M/s. Appaswamy and Associates, Madras.
- ii) M/s. General Optics (Asia) Ltd. Pondicherry.
- iii) Tamilnadu Poultry Development Corporation. Madras.
- iv) RRC Kalpakkam, Facit (Asia) Madras, Machine Tool and Accessories Pvt. Ltd. Madras.
- v) Design and Development of a discreteiy switchable FOV (TV) optical System, ADE Bangalore.

### Teaching and Research :

The centre assists the other departmantms of the institute in teaching and laboratory. It has its own research programme.

### Sponsored Research :

- (a) Sponsored projects that were carried out :
  - i) Development of decentralised energy system.
  - ii) Development of a low cost launcher.
  - iii) Holography interferometry and speckle techniques in NDT.
- (b) Sponsored projects that are currently in progress :
  - i) Investigation on holographic optical elements.
  - ii) Investigations on image subtractions technique.

### Development Projects :

The following projects were carried out :

- i) Development of a Nd: glass laser.
- ii) Development of a Belt-tension meter.
- iii) Development of a wheel chair for handicapped.
- iv) Design and development of a centering microscope for CNC milling machine.

### Projects Under Negotiation :

- i) Development of software for zoom lens design with IRDE Dehradun.
- ii) Remote sensing camera lens system with ISRO.

(a) Papers published/accepted : 23

Communicated	: 6
Presented	: 7
Submitted	: 5
Ph.D. completed	: 2

(b) Book/monograph : Book entitled 'Modern Pressure Vessels and Piping Design' being written in colloboration with a few industries.

## REGIONAL SOPHISTICATED INSTRUMENTATION CENTRE

### Courses :

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

### Research and Development :

Faculty members of RSIC are guiding research work in Molecular Spectroscopy and Instrumentation leading to Master's and Ph.D. degrees. A total of 16 students are registered under the faculty members for Ph.D., and 4 for M.Tech. / M.S. degrees. In addition to these the centre has 3 post Doctoral fellows and one Pool Officer. Two students got their Ph.D. degrees last year.

One of our Faculty members (Prof. P.T. Manoharan) has been elected to the Coveted fellowship of the Indian National Science Academy (FNA).

One of our Faculty Members (Dr. Surjit Singh) has been elected as a fellow of the Indian Academy of Sciences, Bangalore (F.A.Sc.,)

The faculty of RSIC have published nearly 25 research papers in journals of International repute.

### Assistance to Industry and other Academic Institutions :

Routine service of providing spectroscopic analysis on various equipments available, to academic institutions and industrial laboratories was done, which is one of the main aims of setting up this centre. The breakup of services rendered to internal and external users is given below :

<i>Sl. No.</i>	<i>Instrument</i>	<i>Int.</i>	<i>Ext.</i>
1.	Varian Techtron Atomic Absorption Spectrometer — AA6	16	110
2.	UV-Vis-IR (Varian 2390)	359	613
3.	Perkin Elmer PE-781	1377	...
4.	PE 983 IR	443	361
5.	EM 390 NMR	2080	567
6.	Varian XL-100-NMR	178	84
7.	Varian E-4-EPR	234	68
8.	Cary-82 Laser Raman	337	56
9.	Polytech FIR-30-FAR IR	96	189
10.	Single Crystal X-Ray Diffractometer	1066½ hrs.	1204½ hrs.
11.	Aminco Bowman Spectrofluorometer	234	80
12.	Scanning Electron Microscope	354	62
13.	Varian E-112 EPR spectrometer	883	23
14.	ESCA-AUGER	226	2

### Sponsored Projects :

1. NMR Investigations of structure and dynamics of molecules.
2. Electron Donor Acceptor Complexes.
3. Vibrational spectral studies of aqueous solutions.
4. Vibrational spectral studies using matrix isolation.
5. Transient heat transfer in turbine rotors and castings.
6. Design and development of a Microprocessor based data acquisition system for instrumentation.

### New Major Equipments :

A Finnigan Mat high resolution Mass Spectrometer has been installed and is in full operation.

### Invited Lectures delivered by the staff

<i>Title</i>	<i>Speaker</i>
(i) Raman Spectra of aqueous solutions.	Dr. Surjit Singh
(ii) IR Band intensities and dipole moment derivatives	Dr. Surjit Singh
(iii) LFER for spectroscopic parameters and molecular structure.	Dr. Surjit Singh
(iv) Second derivative analysis in IR and Raman spectroscopy for molecular interaction studies.	Dr. Surjit Singh
(v) Low-Dimensional Dithiolene Systems By EPR.	Dr. P. T. Manoharan
(vi) Reconstituted Hemoglobin and Modulation of Heme environment,	Dr. P. T. Manoharan
(vii) Spin-labelled studies on hemoglobins and conformational charge.	Dr. P. T. Manoharan
(viii) Interaction of Fe-Bleomycin by ESR/Mossbauer Studies.	Dr. P. T. Manoharan
(ix) Electron Spin Resonance studies in solids.	Dr. S. Subramanian
(x) Ligand field Theory.	Dr. S. Subramanian
(xi) High Resolution NMR in solids	Dr. S. Subramanian
(xii) Theory and applications of Laser Raman Spectroscopy-Pulse transitions.	Dr. T. K. K. Srinivasan
(xiii) Structural Phase Transitions-Vibrational Spectroscopy.	Dr. T. K. K. Srinivasan
(xiv) Rotational relaxation in free jet expansions.	Dr. S. P. Venkateshan
(xv) Measurement of thermal diffusivity of liquids by a transient technique.	Dr. S. P. Venkateshan

Workshops and Short-term courses mainly for research work in Universities, Defence Organisations, National Laboratories and Industries are conducted on the following topics.

- i) DST Summer School on 'Maintenance of Analytical Instruments'.
- ii) QIP Winter short term course on Scientific Instrumentation.
- iii) DST Winter School-cum-Workshop on 'Magnetism in Inorganic Chemistry.'
- iv) DST Winter School-cum-Workshop on 'ESR Spectroscopy and its Associated Techniques'.

### **Lectures by Visiting Scientists :**

Dr. O. Kahn, Laboratory of Spectroscopy of Transition Elements, University of Paris, Orsay, France.

Dr. C.P. Keijzers, Physical Chemistry, Katholieke University, Nijmegen, The Netherlands.

Dr. K.A. McLachlan, Physical Chemistry Laboratory, Oxford University, South Parks Road, Oxford (U.K.)

Dr. John R. Pilbrow, Department of Physics, Monash University, Clayton, Victoria.

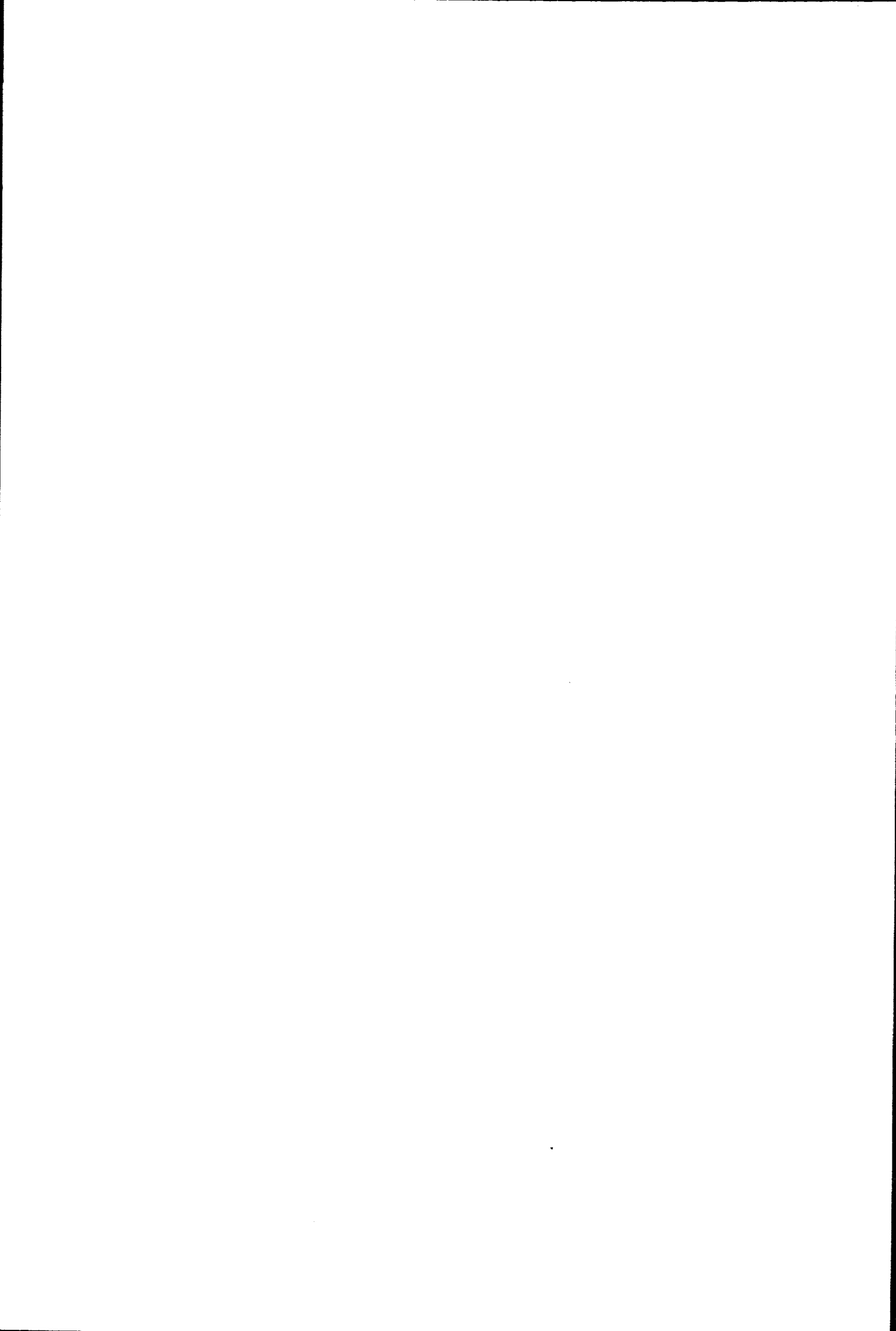
### **Brief Indication of Developmental programme Likely to come up in the Near Future :**

1. Second Derivative spectroscopy in IR and Raman Spectra for Molecular interaction studies.
2. Matrix Isolation studies in molecular interactions.
3. Vibrational correlation functions and effect of intermolecular forces.
4. Development of Electron Nuclear Double Resonance method.
5. Biradical studies using spin labels on model systems and possibly membranes.
6. Development of EXAFES and Mossbauer methods for the study of metal containing proteins and model systems.
7. Development of Electron spin Echo Envelope modulation spectroscopy.
8. Study of chemically induced Dynamic nuclear polarisation (CIDNP) Involving organo metallic compounds using peroxide initiated thermal periodical reactions and ultraviolet induced free radical reactions.
9. Study of 2D NMR spectroscopy in solids and liquids using tailored pulse sequences in biological systems.
10. Development of ab initio and Many Body perturbation methods to evaluate Magnetic parameters of small molecules.
11. Study of pulse and CW methods of Paramagnetic molecules with respect to Molecular dynamics and relaxation processes.
12. Vibrational spectra of phase transition in organic molecular and inorganic complexes.
13. Time resolved Raman spectral studies.
14. Spectroscopic (Electronic and Vibrational) studies of Excited molecules.
15. Development of infrared spectrometer.
16. Measurement of thermo physical properties for solids, liquids and gases.

**CENTRAL SERVICES, FACILITIES**

Central Glass Blowing Section

Central Photographic Section



## CENTRAL GLASS BLOWING SECTION

Since its inception in 1972, the Central Glass blowing Section has been catering services to all Research, Science and Engineering Departments. The Section is well equipped with sophisticated glass blowing equipment such as Horizontal-Vertical lathe, Forming lathe, Universal lathe, Grinding and Polishing machine. Quite recently Central lathe (Indian Make) with taper turning attachment has been acquired by the section.

The unit is capable of making Cryogenic and High Vacuum Glass systems, Quarts apparatus and Instruments fabrication. Quite often the section has been guiding the scientists and technicians coming from the educational and research institutions for Quarts instruments fabrication. Glass to metal seals, Liquid nitrogen dewars (Cylindrical, Spherical and Tail) with slit silvering etc. The Section gives basic glass blowing training to the post graduate students in Science.

### Seminar

The CGBS had sponsored a one day work shop on Recent trends in the scientific and industrial glass blowing at IIT., Madras on 20.6.1982, with Indian Society of Scientific Glass Blowers. A technical note was presented by our Section. Fabrication Techniques such as spherical dewars and a pot dewar making were demonstrated.

Some staff members of this section participated in the second Annual Seminar of ISSG organised by the Indian Institute of Science, Bangalore 22-23 July 1983 and presented a paper on 'some aspects of manufacture of dewars for spectroscopic studies at very low temperatures' by Sri. N. T. Kumarasamy and Shri. A. G. Venugopal.

Three staff members were deputed to attend the third annual seminar on Scientific Glass Blowing in Research and Development Institution and Industries organised by ISSG and Bhabha Atomic Research Centre, Bombay, 15th to 17th November, 1984.

Shri. N. T. Kumarasamy Technical Officer attended the Seminar held at I. I. T., Kanpur and IV annual get together of I. S. S. G. during 14th to 19th October 1985 and presented a paper on the "Development of Nitrogen Spray System" for Cryogenic treatment of warts.

## 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, Processing of Black and White Films, 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 the 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.

During the Silver Jubilee Year (1983-84), the CPS took charge of photorecopying of vintage photographs as also photo-taking and provided several blow-ups for the exhibitions organised in September 1983 and then during the Indo-German Seminar in December-January 1984. For the Open House conducted during 1984, several colour blow-ups for the exhibition were also made by the CPS.

During the year 1985, a photographic exhibition of the photos of the dignitaries presided over the respective Convocation right from first Convocation till date was held. It was well appreciated by one and all. The Panoramic view of the entire gathering at the OAT during the earlier Convocations had been put up at the entrance of SAC Building and it made an impressive impact on the visitors during the 1985 Convocation function.



## **DEPARTMENTS**

**Aeronautical Engineering**

**Applied Mechanics**

**Chemical Engineering**

**Chemistry**

**Civil Engineering**

**Computer Science and Engineering**

**Electrical Engineering**

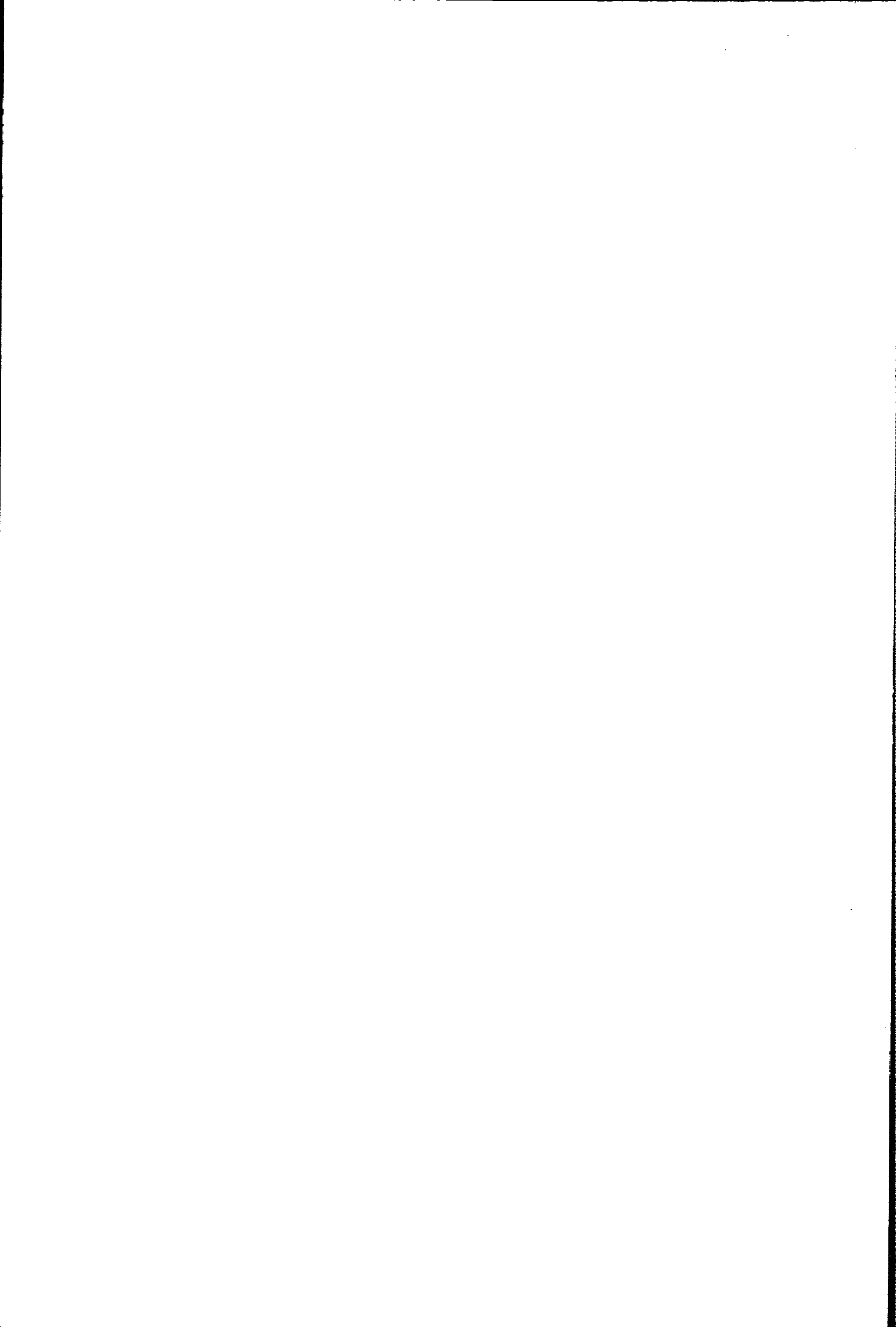
**Humanities and Social Sciences**

**Mathematics**

**Mechanical Engineering**

**Metallurgical Engineering**

**Physics**



## AERONAUTICAL ENGINEERING

Research Publications	— Total upto 1985	192
	Added 1985-86	23
Monographs	— Upto 1985	6
	New Addition	nil
Departmental Projects (1985-86)	— B.Tech.	14
	M.Tech.	2
	M.S.	6
	Ph.D.	nil

### Sponsored Projects :

<i>Title</i>	<i>Sponsor</i>	<i>Amount</i>
1. Hot Cascade Test Rig	ARDB	21.18 lakhs
2. Erosive Burning Studies of Solid Propellants	ARDB	6.95 lakhs
3. Theoretical and Experimental Investigations of Rarefied Gas Flows	ARDB	8.70 lakhs
4. Theoretical and Experimental Investigation of Wake Boundary Layer Interaction of an Airfoil	ARDB	5.8 lakhs
5. Nozzle Deposition problem	ARDB	2.436 lakhs
6. Development of a Reverse Flow Combustion Chamber	ARDB	1.675 lakhs
7. Development of an axi-symmetric supersonic air intake	ARDB	2.5 lakhs
8. Development of a gasturbine fuel control system using Microprocessors	ARDB	2.0 lakhs
9. Nonlinear analysis of Multi-layered structures, using finite element methods	ARDB	2.71 lakhs

### Important Lectures and Seminars :

'NATIONAL CONFERENCE ON AERODYNAMICS' was held on OCTOBER 10 and 11, 1985

S.No.	Date	Speaker	Topic
1.	24.4.1985	Prof. H.N. Mahabala, IIT Madras.	Expert systems
2.	6.9.1985	Prof. N.V.C. Swamy, IIT Madras.	Coherent structures in turbulent shear flows
3.	25.9.1985	Capt. R.V. Kanjalikar, N.D.A., Pune.	Hang gliding
4.	27.9.1985	Dr. G. S. Davies, I. I. T. Madras	Non-Newtonian Flows
5.	8.11.1985	Prof. T.K. Bose, IIT Madras.	Thermodynamic analysis of MHD generator
6.	22.11.1985	Prof. KAV Pandalai, IIT Madras.	Large amplitude vibration of composite structures
7.	13.1.1986	Mr. B. Ramaswamy, CHUO Uni, Tokyo.	Langrangean approach to sloshing in fuel tanks
8.	31.1.1986	Mr. S. Neelakantan, Scientist, CRE's Office, Bangalore.	Escape system for Military Airplane

**Note :** Above lectures were arranged jointly with Aeronautical Society of India (Madras Branch).

**Research Publications :**

<i>S. No.</i>	<i>Author/s</i>	<i>Title</i>	<i>Journal or Conference, Year and so on.</i>
(1)	(2)	(3)	(4)
1.	A Krishnan and N. Srinivasulu	Some studies on vibration of Timoshenko beams	J. of Sound and Vibration, 100 (3); 445-451, 1985.
2.	J. Kurian and A. K. Sreekanth	Shock velocity measurements using Microwave Doppler Shift	Experiments in Fluids (3), 1985.
3.	S. G. Vombatkare, S. Santhakumar and R. Radhakrishnan	Some effects of blade profile and geometry on wind mill power loads	Jl. of Civil Engg. for practi- cing and Design Engineers, Vol. 5, No. 3, 1986.
4.	S. Santhakumar	A new method for the design problem in transonic flow.	National Conference on Aerodynamics, IIT, Madras 91-94, Oct. 85.
5.	A. K. Sreekanth and S. Panneerselvam	Symmetric Separated flow past slender bodies at angles of attack in subsonic and supersonic flows.	A.I.A.A. Paper 85-5807 Oct. 1985.
6.	E. Rathakrishnan and A. K. Sreekanth	A Monte Carlo approach to free molecular flow through tubes with sudden enlargement	Mechanics Research Communications, Vol. 12 (2), 75-80 (1985)
7.	T. S. Balasubramanian and G. Subramanian	On the performance of a four- degree-of-freedom per node element for stepped beam analysis and higher frequency estimation.	J. Sound and Vib., 99 (4), 563-567, 1985.
8.	G. Subramanian and S. Krishnakumar	A glass plate shearing inter- ferometer for curvature contouring of flexed plates	J. Str. Engg. 1 (4), 95-100, 1985
9.	G. Subramanian and T. S. Balasubramanian	A higher order beam element for vibration of beams with discontinuities	FEICOM Proc. Int. Conf., III-B, 627-634, Dec. 1985.
10.	G. Subramanian, C. Ramesh Babu, and C. Jayachandra Bose	On stiffness matrix of tapered triangular DKT plate bending element	FEICOM, Proc. Int. Conf., IIT-Bombay 83-92, Dec. 1985
11.	C. Ramesh Babu, G. Subramanian and G. Prathap	Mechanics of field consistency in finite element analysis - A penalty function approach	Tech. Mem. ST 8514, NAL, Bangalore, Oct. 19 1985.
12.	G. Prathap G. Subramanian and C. Ramesh Babu	Stress oscillations in plane stress modelling of flexure - A field consistency interpretation	Tech. Mem. ST 8507 NAL, Bangalore July 1985.
13.	G. Subramanian and S. N. Nair	Direct determination of curvatures of bent plates using a double glass-plate shearing interferometer	Exp. Mech. 25 (4), 376-380, Dec. 1985

<i>S. No.</i>	<i>Author/s</i>	<i>Title</i>	<i>Journal of Conference, Year and so on.</i>
(1)	(2)	(3)	(4)
14.	M. A. Badrinarayanan, S. Raghu and E. G. Tulapurkara	Non-equilibrium region of a mixing layer	A I.A.A.J. Vol. 23, No. 7, pp. 987-991, (1985).
15.	N. Balachandran and E. G. Tulapurkara	Computation of Laminar flow through slots	National Conference on Aero- dynamics, IIT Madras, 107-110, Oct, 1985.
16.	V. Ramjee and E. G. Tulapurkara	Wings with blunt trailing edge at Reynolds No. of $5 \times 10^5$	National Conference on Aero- dynamics, IIT, Madras, 61-66, Oct. 1985,
17.	V. Ramjee, E. G. Tulapurkara and K. Padmanaban	Visualisation of flow past square cylinders	Proceedings of 14th National Conference on Fluid Mech. and Fluid Power, Roorkee, 45-50, Jan. 1986.
18.	E. G. Tulapurkara and B. H. L. Gowda	Flow through slots-A flow Visualisation study	Proc. of 14th National Con- ference on Fluid Mech. and Power Roorkee, 5-10, Jan. 1986.
19.	T. K. Varadan and G. Prathap	Inelastic post-buckling of tapered flexible bars	Journal of Comp. and Structs., Vol. 21, 1985, pp. 681-690.
20.	T. K. Varadan, B. S. Saikumar and G. Prathap	A general iterative numerical approach to the finite deflection analysis of beams	Journal of Comp. and Structs. Vol. 22, No. 2, pp. 123-130, 1986.
21.	M. Ganapathi and T. K. Varadan	Free vibrations of thermally stressed skew-plates using partition method	The Jour. of Aerot Society of India, Vol. 37, No. 2, May 1985, pp. 153-156,
22.	B. S. Sarma and T. K. Varadan	Ritz finite element approach to nonlinear vibrations of beam columns	Int. Conference on Finite Elements in Computational Mechanics. held at IIT Bombay, India, 2-6, Dec. 1985.
23.	K. Viswanatha Reddy and K. Damodaran	Computation of Flow fluids in supersonic inlets	National Conference on Aero- dynamics. I.I.T., Madras, 29-31 October 1985.

## APPLIED MECHANICS

### Quality Improvement Programme

	M.Tech.	M.S.	Ph.D.
No. of Trainees so far	5	0	21
No. on rolls in Ph. D.			2

### Important Lectures and Seminars

1. 'Acoustic source characterisation' by Prof. M. G. Prasad, Stevens Institute of Technology, New Jersey, USA.
2. The Acoustical Society of India Conference on Acoustics 1985 on the theme 'Acoustics and its Biological Effects' was organised by Prof. B. V. A. Rao in December 1985.
3. International Conference on Biomechanics and Clinical Kinesiology of Hand and Foot in December 16-18, 1985.

### Research Publication

No. of papers published 67 (Sixtyseven)

### Departmental Projects

1. Development of Computer Software for 3 dimensional problems in Fracture Mechanics, BHEL, Hyderabad.
2. Development and fabrication of '3g' eccentric mass mechanical exciter
3. Microcomputer Instrumentation for early detection of leprosy
4. Influence of magnetic field on erythrocyte mobility
5. Blood flow in microvessels

### Assistance to Industry — Industrial Consultancy

1. Solar panel testing — ISAC Satellite Centre, Bangalore
2. Electrical Motor noise study — M/s Jyoti Ltd. Baroda
3. Noise survey of thermal plant — Ennore Thermal Power Station, Madras.
4. Dynamic analysis of Leyland engines — M/s Ashok Leyland Ltd., Madras.
5. Stress Analysis of motor cycle rims — M/s Ind Suzuki Motor Cycles Ltd., Hosur
6. Stress Analysis of ammonia converter shell — Bharat Heavy Plates and Vessels, Visakhapatnam
7. Stress Analysis T-72 wheels — M/s Wheels India Ltd, Madras
8. Assignment on kinetic study and stress analysis of a new mill developed by M/s Walchandnagar Industries Ltd., Walchandnagar, Pune
9. Inhouse training programme on CAD for M/s Bharat Heavy Plates and Vessels, Visakapatnam, 1-15 June, 85 offered by Prof. V. Ramamurti
10. Retainer consultancy to M/s Brakes India Ltd., and KCP Ltd.. Madras by Prof. V. Ramamurti
11. Thermal stress analysis of the steam Turbine, BHEL, Hyderabad (Under progress).
12. Theoretical calculation of speed torque power curves for dynamic separator for M/s KCP Ltd., Madras.

**New Major Equipment :**

1. Audio Power Amplifier Type 45, Philips
2. 16mm Portable drilling machine — Wolf
3. 1 KVA Voltage Stabiliser NELCO
4. 6 channel Carrier Frequency Amplifier KWS 3073, HBM West Germany
5. Strain Rate controlled Testing Machine commissioned
6. IBM PC/XT Compatible microcomputer for image processing
7. Apple Computer 64 KB with monitor and printer
8. Electromagnetic flow meter system

**Visitors to the Department :**

1. Prof. M.G. Prasad, Stevens Institute of Technology, New Jersey, USA
2. Prof. J.M.F. Landsmeer, Dept. of Anatomy, University of Leiden, Netherlands
3. Prof. A. Huson, Dept. of Anatomy, University of Leiden, Netherlands
4. Dr. D. K. S. Ramalingam, Appollo Hospital Madras
5. Dr. V. J. Lubenov from Higher Institute of Mechanical and Electrical Engg., Sofia Bulgaria visited the Department in the period 15. 2. 86 to 20. 2. 86 and delivered a lecture on flows in Entrance Region between plates and in pipes.

**Invited lectures delivered by staff :**

1. Dr. S. Narayanan, delivered a lecture on 'Nonstationary Response of vehicles traversing Rough Roads' at the Mechanical Engineering Department, Massachusetts Institute of Technology, U. S. A., - Nov. 1985
2. Dr. J. Ramachandran, delivered series of lectures on Theory of Plasticity to the staff of Brakes India Ltd., Madras in August 1985.
3. Dr. J. Ramachandran, delivered lecture on 'Boundary Element Method' at Madras Institute of Technology, Madras in September 1985
4. Prof. T. M. Srinivasan delivered lectures in MIT, Manipal
5. Prof. Megha Singh delivered lecture at PGI Basic Medical Sciences, Madras.

**Other information :**

1. Prof. V. Ramamurti was awarded 'VASVIK Research Award' in the field of Mechanical Sciences and Technology, 1983.
2. Dr. N. Ganesan, Dr. K. M. Patil and Dr. Megha Singh have become Professors
3. Dr. V. Ramjee has become Associate Professor
4. Dr. P. Krishna Iyer has become Assistant Professor
5. Mr. G. Thomas has become Senior Scientific Officer Gr. II
6. C. R. Subramaniam Principal Scientific Officer retired from service in the Institute on 30th June, 85
7. Dr. S. Narayanan, Assistant Professor rejoined the Department in December 85 after completing his assignment on Humboldt Fellowship
8. Dr. B. S. Prabhu has joined the Department in Oct. 1985 after availing the sabbatical leave.

**Developmental Programme in the near future**

1. Setting up of a condition monitoring laboratory with emphasis on Fault Analysis
2. Medical Image processing
3. Laser Application in Medicine
4. Studies on bed sores and bone mechanics
5. Gait Analysis and design of modular above knee prosthesis
6. Simulation studies in cardiovascular system
7. Computational measurement of foot pressure



## CHEMICAL ENGINEERING

### Specialisation in M.Tech. (3 Semesters)

- i. Biochemical Engineering
- ii. Catalysts and Reactors
- iii. Computer Aided process systems and Equipment Design
- iv. Environmental Engineering
- v. High Polymer Engineering
- vi. Instrumentation and Process Control
- vii. Mineral Process Engineering

### Quality Improvement Programme

(Serving Teachers Programme)

	<i>M.Tech.</i>	<i>M.S.</i>	<i>Ph.D.</i>
No. of Trainees so far	5	3	5
Presently working	—	—	5

### Important Lectures and Seminars (Guest Speakers)

1. Prof. Dr. Ing. H. Brauer      T. U. Berlin
2. Prof. Dr. Schugerl, University of Claustahl

### Research

a) Research publication			
(i) Papers published		5+2	
(ii) Papers presented		5+2	
b) M.S/Ph.D	M.S.		Ph.D.
Completed	5		5
on going	22		25

### ICC Including Retainer Consultancy

1. M/s. Beardsell Insulations Limited
2. M/s. Stan Besto Foamlags Pvt. Ltd.
3. Tamil Nadu Alkaline Batteries Ltd.
4. Beardsell Insulations Ltd.
5. M/s. Prasanth Overseas Supplies House Pvt. Ltd.
6. M/s. Swathi Chemicals Ltd.
7. M/s. P. Olymers Chemicals

### Retainer Consultancy

Dr. C. A. Sastry	—	M/s. Lakshmi Starch, Hyderabad M/s. Harihar Polyfibres - Harihar
Dr. Y. B. G. Varma	—	M/s. Mothy Chemicals, Trivandrum M/s. Polymer Chemicals Madras M/s. Toshniwal Instrument, Madras

**Visits to the Departments :**

Prof. Dr. Ing. H. Brauer, TU, Berlin  
Prof. Dr. Schugerl, University of Claustahl  
Prof. Dr. R. Mahalingam, Washington State University (Visiting Professor from August - December 85.)

**Invited lectures delivered by Staff**

1. Prof. M. Satyanarayana
  - i) University of Roorkee
  - ii) Government Engineering College, Raipur
  - iii) Regional Research Laboratory, Jorhat
2. Prof. Y. B. G. Varma  
Reactor Research Centre. Kalpakkam
3. Prof. N. Subramanian
  - i) Reactor Research Centre, Kalpakkam
  - ii) Vikram Sarabhai Space Centre, Trivandrum
4. Prof. C. A. Sastry
  - i) College of Engineering, Guindy
  - ii) Tamilnadu Water and Drainage Board, Madras
  - iii) National Productivity Council, Madras
  - iv) Institute of Technology & Management System, Delhi
  - v) Engineering Staff College, Hyderabad
  - vi) Metroboard, Madras.
5. Prof. M. S. Ananth  
Karnataka Regional Engineering College, Suratkal
6. Prof. Ch. Durgaprasada Rao  
M. I. T. Chromepet (2 lectures)
7. Dr. V. S. Ramachandra Rao  
Karnataka Regional Engineering, College Suratkal (2 lectures)

**Any other item of special interest :**

1. Project sanctioned :
  - i) Department of Environmental studies - Seagrass Ecosystem of coromandel coast.
  - ii) Department of Science & Technology,—VLE and Excess Enthalpy measurements and an expert system for thermophysical properties.
2. Participation of students in All India Chemical Engineering students' Congress: Four final year students participated and got prizes.
3. Applied for patent in "Circular Fluid Energy Mill"

## CHEMISTRY

### Research and Development

Research work undertaken by the faculty of the Department covers a variety of areas in Chemistry and include both basic and applied, the specific areas being electrochemistry, polymer chemistry, catalysis, synthetic organic chemistry, organic reaction mechanism, structural and theoretical chemistry, solid state and coordination chemistry, analytical and nuclear chemistry. Major portion of these activities are supported by Government agencies like DAE, DST, ISRO, CSIR, Defence and other organisations.

### Publications :

About 85 papers have been published in national and international journals during the year.

### Sponsored Projects :

There are currently 24 ongoing projects sponsored by various organisations. A number of new proposals have been submitted to these organisations by the faculty.

### Indo-German Project :

Two Indo-German projects are also in progress.

### Visitors :

A total of 18 scientists visited the Department from abroad during the year and gave seminar talks in the Department. The visitors were from USA, USSR, England, Australia and Bulgaria.

### Visits abroad

6 of the faculty members went abroad to participate in various international symposia and seminars in Japan, USA, USSR, England and West Germany and DAAD reinvitation programme.

### Seminars & Symposia

A two day Annual Symposium in Chemistry was held on March 15-16, 1986 and was co-sponsored by Department of Chemistry, Anna University, Guindy Campus. It was attended by about 400 delegates and a total of 68 papers were presented in the two days.

### Assistance to outside organisation

Analytical assistance for characterisation of the R & D product chemicals, industrial products, catalyst samples (of various industrial organisations) etc are being provided to educational and industrial institutions.

### Research collaboration

Collaborative research work on inter-departmental and inter-institutional level is also being conducted by the faculty members of this Department. The outside institutions include MRL, Madras, University of Madras, May & Baker (P) Ltd., England.

## CIVIL ENGINEERING

### New Courses Introduced

A few additional elective Courses were introduced at the B.Tech and M.Tech levels. Particular mention may be made of "Computational Hydraulics" & 'CAD in Civil Engineering' at M. Tech level.

### Important Lectures and Seminars

In addition to the weekly seminars by the post graduate students and Research scholars the following special lectures were arranged.

<i>Topic of Lecture</i>	<i>Speaker</i>
Special consideration in Industrialised Earthquake proof Housing in Hot climate areas	Dr. Hary Shahnazarov Chief Design Engineer Central Research and Design Institute for Housing Moscow, USSR.
Lighting of offices and museums	Mr. D.A. Loe Senior Lecturer Bartlett School of Architecture, U.K.
Value Engineering and Management	Mr. R.K. Khatri Member, Board of Directors American Society of Engineers from India, Michigan, U.S.A

### Visiting Faculty

The following faculty visited the Department during the year.

<i>Name of visiting faculty</i>	<i>Programme</i>
1. Dr. Arun Chatterjee Professor of Civil Engineering, University of Tennessee, USA.	UNDP-India TOKTEN
2. Dr. Kumares C. Sinha Professor of Civil Engineering, Purdue University U.S.A	UNDP-India TOKTEN

### Short term Courses

1. An 'Advanced Course on Urban Transportation Management' was conducted under the Continuing Education Programme during December 1985.
2. An advanced course "FEM 85" was conducted under the Continuing Education Programme in May 85.

## **Research and Development**

In addition to the M.Tech., M.S., and Ph.D. research activities, three sponsored projects were in progress.

### **Indo-German Projects**

The following Indo-German Projects were continued during the year.

- 1) Water Resources Evaluation and Management Model for Rural Areas with particular reference to Narayanapuram.
- 2) Appropriate Technology for Rural Housing.
- 3) Transportation Management System for Indian Cities.

### **Assistance to Industry—ICC**

A number of projects referred by various industries and government organisations have been undertaken and the department leads in the industrial consultancy activities at the Institute.

### **Computing Laboratory in Civil Engineering**

A computing laboratory in Civil Engineering Department was set up with a VAX 11/730 computing system and a graphic terminal.

### **Croposed Development Programme**

In addition to the on going research work in various disciplines the department plans to strengthen the activities in the following areas ;

1. Appropriate Technology for Housing.
2. Functional Design of Buildings and study of Built Environment.
3. Materials and systems for Housing.
4. Construction Management.
5. Wave Hydrodynamics.
6. Ground Water Modelling.
7. System Analysis of Multi Reservoir Projects.
8. Flood Managemant and Surface Water Flow Analysis.
9. Shell and Special Foundations
10. Foundation on clays.
11. Machine Foundations.
12. Wind Engineering.
13. Timber Structures.
14. Optimization in Structural Design.
15. Urban and Intercity Transportation Planning
16. Traffic Engineering and Management.
17. Computer Aided Design and Civil Engineering System.

## COMPUTER SCIENCE & ENGINEERING

The Department of Computer Science and Engineering has completed two years after attaining the status of a separate department in the Institute. Our first batch of B. Tech students will be graduating in July 1986. We are continuing our M. Tech. program with a normal intake of about 35. The strength of our research scholars is also growing from year to year.

In addition to the academic program the department supports both sponsored and industrial research activities. Currently the sponsored work involves development of display control for Kannada language and new algorithms for applications in Acoustic Imaging. This industrially oriented work consists of organizing short courses on system support, data processing and computer applications.

The department is engaged in the following specially funded activities

1. **INFORMATION SCIENCES** : The goal is to create infrastructural facilities for work in information processing. In particular, the scheme aims at developing distributed information systems using LAN (Local Area Net work), graphics for DSS (Decision Support Systems) and capabilities for interaction in regional languages.
2. **CLASS PROJECT** : The aim of the project is to make even school children aware of the capabilities of computers. As a part of this project IIT is required to train school teachers and interact with them on hardware / software problems.
3. **MICROPROCESSOR TRAINING PROGRAM** : This program is intended to train teachers of engineering colleges in microprocessor techniques.

The Department have good financial support from Government of India for the above activities including procurement of computer systems. There is also a handsome subsidy from the Government to strengthen our undergraduate program in terms of providing adequate laboratory facilities.

With ten faculty and several research scholars, the department is actively engaged in research in the frontier areas of computer science like Artificial Intelligence, Distributed Data Processing, Advanced Theoretical Computer Science, Simulation involving Performance Evaluation Studies, Speech Recognition, CAD for VLSI and Algorithms. The department is going to play a major role in the V Generation Computer Project of Department of Electronics, Government of India. Our department has been identified as a focal centre for activities connected with 'Expert Systems' in this project and Prof. H. N. Mahabala has been identified as the co-ordinator for this activity. Work has already been initiated to develop man-machine interface through speech and picture modes.

The Department also share a major responsibility in managing the Central Computer systems to provide service to all departments of the Institute. Our dedicated operations staff keep the central systems IBM 370/155 and IPL 4443 running almost 24 hours a day. Our system staff provide software support to various activities in the Institute.

A new computer centre building is coming up to house a new central computer Siemen 7570-C system which would operate in a time-shared mode with about 100 terminals distributed all over the Institute. We plan to step up our research, development and service activities by next year when the new building will be ready for occupation.

### LIST OF PUBLICATIONS (In Reviewed Journals)

1. B. Yegnanarayana, J. Srekanth and Anand Rangarajan, Waveform Estimation Using Group Delay Processing, IEEE Trans. on Acoustics, Speech and Signal Processing, Vol ASSP-33, No. 4, PP 832-836, August 1985.
2. Mrs. Kamala Krithivasan and A. Das, "Terminal Weighted Grammars and Pictures Description, "Computer Vision, Graphics and Image Processing, 30, 13-31 (1985).

3. Mrs. Kamala Krithivasan and A. Das, "Time Varying Finite Automata", International Journal of Computer Mathematics, 19, 1985.
4. N. Nirmal and Mrs. Kamala Krithivasan, "Context Dependant Table Matrix L systems", Information Sciences, 35, 1985.
5. S. V. Raghavan and R. Kalyanakrishnan, "On the classification of Interactive Users Based on User Behaviour Indices", ACM SIGMETRICS Conference on Measurement and Modelling of Computer Systems, August 1985, Austin, Texas, USA, PP - 40 - 49.

#### LIST OF PUBLICATIONS (In Conference Proceedings)

1. B. Yegnanarayana and S. Tanveer Fathima. "An Algorithm for Band limited Signal Interpolation", Proc IEEE International Conference Acoust, Speech and Signal Processing, ICASSP-86, Tokyo, Japan, PP. 1677-1680, April 8-11, 1986.
2. B. Yegnanarayana, S. Raman and R. Sundar, "Signal Dependant Analysis in Speech Recognition", Proceedings of International Conference on Speech Input/Output Techniques and Application, London, UK, PP. 31-36, March 24-26, 1986.
3. C. R. Muthukrishnan - "Computer Science and Operations Research - interfaces" - Annual meeting of the OR Society of India, Jamshedpur, December 1985.
4. Mrs. Kamala Krithivasan, S. Kalavathi and A. Das; "Growth Functions and Syntactic Inference of DGDL Systems, Proceedings of WG '85, June 18-21, 1985, West Germany, PP. 181-190.
5. Mrs. Kamala Krithivasan and U. B. Manon, "Single Successor Context-free Graph Grammar and Application to Flowchart Compilation", Proceedings of WG '85, June 18-21, 1985, West Germany, PP. 191-200.
6. S. Jayaprakash and K.B. Lakshmanan, "Evaluation of Control Flow Complexity Measures", CSI-86, Annual Convention of the Computer Society of India, Calcutta, Jan 22-25, 1986.
7. M. K. Ramanujam. "Local Area Networks and Satellite Communications", Indian Society for Information Science Conference at Bombay - Sept. 85.
8. M. K. Ramanujam, "Facsimile Transmission", RILISAR, Ranganathan Institute - Proceedings - Madras - Feb. '86.
9. M. K. Ramanujam and T.R. Natesan, "Preservation of feasibility in L. P. Problems" - C.S.I. annual conference at Calcutta 1986.

#### SPONSORED PROJECT

<i>Project</i>	<i>Agency</i>	<i>Coordinator</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 Technology Program in Telematics.	DOE Govt. of India.	S. V. Raghavan
4. EXPERT Systems (Under Fifth Generation Project)	DOE Govt. of India.	H. N. Mahabala

<i>Project</i>	<i>Agency</i>	<i>Coordinator</i>
5. Development of Bit Slice Based Display Controller for Kannada Script (Completed)	DOE Govt. of India.	H. N. Mahabala
6. Laser Link	Indo-German Project	H. N. Mahabala
7. Digital Design of VLSI	Ministry of Human Resource Development, Govt. of India.	H. N. Mahabala

#### CONTINUING EDUCATION PROGRAMS

1. Microprocessor Training Program/  
Advanced Microprocessor Training — May 1985.
2. School Teachers Training Program (Class Project)
  - (i) Teachers Training Program — May 20-31, 1985.
  - (ii) Teachers Training Program — June 17—July 6, 1985.
  - (iii) One day Workshop — November 4, 1985.
3. Advanced COBOL Programming — June 1985.

#### TECHNICAL REPORTS

1. C. R. Muthukrishnan, "Implementation of a PROLOG interpreter in C".
2. C. R. Muthukrishnan, "Computer Graphics Software for Solid Modelling".
3. S. Kirankumar and C. Pandu Rangan, "A New Linear Space Algorithm for LCS problem" —CS-TR-86-01 — March '86.
4. N. Parameswaran, S. Venugopalan "An Occam Translator-Interpreter" Jan 1986.

#### 4. PROFESSIONAL ACTIVITIES

1. Prof. B. Yegnarayana has been appointed as a Honorary Editor for the Journal of the Institution of Electronics and Telecommunication Engineers, India.
2. Prof. C. R. Muthukrishnan has been appointed Member of Board of Governors, KREC, Suratkal.
3. Dr. H. N. Mahabala has served as Chairman, Program Committee for the First International Workshop on VLSI Design.
4. Dr. H. N. Mahabala has been nominated Member on Electronic Commission, Govt. of India.
5. Dr. H. N. Mahabala has been nominated a member CLASS Steering Committee.
6. Dr. H. N. Mahabala has been elected Vice-President of Computer Society of India (CSI).
7. K. B. Lakhmanan has been appointed member, Program Committee, Fifth Conference on Foundation of software technology and Theoretical Computer Science (FST & TCSS), New Delhi, 1985.
8. Dr. C. Pandu Rangan offered a full course on Theory of Computation at IIT Delhi for a DOE Sponsored Project on Man Power Development.
9. Dr. C. Pandu Rangan served as a Program Committee member for the First International Workshop on VLSI Design.



10. Dr. C. Pandu Rangan participated in a Short Term Course at IIT, Delhi on Parallel Processing and VLSI Architecture with emphasis on Digital Processing.
11. M. K. Ramanujam has been invited to be a member in the Expert Advisory Committee for National Information Centre for Leather and Allied Industries at CLRI/Madras for 1985-86.
12. Mr. R. Dheenadayalu has been nominated as a member of the Committee for preparing the curricula for three years Diploma Course in Computer Science and Applications for Department of Technical Education, Madras.
13. Mr. R. Dheenadayalu has been assisting the Vanavani School in their Computer Science Program for IX Standard.
14. Mr. N. Rajagopalan has been nominated as Member, Board of Studies, Department of Library Science, Madras University.

#### CONFERENCE

International workshop on VLSI design was conducted under combined auspices of CSI & ISTE - Dec. 1985.

#### COURSES CONDUCTED FOR INDUSTRY

1. C. R. Muthukrishnan has coordinated courses on Unix and C, for CMC Ltd, Madras.
2. C. R. Muthukrishnan has coordinated courses on Fifth Generation Computing Systems, for CMC Ltd, Secunderabad.
3. M. K. Ramanujam took part in COBOL Programming Course for industry, June 1985.
4. M. K. Ramanujam conducted in-house lectures for M/s. Dastur & Co, Madras on Data Base & CICS Systems-Sept. '85.
5. S. Ramesh and V. Mohan Kumar-delivered lectures and provided practical training for M/s. TIAM HOUSE on VM/370 Concepts, March-April '85.
6. K. B. Lakshmanan has conducted a course on Data Structures and Algorithms for TCS Ltd, Madras.

#### VISITS ABROAD

1. Mrs. Kamala Krithivasan visited some Universities in West Germany, Holland, U.K and France. Attended the Workshop on Graph Theoretic concepts in Computer Science at Castle Schwanberg, Wurzburg, Germany.
2. Dr. H. N. Mahabala visited Washington D.C. (1985) for "Expert systems in Government".
3. Dr. H. N. Mahabala visited Bangkok (1985) as a member of UNESCO Expert Committee on Computers in Education.
4. Dr. H. N. Mahabala visited Stanford USA (1986) as member of UNESCO Expert Committee on Future direction in R & D on Computers in Education.

#### VISITS/TALKS BY SCHOLARS

1. Dr. Kodandapani, Sr. Engineer, Digital Equipment Corporation.
2. Mr. G. Venkatesh, Solids State Graph, TIFR, Bombay.
3. Dr. Reddy, AI Lab, West Virginia.
4. Sri Magesh Chella, Cafe lyst, Semiconductors, Santa Clara, USA.
5. Sri P. Das Gupta, Sr. Engr. Siemens Computer, R & D, Munich.
6. Dr. Prasad Subramaniam, AT & T Bell Labs, USA.
7. Dr. Kowalski, Imperial College, London, U.K.
8. Dr. Vidyasankar-Memorial University of Newfoundland, Canada.
9. Sri. S. Prithiviraj, CMC Ltd, Secunderabad.

#### CHANGES IN STAFF POSITION

1. Dr. M. Manohar joined as Assistant Professor.
2. Mr. Kumaravel joined as Senior Scientific Officer Grade-I.
3. Mr. S. Srinivasan, Systems Manager resigned from his post.

#### CONSULTANCY

1. M. K. Ramanujam and C. S. Krishnamoorthy, "Feasibility study for computerisation" at M/s. Southern Structurals Ltd, Govt. of Tamil Nadu, Madras.
2. Mr. Seshasayee did design of system for critical soil test level and potassium potential cropwise for varied soils for the Department of Agriculture, Tamilnadu.
3. V. Mohan Kumar - Data Retrieval - Validation - Software Development for Kirloskar consultants Pvt. Ltd, - June 85 - Jan. '86.
4. V. Mohan Kumar - Software Development of SPIC to provide one more project Management Report (REPORT 20) - Aug. '85.
5. S. K. Ramesh - Statistical analysis - Software Development work for Kirloskar Consultants Pvt. Ltd - June '85 - Jan '86.
6. S. K. Ramesh - Software development work for the State Geological Department - Jan '86.
7. S. Jayaprakash - Data Validation - Software development for Kirloskar Consultants Pvt. Ltd.

## ELECTRICAL ENGINEERING

### 1. INVITED LECTURES BY STAFF :

- a) VLSI Technology by Dr. K. N. Bhat in International Conference on VLSI Design, Dec. 1985.
- b) Modelling and Simulation of Engineering Systems by Dr. K. Ramar at Regional Engineering College, Calicut, May 1985.
- c) Future of Microprocessors, Microcontrollers and Microcomputers at IETE Symposium, Madras, Dec. 1985.

### 2. LECTURES BY INVITED SPEAKERS :

- a) Multi-dimensional circuits and systems by Prof. A. Fettweis, University of Bochum, Jan. 1986.
- b) Electronic Impulsing in Energy Meters by Sri S.K. Iyer, SIMCO Meters, Trichy.
- c) Variable Frequency motor drives using Thyristorized Inverters by Mr. Ramaswamy Mahadevan, California Institute of Technology, USA, April 1985.
- d) Estimation of Transmission Losses in Power Systems by Dr. Natarajan Narasimhamurthy, University of Michigan, USA.
- e) Microcomputers in monitoring and modelling of Power Systems by Dr. K. Srinivasan, IREQ, Hydro-Quebec, Canada.
- f) Design of 1-D and 2-D Digital Filters by Mr. V. Ramachandran, Concordia University, Montreal, Canada.
- g) (i) Array Processing, High Resolution and Eigen analysis  
(ii) Universe and Unison, An Exercise in cooperation by Prof. J.W.R. Griffiths, University of Loughborough, U.K.

### 3. EDUCATIONAL PROGRAMS :

- a) Short term course on Integrated Circuits under ISTE during June 1985.
- b) Application of Electronics to Power Systems QIP course for Engineering College Teachers, June 1985.
- c) Short term course on Microprocessors at IIT, Madras, May-June 1985.
- d) Intensive short term workshop on Colour T. V. Technology, November 1985, Dr. J.P. Raina and Mr. K. Palaniswami.
- e) Rotary Electrical and Electronics Fair, Coordinator for IIT, Madras, was Dr. V.V. Sastry.
- f) Short term course on Micro processors for Engineering College Teachers from Tamil Nadu and Kerala, May 1985 by Mr. S. Raman.
- g) Symposium on Digital Control and Instrumentation, December 1985, by Dr. S. Srinivasan and Mr. G. T. Manohar.

### 4. EQUIPMENT PROCURED :

#### i) Semiconductors :

Diffusion Furnace capable of operating upto 1300°C with  $\pm 0.5^\circ\text{C}$  precision.

#### ii) Measurements and Instrumentation :

- a) 20 inches Video Monitor
- b) PSAr — Kelvin Bridge
- c) LVDT with accessories for displacement in the range 0 to 25 mm
- d) Student Potentiometer
- e) Colour Genie Microcomputer

iii) **Controls** : CRT Monitor and Floppy disc drives

iv) **Machines** :

- a) PWM Inverter was obtained as a gift through DAAD
- b) 16 bit 8086 microprocessor and stepper motor drive
- c) Chopper circuit power and logic modules
- d) Thyristor Power Module
- e) Single phase Bridge Trigger Module.

v) **Communications** : 40 MHz Oscilloscope for MPF 1/88 microprocessor kit.

vi) **Control and Guidance** : Colour T.V. Monitoring unit.

vii) **Television** :

- i) FM/AM Signal Generator (0.1 Hz to 110 MHz) KIKUSUI (KSG 4100)
- ii) Mag Tape System (CIPER) for PDP 11/23, 1600 BPI
- iii) Floppy Drive (Andermedo) 2 drives, 8 inches.

#### LABORATORY FACILITIES CREATED

a) **Semiconductors** :

- i) C. V. Plotter
- ii) High Pressure Oxidation System
- iii) Buried channel devices.

b) **High Frequency Technology** :

- i) Microstrip Techniques in the UHF and Microwave range

c) **Machines** :

- i) Modular Equipment for Power Electronics Equipment.

#### SEMINARS ATTENDED :

- i) International Conference on Microelectronics and Fibre-optics, Chandigarh, November 1985  
S. Karmalkar.
- ii) a) Third International Workshop on Semiconductor-Devices, November 1985.  
b) First International Conference on VLSI Design, 1985, by K. N. Bhat.
- iii) IEEE Winter Power Meeting, February 1986, by V. Jagadeesh Kumar.
- iv) International Conference on Modelling and Simulation, Gorakhpur, December 1985, by  
Vedam Subrahmanyam.
- v) National Seminar on Energy Conservation by G. Sridhara Rao.
- vi) a) IEEE Summer Power Meeting, Vancouver, Canada, July 1985.  
b) Annual Symposium of IETE Madras Chapter, December 1985.

#### SEMINARS CONDUCTED

- i) Digital Techniques for Instrumentation and Control.
- ii) International Workshop on Optical Communication.

## **DISTINGUISHED VISITORS**

- i) Prof. Dr. J.W.R. Griffiths, Loughborough University, U.K.
- ii) Prof. A. Fettweiss, University of Bochum, West Germany.
- iii) Sri S. K. Iyer, SIMCO meters, Trichy.
- iv) Dr. Natarajan Narasimhamurthy, University of Michigan.
- v) Dr. K. Srinivasan, IREQ HYDRO QUEBEC; Canada.

## **R AND D IN PROGRESS**

### **Semiconductors :**

Microelectronics and related technology of Silicon and Ga As Devices and monolithic filters.

### **Microwaves (HFT) :—**

- i) Development of Fin-line components
- ii) Study of signal level variation at 78, 172 and 481 MHz for a transmitted power of 2 W between Tiruporur and Madras.
- iii) VHF/UHF Propagation Studies.

### **Measurements and Instrumentation :**

- i) Development of Semi-automated equipment for rapid testing of transformer cores.
- ii) B-H curves for ferromagnetic materials.

### **Communications :**

Research on Group Delay Functions, Cepstrum, differential Cepstrum, applications to signal processing.

### **Microprocessors :**

- i) Microprocessor based stencil cutter for computer output.
- ii) Multilingual Terminal.
- iii) Voice Input/Output Terminal

### **Control and Guidance :**

Pattern Recognition Algorithms for Terminal Phase of Photo guidance of missiles.

### **Machines :**

- i) Inverter Fed Motors
- ii) Analysis of doubly fed machine drives with constant current source inverters and voltage source inverters.
- iii) Design optimization of Electrical Machines.
- iv) Finite element analysis of electric fields in 230, 400 KV gapless lightning arresters, fields and forces in 230 KV line traps, Heat transfer studies in 600 HP induction motors.
- v) Electromagnetic 20 m<sup>3</sup>/hr, 8 bar liquid sodium pump for Kalpakkam fast breeder reactor.
- vi) Magnetic fields, forces and eddy current calculations in Tokamak Coils.
- vii) Design of 3.5 mJ Homopolar generator for Fusion Experiments.

### High Voltage :

- i) HVDC Pollution Performance of Insulators.
- ii) Application of Numerical Methods to Electrostatic Field problems.
- iii) Surface Flash Over characteristics of spacers in compressed gas insulated systems.
- iv) Development of CO<sub>2</sub> - laser for monitoring the intensity of pollution in HV Insulators.

### Television :

- i) 2-D Adaptive Filtering Algorithms applied to Bio medical Images.
- ii) Hand Printed Tamil Characters using Exact Matching Techniques.
- iii) Image Restoration.

### INDO-GERMAN COLLABORATION

#### High Frequency Technology

Microwave Communication Systems

Control : Speed Control of Squirrel Cage Induction Motor.

### INDUSTRIAL TESTING

- i) Calibration of current and voltage Transformers.
- ii) Measurement of Additional losses in Transmission Line Fittings.
- iii) Design, Testing of Inverters for System Control Engineers, Salem.
- iv) Pollution performance testing of Railway Insulators.
- v) Impulse Testing of Transformers.

### ASSISTANCE TO INDUSTRY

- a) Computer Power Supply study for Messrs. Sundaram Clayton Limited.
- b) Electronic Compensation of Current Transformers for Messrs Kappa Electricals.
- c) Fault Diagnosis of a Thyristor power converter, feeding a M.W.D.C. motor.
- d) Optimum Design of Induction Motor.
- e) Consultations offered in Machines etc. to
  - i) Vijay Energy Products Pvt. Ltd.
  - ii) Kay Bee Powelec.
  - iii) Coromandel Fertilizers Limited, Cement Plant at Chifamkur, A.P.
- f) Evaluation of Power Supplies UPS and SMPS for Sundaram Clayton Ltd.
- g) Sponsored project on 'Over-voltage studies in Orissa State Electricity Supply System', was completed.
- h) Consultancy provided for the following industries :
  - i) P. S. Industries, Madras.
  - ii) Messwandler Bau (MWB) India, Bangalore
  - iii) W. S. Insulators Ltd., Madras.

## PUBLICATIONS

### Semiconductors

- 1) Linearization Chip, by S. Karmalkar, International Conference on Microelectronics and Fibre Optics, Chandigarh, November 1985.
- 2) Effect of Lateral Curvature on the breakdown Voltage, by K. N. Bhat, IEEE Electron Devices Letters, p. 276, June 1985.
- 3) Current Gain of Narrow Base Transistors by K. N. Bhat, Solid State Electronics, March 1986.

### High Frequency Technology :

- 4) Propagation studies in the VHF, UHF Bands on a Coastal Route by Dr. D. K. Banerjee and V. Subrahmanyam. IIT, Madras, Technical Report No. 4, March 1986.

### Measurements :

- 5) On Two-dimensional partial fraction expansion, by P. Subbarami Reddy, Signal Processing, March 1985.
- 6) An Electronic Phase Balancer for 3-phase 3-wire loads by V. Jagadeesh Kumar and P. Sankaran, Proc. IEEE, pp. 233-34, Vol. 74, Jan. 1986.
- 7) A Novel Precision type liquid conductivity measurement system, by M. Rehman, V. G. K. Murti, M. R. Gupta, J. Physics Scientific Instruments, Vol. 18, pp. 902-903, 1985.
- 8) An optimization criterion for 3-phase reactive power compensation, by P. Sankaran, V. V. B. Rao, E. Vasu, IEEE Trans. on power Apparatus Systems, pp. 3216-3220, Nov. 1985.

### Machines

- 9) Digital Simulation of Inverter-fed Induction Motor, by Vedam Subrahmaniam, EPEC Brussels.
- 10) Analysis of an induction motor with an inverter cascaded in the rotor circuit, by Vedam Subrahmanyam, Proc. EPEC, Brussels.
- 11) A new algorithm for a non-linear multicriteria decision making problem by P. V. Rao, T. C. Kory and V. V. Sastry, IEE Proceedings, Vol. 132, pp. 118-122, May 1985.

### Communications :

- 12) Processing of clutter through least squares algorithm, by K. B. Raju and V. V. Rao, IX National Systems Conference, Allahabad, December 1985.
- 13) Signal delay and waveform estimation through group delay functions, by G. R. Reddy and V. V. Rao, International Conference on Modelling and Simulation, Gorakhpur, December 1985.

### Power Systems :

- 14) A simple approach to line loss minimization, paper presented by K. Ramar at 4th National Power Systems Conference, February 1986, BHU, Varanasi.

### Microprocessors :

- 15) Signal-dependant analysis for speech recognition, by S. Raman, IEE Conference Publication No. 258, London, March 1986.
- 16) Microprocessor based peripherals for computer In/Out in Indian Languages etc. by S. Raman at IETE Symposium on Digital Technology for Control and Instrumentation, Madras, December 1985.

- 17) Direct Z-plane phase Equivalent Reduction for Discrete-data Systems, by Dr. V. Seshadri and G. Pavithran, International Conference on Modelling and Simulation, Gorakhpur, India, December 1985.
- 18) Tissue characterization using Texture of Ultrasonic B-Scan Biomedical Images, by K. Palaniswami and Vasantha Srinivasan, International Conference on Acoustics and Signal Processing, USA, December 1985.

#### 14. FUTURE PLANS :

##### **Semiconductors :**

Microelectronics activity in the Department has been approved by the Ministry of Human Resource Development and Rs. 20 lakhs has already been sanctioned. The infrastructure for VLSI Technology and Design will be built, with emphasis on Si and GaAs devices.

##### **High Frequency :**

Experimental work on direct reception of signals from Satellites; the sponsored project on Telecommunications Research will be continued; noise characteristics in the Tiruvallur Madras route would be taken up.

##### **Measurements :**

Multidimensional filter stability and design; study of Transducers.

##### **Machines :**

Establishment of VAX 11/750 Computer facility; Microcomputer based power electronics laboratory; Computer aided design for machines.

##### **Microprocessors :**

Development of Input/Output Peripherals.

##### **Control and Guidance :**

A small Robotics Laboratory is planned to be established as a part of Control and Guidance Lab.

##### **High Voltage :**

DST Project on Air Pollution monitoring system using lasers.

##### **Television :**

Expansion of Digital Image Processing facility.

#### 15. STAFF MATTERS :

- 1) Prof. V. V. Bapeswara Rao proceeded on voluntary retirement (March 1986), after 22 years of service at IIT, Madras.
- 2) Dr. C. Narayana Reddy and Dr. S. Srinivasan have resigned to take up teaching and research positions in Libya and USA respectively.



## HUMANITIES & SOCIAL SCIENCES

### New Courses introduced :

HS 336 : Great Social Thinkers : Elective at Undergraduate level.

### Serving Teacher's Programme :

<i>M. Tech</i>	<i>Ph D</i>
1	2

### Research Publications :

#### a) Books :

Title	Author
1. "You and the Computer" (2nd ed.)	Dr. R. Rajagopalan
2. Engel and Mensch Studien Zu Rilkes Duineser Elegien	Dr. B. Subramanian
3. Der Ueerfall auf das Unsagbare Zuranamnetischen Struktur der Dichtung Rilkes In : Beharrung and Bewegung (Monograph)	

#### b. Research Papers published :

13

### Seminars conducted :

Dr. Roger Hilsman (Columbia University) L U. S. Foreign Policy.

Dr. Gerhard Schmitt Rink (University of Bochum) : High Tech and Low Tech Components of International Trade

Dr. Douglas Allen : Karl Marx and Bhagavat Geetha

### Invited Lectures by Faculty

#### Dr. S. Ambirajan

"Recent Developments in the History of Economics".

"Use and Abuse of Mathematics in Economics" in IIT/USEFI Economics Institute, Summer School, Madras May 1985.

Inaugural Address to the Commerce Association of "The Annmalai University, December, 1985".

"The pattern of our past : How the Economic History of India is being written", Lecture at Madras Institute of Development Studies, November 1985.

#### Dr. L. V. L. N. Sarma

Lectures on Financial Managements at SPIC in-house programme. Lectures on Finance to M. B. A. & Research students at Calicut University.

#### Dr. R. Rajgopalan

Lectures on "computers and Society" to National Institute of Educational Planning and Administration, New Delhi.

Lectures on "Computers" to Executives of "Bank of India" Regional Staff College, Madras.

**Dr. R. N. Anantharaman**

Lecture on "Human Relations and Productivity at TTTI", Madras.

Lectures on "Psychological aspects of Accidents" at Regional Labour Institute, Madras.

Lecture on "Psychological Approach to Discipline in Industry" at Tamil Nadu Institute of Labour Studies.

**Shri. S. Mohan and Shri. V. S. Kumar**

To trainees at National Productivity Council Institute in Kilpauk on Report writing.

**Placement :**

Number of contacts : 75

Number of candidates placed : 21

## MATHEMATICS

### 1. RESEARCH WORK :

Work is in progress in the various research fields with specialization in particular areas :

Applied Probability, Stochastic processes, Stochastic Neural Models, Inventory Control, Operational Research, Application of Stochastic Processes to Life and Engg. Sciences, Statistical Inference, Bio-statistics, statistical Methods, Quality Control.

Fluid Mechanics, Numerical Fluid Dynamics, Gas Dynamics, Magneto-hydrodynamics, Hydrodynamic, Stability, Wave propagation, Suspension Rheology, Ship-hydrodynamics, Mathematical problems Related to Naval Architecture, Piezoelectricity, Magnetoelasticity, Elasticity, Bio-Fluid Dynamics.

Differential Equations, Singular Perturbations, Differential Inequalities, Stability of Motion, Complex Analysis, Theory of Splines, Lacunary Interpolation, Fixed point Theory, Nonlinear Analysis, Banach Algebras, Fourier Transform, Soliton Theory, Pade' Approximation.

Theory of Relativity, Cosmology, Statistical Physics, Optics, Elementary Particle Interactions. Graph Theory

Bio-mathematics, Mathematical Methods. Mathematical Modelling.

### 2. DISTINGUISHED VISITORS

Dr. Martin J. Beckmann, Professor of Economics at Brown University, Providence (USA) and Professor of Statistics and O.R., Technical University, Munich (FRG) visited the department under DAAD sponsorship during January, 1986. He gave two series of lectures, one on Dynamic programming and the other on Organization theory. In addition, research seminars on 'Continuous Time Decision processes' jointly with Professors S. K. Srinivasan and R. Subramanian, were held,

Professor Dr Klaus Peter Kistner, University of Bielefeld (FRG) was at the department under DAAD sponsorship programme during Feb-March, 1986. He gave lectures on production theory and Queueing Theory. Also the Research seminars on Inventory Theory jointly with Professors S.K Srinivasan and R. Subramanian, were held.

Among the visiting speakers at the dept. seminar were :

Prof. R. N. Sen, Ben Gurion University, Israel,

Prof. Kichnasami, Henri Poincare Institute, Paris,

Prof. N. G. Marchuk, Steklov's Institute, of Mathematics, Moscow (USSR)

### 3. JOURNAL OF MATHEMATICAL AND PHYSICAL SCIENCES

This international Journal continues to publish quality research papers. It is now in the 19th year of publication and has crossed 16000 pages of published matter.

### 4. SYMPOSIA/CONFERENCES/SCHOOLS ATTENDED BY FACULTY/SCHOLARS

A few faculty members and research scholars attended, presented research papers and took active part in a few conferences.

Dr. S. N. Majhi participated and presented a paper at the 22nd Annual meeting of "Society of Engineering Sciences" held at the Pennsylvania State University (USA) during Oct. '85. He also gave a Seminar talk at the Pittsburg University (USA) on invitation.

Dr. P. V. Subramanyam participated and presented a paper in the International Conference on "Banach Spaces and Classical Analysis" at Kent University, Ohio (USA) in July-Aug. 1985.

Prof. V. B. Johri.

- (i) Participated and presented a paper in the International Conference on 'Scientific Approach to Para-psychology' held at Andhra University, Waltair.
- (ii) took part in the IAU Symposium on QUASARS at Bangalore from Dec. 2-6, 1985 and
- (iii) participated in the ICTP (Trieste) sponsored Summer College on 'Frontiers of Physics' at Nathiagali, Pakistan during June 1985 and delivered lectures on Cosmology.

Dr. P. Achuthan presented research papers

- (i) In a Seminar on "Perception in Science and Shastras" (Bangalore, Aug. '85)
- (ii) In an International Conference on "Microphysical Reality and Quantum Mechanics" (Italy, Nov. '85)
- (iii) In the World Congress for "Synthesis of Science and Religion" (Bombay, Jan. '86)
- (iv) In a Seminar on "Science of Human Development" (Karaikudi, Feb. '86)

Dr. Y. Nagendra delivered an invited lecture in the Symposium on Sequential Estimation and Testing under the auspices of the Statistics Section of Indian Science Congress during Jan. 3-8, 1986 at the Delhi University, Delhi.

## 5. FACULTY NEWS

Dr. P. R. Parthasarathy returned from West Germany after availing a Humboldt Fellowship in the Department of Medical Biometry, Tubingen University.

## 6. SEMINARS

Regular seminars were arranged in the department on every Thursday with lectures on topics of current interest by Faculty, Scholars and Guests.

## 7. GENERAL

Some among the faculty are serving on the Editorial Board, as referees and reviewers of papers for research journals of international repute.

The UGC Book writing project of Prof. P. Achuthan has been completed.

Faculty members have fruitfully associated themselves with the research and developmental activities of a number of sister institutions.

A sponsored research project: 'Numerical studies of slow viscous rotating fluids past a body' with Dr. C. V. Raghava Rao as the Principal investigator and Dr. D. S. Subramanyam as Co-Cordinator with sufficient financial provision has been granted by the Department of Atomic Energy (DAE).

The University Grants Commission has approved a project by Prof. K. R. Parthasarathy to write a book entitled 'A First Course in Graph Theory'.

## MECHANICAL ENGINEERING

### Faculty :

Professors	Assoc. Professors.	Asst. Professors.	Lecturers	Design Engineer	SSO II
18	4	19	12	2	3

### Deputation/Assignments Abroad/Resignations

Dr. S. Rajesham, Asst. Professor resigned from the Department.

### Mechanical Engineering Association :

Following special lectures were arranged :

1. Modern Developments and Trends in Automobile Engineering. Mr. T. K. Balaji, Managing Director, Lucas - TVS, Madras.
2. Planning and Management in Design Office.  
Mr. N. Radhakrishna Rao, Manager, EIMCO - KCP LTD, Madras.
3. Career Opportunities for Mechanical Engineers.  
Mr. A. Ramakrishnan, Director Board of Apprenticeship Training and Regional Central Apprenticeship Advisor, Govt. of India, Madras.
4. Developments in Automobiles.  
Mr. L. Srinivasa Madhavan, General Manager, Standard Motor Products of India Ltd., Madras.
5. Boundary Layers, Radial Mixing and Related Effects in Compressors.  
Dr. N. A. Cumpsty, Secy of the Faculty Board of Engineering, Cambridge University Engineering Department, Cambridge, England.
6. Modern Concepts of Accident Prevention in Industry.  
Mr. W. A. Balakumaran, Joint Director (Engg.) Regional Labour Research Institute, Madras.
7. Some Aspects of Engineering Education in the Federal Republic of Germany.  
Prof. H. Alting, Fachhochschule, Bremen.
8. Carburettors - Design and Manufacture,  
Mr. S. Govindarajan, Deputy Manager - R & D, Carburettors India Ltd.

### Other activities :

1. Mechanical Engineering Sports.
2. Mechanical Engineering Quiz.
3. Visit to Industry.
4. Screening of Technical Films.
5. Publication of MEA Magazine 'DEPTH'

### Educational Tour :

Prefinal Year B. Tech students accompanied by Prof. N. Venkatrayulu and Mr. B. Ramamoorthy went on industrial-educational study tour lasting for about 19 days in Nov. - Dec. 1985.

## HEAT TRANSFER AND THERMAL POWER LABORATORY

### (A) Sponsored Projects :

- (1) Indo German Project : Development of Fluidized Bed Cooling Tower
- (2) BHEL Projects
  - (a) Design and Model testing of Horizontal Feed Water Heaters
  - (b) Heat Transfer in the casing of Steam Turbines.

(3) SAIL Ranchi

Simulation of continuous casting of steel using FEM.

- (B) Research and Development : 1. Direct contact Heat Transfer Between immersible liquids.  
2. Subcooled Boiling  
3. Simulation of Casting Processes using FEM.  
4. Measurement of Thermal diffusivity of metals and liquids.  
5. Asymptotic solution to radiating fin problem.  
6. Development of a thermal infrared detector.  
7. Heat Transfer at low densities from strips and wires.  
8. Fluidized Bed cooling Towers.  
9. Bed dynamics and Heat Transfer in Fluidized Bed coal combustors.  
10. Thermal Energy Storage using a PCM.  
11. Thermal conductivity of disperse media.  
12. Compact Heat Exchangers with evaporation, condensation.  
13. Heat Transfer augmentation in single phase and multi phase system.  
14. Second law analysis of heat exchangers.  
15. Analysis of fouling on finned surfaces.  
16. Thermal performance of Deaerators.  
17. Cooling of Electrical Machines.  
18. Optical methods in Heat Transfer.  
19. Analysis of Heat exchangers and their network using FEM.  
20. Analysis of Fluid Flow and Heat Transfer problems using FEM.
- (C) Research publication : 15
- (D) Staff : Dr. Vijay R. Raghavan was Deputed for 3 Months to A.I.T Bangkok.
- (E) Invited Lectures delivered : 1. Delivered an invited lecture at the Computer methods in continuum 'Mechanics' at Roorkee on 12.3.86 by Dr. K.N. Seetharamu.  
2. 'Wind Pump Applications' A lecture was delivered by Dr. K.V.C. Rao at Kathmandu Nepal during July 1985.

**Visits by Foreign Scientists**

1. Dr. R K. Shah, Technical Director, Harrison Radiators, General Motors, USA visited under TOKTON Programme during January 1—9, 1986 and delivered a series of lectures on Heat Exchangers.
2. Prof. H. Brauer of Technical University, Berlin visited the department during February 12—25, 1986 under the Indo German Project.

## HYDROTURBOMACHINES LABORATORY

### a) Sponsored Project :

#### i) BHEL Project on 'Bulb Turbines'

Microhydel power plants located close to the consumer have a future and they do no harm to the environment. In its efforts to develop indigenous knowhow for the design of suitable turbines for such low head applications, the Hydroturbomachines Laboratory, in collaboration with BHEL, Bhopal has successfully developed a design for high specific speed model Bulb Turbine. This project has now been concluded and the model turbine has now been developed and this gives a maximum efficiency of 90 percent. The prototype of this turbine will give a higher efficiency than the above. The development of indigenous design knowhow for these turbines will greatly help in tapping the mini and micro hydel potentials of our country.

#### ii) ARDS Project :

The project entitled 'LPR Turbopump Cavitation Prediction' is in progress.

#### iii) CBIP Project :

The following projects have been started :

1. Research on Flow Through Axial Flow Pumps.
2. Development of Pump Turbines — Design and Analysis of 'S' Cambered profiles for fully reversible Axial Flow Pump Turbine.

### b) Research and Development :

- i) A model Bulb Turbine developed has been successfully tested for efficiency
- ii) Inverse design of Aerofoils using surface vorticity distribution method has been completed
- iii) Studies on cavitation, noise and vibration aspects in centrifugal pumps have been completed
- iv) Studies on the influence of number of blades on the performance of the Bulb Turbine is in progress
- v) Studies on blade profiles for self rectifying Air Turbines are in progress

### c) Assistance to Industry-ICC : NIL

### d) QIP/UGC Fellowship Programme : NIL

### e) New Major equipment added :

A 16 bit micro-computer

### f) Research Publications :

- 1) V. Ramjee, E. G. Tulapurkara and V. Balabaskaran, 'Experimental and Theoretical study of wings with blunt trailing edge', Accepted for publication in the AIAA Journal of Aircraft, USA.
- 2) V. Ramjee and V. Balabaskaran, 'A numerical study of Symmetric NACA aerofoils with blunt trailing edges', 14th National Conf. on FM & FP, Jan 11-12, 1986.
- 3) S. Kumaraswamy and H. C. Radha Krishna 'Cavitation noise and vibration measurements in radial flow pumps', 14th National Conf. on Fluid Mechanics and Fluid Power, University of Roorkee, Jan. 1986.
- 4) S. Kumaraswamy and H. C. Radha Krishna 'Vibration measurements for diagnosing Cavitation in Pumps', National Symp. on vibration of power plant equipment, BARC, Bombay, March 1986.

- 5) S. Kumaraswamy and H. C. Radha Krishna, 'Studies on vibration due to cavitation in a radial flow pump', Journal of Engineering Design, ISME, New Delhi, 1986.
- 6) Rm. Ramachandran, H. C Radha Krishna and P. A. Aswatha Narayana, 'Cascade Experiments over 'S' blade profiles', accepted for publication in ASCE journal, USA.

**g. Brief indication of developmental programme :**

- 1) Studies on ducted propellers and Pump Jets
- 2) Studies on wave energy Turbines
- 3) Cavitation, noise and vibration studies in Hydroturbomachines
- 4) Studies on Jet Pumps
- 5) Developmental studies on Bulb Turbines and special purpose Pumps
- 6) Developmental studies on alternative sources of energy

**h. Invited lectures delivered by the Staff :**

- 1) Dr. V. Balabaskaran, Asst. Professor delivered a series of six lectures on 'Ducted Propellers' at the Naval Science and Technological Laboratory, Visakhapatnam during July, 1985.

**Ph.D. thesis completed :**

S. Nilavalagan,

'Studies on the mixing characteristics of flow in a Jet-Pump'

M. S. Thesis completed :

K. Bharathy, 'Design and development of Slurry Pumps'.



## INTERNAL COMBUSTION ENGINES LABORATORY

### (A) Sponsored Projects :

Name	Sponsoring Agency	Value Rs.
1. Combustion of Alcohol and Biogas.	National Science Foundation USA.	9,44,000/-
2. Non-Edible Vegetable Oils as Diesel Engine Fuels	Dept. of Non-Conventional Energy Sources	6,90,800/-
3. Alternative Fuels for IC Engines	Indo-German Project DM	1,50,000/- + 55,000/-
4. Mathematical Modelling of Two-Stroke Spark Ignition Engines.	M/s. Sundaram Clayton Madras	96,000/-

### (B) Research and Development :

- (a) Development of Surface Ignition Engine.
- (b) Use of Alternative Fuels like Alcohols, Biogas, Vegetable Oils etc.
- (c) Mathematical Modelling of Engine Processes
- (d) Hot Wire Anemometric Studies of Air Turbulences.

(C) Research Publications : Total number of publications — 30

(D) Staff Matters : Dr. V. Ganesan has been invited to do Post Doctoral Research Work at the University of Kyoto, Kyoto, Japan.

## MACHINE ELEMENTS LABORATORY

**a) New Courses introduced :**

ME 725 Numerical methods in Machine Design

ME 700 Computer aided Machine Design

**b) Sponsored Project :**

Super plastic forming of Titanium alloys for fuel bottles of PSLV—DRDL project. Co-investigator with Department of Metallurgy.

**c) Research & Development :**

1. Software development for Design of Machine Elements
2. Surface Durability studies on gears, bearings etc.,
3. Spatial linkages for uniform motion transmission
4. Cam-type indexing device development
5. Stress Analysis of wheels
6. Friction & Wear studies in sintered brake materials
7. Powder preform forging

**d) Assistance to Industry—ICC :**

1. Stress Analysis of Ammonia convactor
2. Design verification of pressure vessel equipment
3. Stress Analysis of automotive wheels.

**e) Research Publications :**

1. A. Ramamohana Rao, Performance studies on liquid nitrided gears, Proceedings of the 2nd World Congress on Gearing held at Paris, March 1986.

**f) Important Lectures/Seminars (by outside experts)**

Prof. Dr. Ing. Gert Bechtloff on metal spray & under water welding.

**g) Visitors to the Department :**

Prof. Dr. Ing. Gert Bechtloff, Head of the Machine Elements and Mechanical Handling Laboratory, Armed Forces University, Hamburg, West Germany, visited the Laboratory from 8-3-86 to 1-4-86.

**h) Brief indication of developmental Programmes :**

Research in the areas of CAD, Mechanisms, Surface fatigue, friction and wear are being pursued.

**i) Invited lectures delivered by the staff :**

Dr. K. Gopinath on combating techniques in wear, Engineering College Guindy.

Dr. N. Sivaprasad on FEM, Brakes India, Madras.

**j) Any other information :**

Perthometer for roughness measurement, Ferrograph for wear particle analysis and an Aurelec 16 bit micro computer system have been added.

## MECHANICAL HANDLING LABORATORY

### Sponsored projects :

An IC & SR sponsored project on development of an equipment to produce continuous helicoids is under progress.

### Research and Development :

Research in the fields of vibratory conveying, pneumatic conveying, air slide, dynamics of cranes and mechanical manipulators. is carried out.

### Assistance to Industry - ICC :

M/S KCP Ltd. M/S Mettalloys, M/S BHEL Hyderabad, M/S Nircon Engg ,

### QIP/UGC fellowship programme :

Two research scholars have got their Ph.D. degrees.

### Research publications : Published 3 papers

### Important lectures & Seminars :

Delivered five lectures on cranes, continuous conveyor, bulk handling equipment and homogenisation and blending methods for the training course on 'Materials handling and storage practices in cement Industry organised by National Council for Cement and Building Materials at IIT, Madras.

### Invited lectures delivered by staff :

A lecture on applications and selection criteria for Bulk handling equipment was delivered in a course on Earth moving and construction equipment' organised by Water Power Consultancy Services at Bangalore.

### Visiting faculty :

Prof. H. Altig from Fachhochschule, Bremen, West Germany, gave a series of lectures on crane design and also on layout of cranes for ship building in a covered dry dock.

Dr. Jan Farkas from Kosice University, Czechoslovakia delivered five lectures on dynamics and stability of EOT cranes.

Prof. Dr. Ing. G. Bechtloff from Military college of Engineering, Hamburg, West Germany delivered lectures on new developments in conveying technology and underwater robots.

### Fabrication :

A prototype pneumatically counterbalanced manipulator is designed and fabricated.

### Patents :

A device to measure conveyor idler/roller friction coefficient is designed and developed and the same is applied for patent.

## PRECISION ENGINEERING AND INSTRUMENTATION LABORATORY

- a) **New Course introduced :**  
ME 729 "Principles of Robotics".
- b) **Sponsored Projects :**
1. Gyro Modeling - ARDB
  2. Hydraulic Feed and Positioning Servodrives-Indo-German.
- c) **Research and Development :**
1. Optimization problem in micro-hydraulics
  2. Electrohydraulic servo system for engine gimbal control
  3. Dynamic analysis of fluid power systems
  4. Hydraulic quill feed unit for Drilling purposes
  5. Investigation on the effect of some parameters on sintered bearings
  6. Dynamic load study on gear drives
  7. Manufacturing error effect on the performance of oil-pump used in agricultural machinery
  8. Comparison of sintered bearings with solid bearings
  9. Roundness error of precision shafts
  10. Inspection of certain parameters in Vikas Engine Thrust Chamber.
  11. Identification of a rotor on magnetic bearings
  12. Microprocessor control for positioning of pneumatic actuators
  13. High acceleration motor for antenna control
  14. Modelling and simulation of turbine governing systems
  15. Pole assignment in multivariable systems
  16. Microprocessor Based system design
  17. Microprocessor controlled Job Drilling
  18. 4-legged pantograph type pneumatic driven walking machine
  19. For-torque wrist sensor for active compliance in assembly in Robots Design
  20. On line process parameter estimation for turning
  21. Automatic test equipment for Aircraft Instruments.
- d) **Assistance to Industry — ICC :**
- i) Projects
    1. Design of a 250 Ton Cotton Bailing Press
    2. Instrumentation for torque and force measurements
  - ii) Retainer Consultancy  
M/s. Associated Mechanical Equipment (P) Ltd., Madras by Dr. Y.G. Srinivasa.
- e) **QIP/UGC Fellowship Programme :**  
One QIP Ph. D. Scholar (Mr. K.K. Appukuttan) Guide : Dr. T. Rajagopalan.

**f) Research Publications : Papers published : 4**

1. Pole Assignment with Dynamic Compensator — IETE, Journal Vol. 31, 1985, pp59-61. Dr. T. Rajagopalan
2. Controller Design For Pole Assignment with output Feedback IETE Journal, Vol. 31, 1985, pp144-148. by Dr. T. Rajagopalan
3. Experimental Study on the Effects of Bearing Wall Thickness and Bearing Length on the Frictional Characteristics of Sintered Bearings, Wear, 104 (1985) by Dr. R. Raman and Mr. P. Iyamperumal.
4. "Ball Bearings with Plastic Races", All India Seminar on Antifriction Bearings, Institution of Engrs. (India), Bangalore, Jan. 1986, by Dr. R. Raman and Mr. P. Iyamperumal.

**g) Ph.D. Submitted — 3**

Details :

- i) "Investigation on the optimum configuration for the port plate of a micro-hydraulic axial piston machine", December 1985, submitted by Mr. M. Singaperumal, Guide : Prof. M.A. Veluswami.
- ii) "Investigation on the Effects of some Parameters on Sintered Bearings" submitted by Mr. P. Iyamperumal, in 1986 Guide : Dr. R. Raman
- iii) "An experimental investigation of impact phenomenon in spur geared torsional systems submitted by QIP Research Scholar Mr. Ch. Penchalaya, Guide : Dr. T. Nagarajan/Prof. M.A. Veluswami.

**2) M.S. Completed — 1**

Details : Active Damping for Liquid Engine Gimbal Control in Launch Vehicle by Mr. U. Janardhan Naik Guide ; Dr. R. Raman/Dr. T. Rajagopalan.

**h) Brief indication and developmental programme :**

It is proposed to strengthen the activities in the following areas :

1. Plastic materials in Mechanical Engineering
2. Application of Microprocessors in Mechanical Engineering
3. Robotics
4. High pressure pneumatics
5. Electro-hydraulic servo-control.

**i) Summer Schools/Invited lecturers :**

1. QIP Summer School : on "µP Applications in Mechanical Engineering" June 1985, Co-ordinator : Dr. Y.G. Srinivasa
2. Invited lecture delivered by the staff :  
Dr. T. Nagarajan delivered a lecture on "Basic principles of Robotics" at the Institution of Engineers (India), Madras on 20.9.1985.

## PRODUCTION ENGINEERING AND MACHINE TOOLS LABORATORY

**a) Research and Development :**

Ph.D. — 4 + 1\* (completed)

M.S. — 3 + 7\* (external)

M.Tech. — 10

**b) Assistance to Industry :**

ICC work to VSSC Trivandrum in machining

ICC work to Shriram Fibres Ltd.

ICC work to Amalgamations P. Ltd.

ICC work to Cutfast Abrasives Ltd.

**c) Research publications : 18**

**d) QIP/UGC Fellowship programme :**

Ph.D. — 6 + 2\* (completed)

M. Tech 1 + 2\* (completed)

**e) Vistors :**

1. Weiler Hermann,  
Fa. Weiler, West Germany.

2. Dr. Cap Peter  
Fa. Weiler, West Germany.

3. V. Sichevov,  
Thomas VDMA, Munchen.

**f) Brief indication and Developmental Programme :**

Research and development work on Unconventional Machining, Surface characterisation, Surface Integrity, Metal Cutting, EDM, ECM, Gear Tribology, Surface Treatment, CAD/CAM, and Continuing Education Programme.

**g) Invited lectures delivered by the staff:**

1. College of Engineering, Guindy.

2. A.T.I. Guindy.

3. L and T McNeil Ltd., Madras.

4. Rotary International (Madras)

**h) Patents :**

Approved : 4

Applied : 3

**i) Educational Programme/Continuing Education Programme :**

1. HAL Management Trainee Programme

2. HAL Process Engineering Course

**j) Major Equipment added :**

1. CAD Equipment

2. CNC Trainer Lathe

3. Personal Computer

4. Automation Lab. equipments

## THERMAL TURBOMACHINES LABORATORY

### A. SPONSORED PROJECTS :

1. Currently the laboratory is carrying out a Joint Indo-German Project on 'Energy-Centrifugal Compressors in collaboration with Aachen Technical University, West Germany.

### B. RESEARCH AND DEVELOPMENT :

1. The laboratory is co-ordinating with the Regional Engineering College, Trichy under the Institute network scheme of the ministry of Human Resource Development New Delhi to establish a Turbo machinery Lab at REC, Trichy. This scheme is in progress from 1983, February onwards.
2. Mr. K. Sankaran, QIP—research scholar has submitted his Ph. D. Thesis in June 1985. Thesis title : Flow studies at the exit of Centrifugal Impellers.

### C. ASSISTANCE TO INDUSTRIES :

The laboratory has offered assistance by way of consultancy services to industries in the following areas.

1. 'Two dimensional cascade testing of axial fan blades for its performance characteristics' for BHEL R & D, Hyderabad.
2. 'Design, manufacture and calibration of two dimensional and three dimensional pneumatic probes' for BHEL R & D, Hyderabad.
3. 'Calibration characteristics of orifice meters and flow nozzles' for Elgi Equipments Limited, Coimbatore.
4. 'Design and development of axial flow fans for naval frigates' for Bharat Bijlee Limited' Bombay.
5. 'Performance testing of axial flow fan model for the given specification's for Bharat Bijlee Limited, Bombay.
6. 'Design and development of pneumatic probes for M/s Bharat Bijlee Ltd., Bombay.

### D. RESEARCH PUBLICATIONS :

1. 'Effect of upstream boundary Layer Thickness on Secondary Losses in a linear Turbine Rotor Cascade' (M. Govardhan, N. Venkatrayulu & Rangarajan, M.) Proceeding National Conference on Aerodynamics, Aero. Society of India, IIT, Madras, Oct. 1985.
2. 'Study of Losses through an annular Turbine nozzle and rotor cascade' (M. Govardhan & N. Venkatrayulu) Proceeding 14th National Conference on Fluid Mechanics and Fluid Power, University of Rookee, Rookee. Jan. 1986.

### E. VISITORS TO THE LABORATORY FROM ABROAD :

1. Dr N. A. Cumpsty, from Cambridge University Engineering Department, Cambridge, England, visited the laboratory for three days from 9th to 11th Jan. '86 and delivered lecture on 'Boundary Layers, Radial mixing and Related effects in Compressors'

## THERMODYNAMICS AND COMBUSTION ENGINEERING LABORATORY

### Sponsored Projects :

- ARDB (up to 19-11-85) : Combustion Phenomena in a Solid Propellant Rocket Ramjet Engine.
- ARDB (from 20-11-85) : Combustion Phenomena in Integral Rocket-Ramjet Engines.

### Research and Development

R and D work in the following areas of Combustion and Propulsion, and Solar Energy are in progress :

- Reaction Kinetics
- Rocket Technology
- Turbulent Combustion
- Spray Combustion
- Combustion in Swirling Flows
- Thermal applications of Solar Energy
- Intermittent Solar Refrigeration
- FMDF Solar Collector

**Assistance to Industry - ICC** Calibration of Thermocouples, Calibration of Gas meters.

**Research Publications :** Total number about 30

**Invited Lectures delivered by staff** Total ; 5



## REFRIGERATION AND AIRCONDITIONING LABORATORY

### A. Sponsored Projects :

1. Study of thermal problems in ground based navigational equipment-Department of Electronics
2. Utilization of solar energy for cold storage for food products (Phase-II) Indo-German Project.
3. Development of Solar boosted heat pumps for drying of forest and agricultural products-Indo-German Project.
4. Design and development of optimal continuous solar refrigeration and airconditioning system-Department of Non-conventional Energy Sources (concluded).

### B. Research / Development :

1. Comparison of working fluids for vapour compression heat pumps.
2. Transport properties of refrigerant - absorbent mixtures.
3. Thermodynamic analysis of vapour absorption heat pumps and heat transformers.
4. Hydrair cooling of fruits, vegetables and gels.
5. Modelling of saturated solar ponds.
6. Combined convection in enclosures.
7. Thermo-optical analysis of concentrating collectors.
8. Regenerative heat-and mass exchangers for energy conservation in airconditioning systems.
9. Computerized cooling load calculations.
10. Heat Pumps operating with refrigerant mixtures.

### C. Instrument / Equipment received

1. Electronic Relative Humidity Measurement Instrument
2. Electronic Thermo Hygro Barograph
3. Solartron 7081 Digital Voltmeter
4. Datalogging System
5. Ultra X (Moisture tester)
6. Solartron 7151 Computing Multimeter
7. BITZER open compressor (2 Nos.)

### D. Accepted Ph.D. dissertation :

P.V. Padmanabhan "Studies on Direct contact and Extended surface heat transfer with phase change for thermal energy Storage"

### E. Deputations :

1. Dr. M. V. Krishna Murthy visited University of Stuttgart during May Aug. 1985 under Indo-German Project

### F. Visitors :

1. Mr. J.C. Arditti, Deputy Counsellor for Scientific and Technical co-operation, of French Embassy visited this Laboratory in September 1985.
2. His Excellency the Ambassador of France visited the Laboratory on October 1985.

## METALLURGICAL ENGINEERING

1. No. of research papers published in journals and in press.	45
No. of students awarded Ph. D. degree in the Convocation held in 1985.	3
No. of students awarded M.S. degree in the Convocation held in 1985.	10
Ne. of students completing their requirements for Ph. D.	1
No. of students completing their requirements for M. S.	5

### No. of Students Registered :

For Ph. D.	: Regular	7
	External	6
M. S.	: Regular	4
	External	16

### Assistance to Industry :

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

- (1) Failure analysis for FACT, Cochin.
- (2) Investigation of casting defects-KCP Ltd., Madras.
- (3) Analysis of shaft failure — NMDC.
- (4) Characterisation of fine powders-Ponds, Madras.
- (5) Residual stress measurements.
- (6) Development of fatigue testing for bellows M/s. Fluidyne (P) Ltd.

### Sponsored Projects :

- (1) Hot corrosion of high temperature alloys-DRDO

### Long Term Developmental Consultancy Projects :

- (1) Welding Technology Development of AFNOR 7020 alloy for space applications—VSSC, Trivandrum.
- (2) Evaluation of performance of solar water heaters—Indian Copper Information Centre, Calcutta.

### Awards :

- Prof. R. Vasudevan was awarded the NRDC Republic Day Award/January 1986, for a " Portable, Compact, in house thermocouple welding unit ".

### Other Staff Matters :

- Prof. R. Vasudevan was the Co-ordinator under the Institutional Network Scheme for setting up Mechanical Testing Laboratory at Regional Engineering College, Warangal.
- Dr. DRG Achar served as Vice-Chairman of the Madras branch of the Indian Institute of Welding.
- Was a member of the Educational Sub-Committee of the Indian Institute of Welding.
- Was Chairman, Technical Committee XIV on welding Instructions of Indian Institute of welding.
- Was member, Expert Committee of Foreman Training Institute, Bangalore.

### Seminars :

'Frontiers in Matallurgical Science, Engineering and Technology'-Seminar organised by Department of Metallurgical Engineering and the IIT/Madras chapter of IIM during 6-7 April 1984.

### Lectures delivered by distinguished visitors

- 1) Dr. S. Nazare, Institute for Material and Festroperforschung, Karlsruhe, West Germany on Development of Dispersion fuels for test reactors.
- 2) Dr. K.V. Krishnamurthy, Sundaram Fasteners Ltd. on Seamless Steel tubes - defect synthesis and analysis.
- 3) Dr. M. Iorchev, Technical University of Sofia, Bulgaria on Inhibition of mild steel corrosion in high specific salinity water - a new approach.
- 4) Dr. P. S. Raghupathy, Battelle - Columbus Lab., Ohio, USA on Computer Applications in manufacturing with special reference to metal forming.
- 5) Prof. K. Tangri, University of Manitoba, Canada, on Strength/ductility - microstructure relationships in two phase materials.

### Lectures delivered by staff :

- |                            |  |
|----------------------------|--|
| — Prof V. M. Radhakrishnan | — 'Residual Stresses' IIW, Madras Chapter  |
| — Prof. R. Vasudevan       | — 'Fatigue Fractography' at ONGC training programme.   |
|                            | — Ultrasonics in Engineering Metallurgy - New Vistas of Promise at the seminar on Frontiers in Metallurgical Science Engg. and Technology, Madras. |
| — Dr. P. Venugopal         | — 'Some aspects of Cold extrusion of sintered powder preforms' at University of Karlsruhe, West Germany.   |
|                            | — 'Effect of high strain rate on frictional aspects in metal working' at special summer course, Annamalai University.                              |
| — Dr. D.G.R. Sharma        | — On Statistical quality control and operations Research at ONGC training programme.   |
|                            | — On ultrasonics at IINDIE, Madras.  |
|                            | — On Acoustic Emission at Engg. College, Guindy, Madras.   |
| — Dr. K. Prasad Rao        | — 'Corrosion of weldments' at BHPV, Vizag.   |

## PHYSICS

### 1. New projects approved during the year :

1. D.S.T. project on experimental studies on the Physical properties of High T<sub>c</sub> high critical field superconducting materials from February 1986. Value of the project Rs. 17.3 lakhs. Coordinator Dr. R. Srinivasan.
2. CSIR project on "Elastic and thermal properties of materials through higher order elastic constants and the A G Parameter" from September 1985. Value of the project Rs. 63,000/- Coordinator Dr. R. Ramji Rao.
3. DST project on Microprocessor based control and instrumentation for stirling cycle nitrogen liquefier. Value of the project Rs. 2.95 lakhs. Coordinator Dr. G. Rangarajan.
4. D.O.E. project on "Development of high power solid state laser sources". Value of the project for Rs. 15.41 lakhs. Coordinator Dr. T.A. Prasada Rao.

### 2. Short-term courses held during the year :

1. Fourth International Course on Physics of Materials held during 15 to 25 November 1985, Prof. Powlikoshi, Poland and Dr. A. Ionue, Japan gave lectures to the participants, in addition to 16 other experts in the field of Semiconductors. Thirty participants from Asian countries attended the course.
2. An International Winter School on Crystallography was organised in collaboration with the department of Biophysics, University of Madras, during 9.12.85 – 18.12.85.

### 3. Conferences held during the period :

1. Third International workshop on the Physics of Semiconductor Devices November 27th – December 2nd 1985.
2. National Seminar on Crystallography 19.12.85 to 21.12.85.

### 4. Visiting professors and special lectures conducted :

S.No.	Name and Address of the speaker	Dates on which lectures were delivered	Topic
1.	Dr. D. Suryanarayana IBM, USA.	8th July '85	Application of ceramics in Computer Technology.
2.	Prof. R. Chatterjee Dept. of Electronics I.I.T., Kharagpur.	2nd August '85	Fuzzy set Techniques and Applications.
3.	Dr. Philip Teu Singapore Broadcasting Corporation	3.12.85 to 5.12.85	Special course of Lectures on Microprocessor Design and Applications.
4.	Prof. G.V.S. Rayudu RUSH Brooke University USA.	7.1.86 and 8.1.86	Radiation Dosimetry.
5.	Prof. A.L. Laskar Professor, Physics Clemson University Clemson, USA.	9.1.86	Mass Transport in ionic solids.

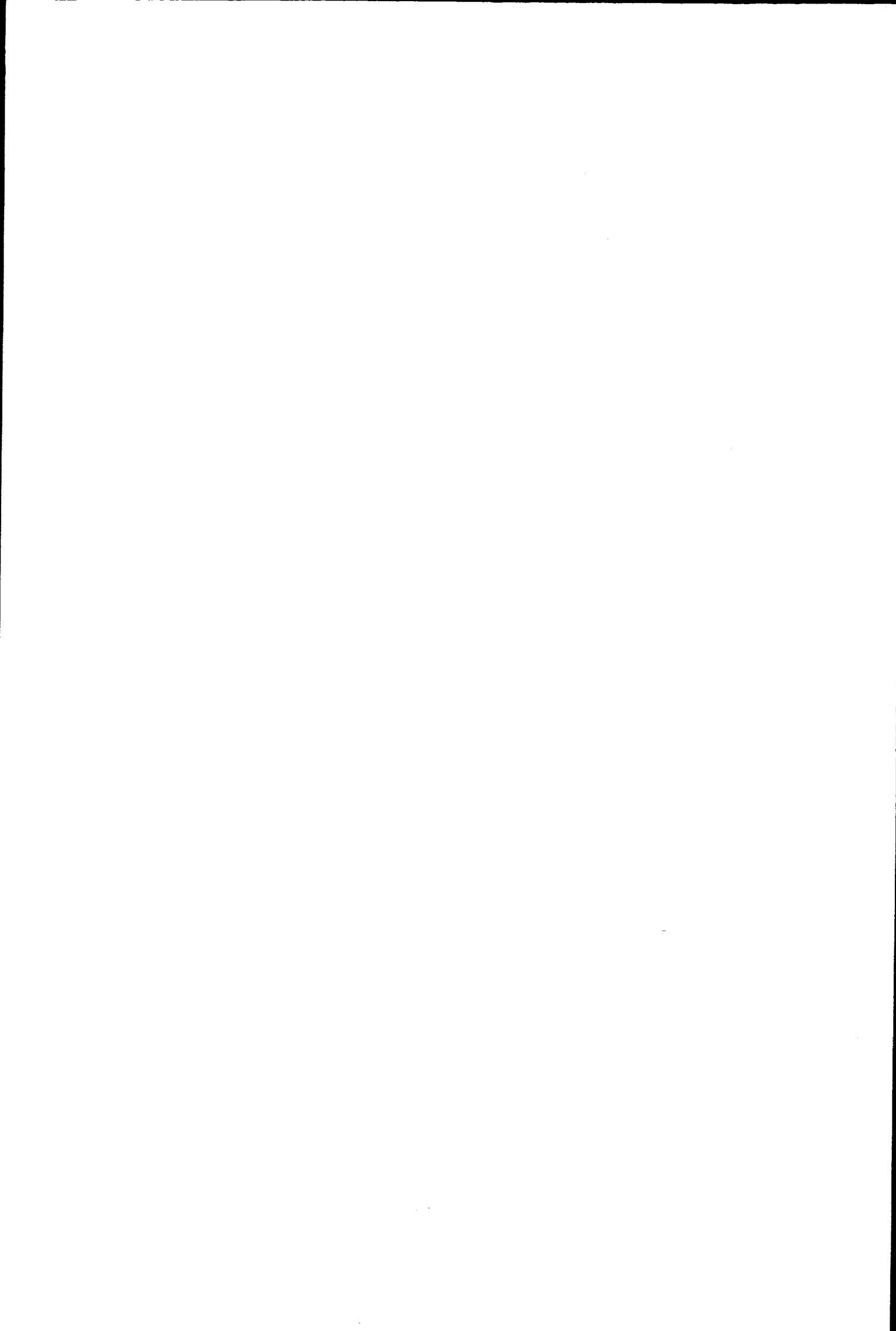
6. Prof. N.A. Narasimham  
Head, Spectroscopy Division  
BARC.

18th and 19th  
Feb. 1986.

Recent Advances in  
spectroscopy.

**5. New facilities set up in the laboratories :**

1. Flash evaporation systems for composed Semiconductors.
2. Cryostat for low temperature measurements of C—V characteristics of semiconductor devices.
3. Set up for the estimation of hydrogen absorption in metals employing volumetric method.
4. Double pulse electronic system with a variable delay between the pulser.
5. An apparatus for measurement of state of polarisation of light scattered by dyes.
6. Miniature portable Nitrogen Laser.
7. An experimental set up to measure variation of dielectric constants in crystals with uniaxial stress.



## **OTHER REPORTS**

Quality Improvement Programme

Indo German Programme

Central Library

Central Workshop

Institute Hospital

Placement Office

Weaker Section Students & Foreign Students

Institute Gymkhana

National Cadet Corps

Hostel Management

Central Supplies Unit

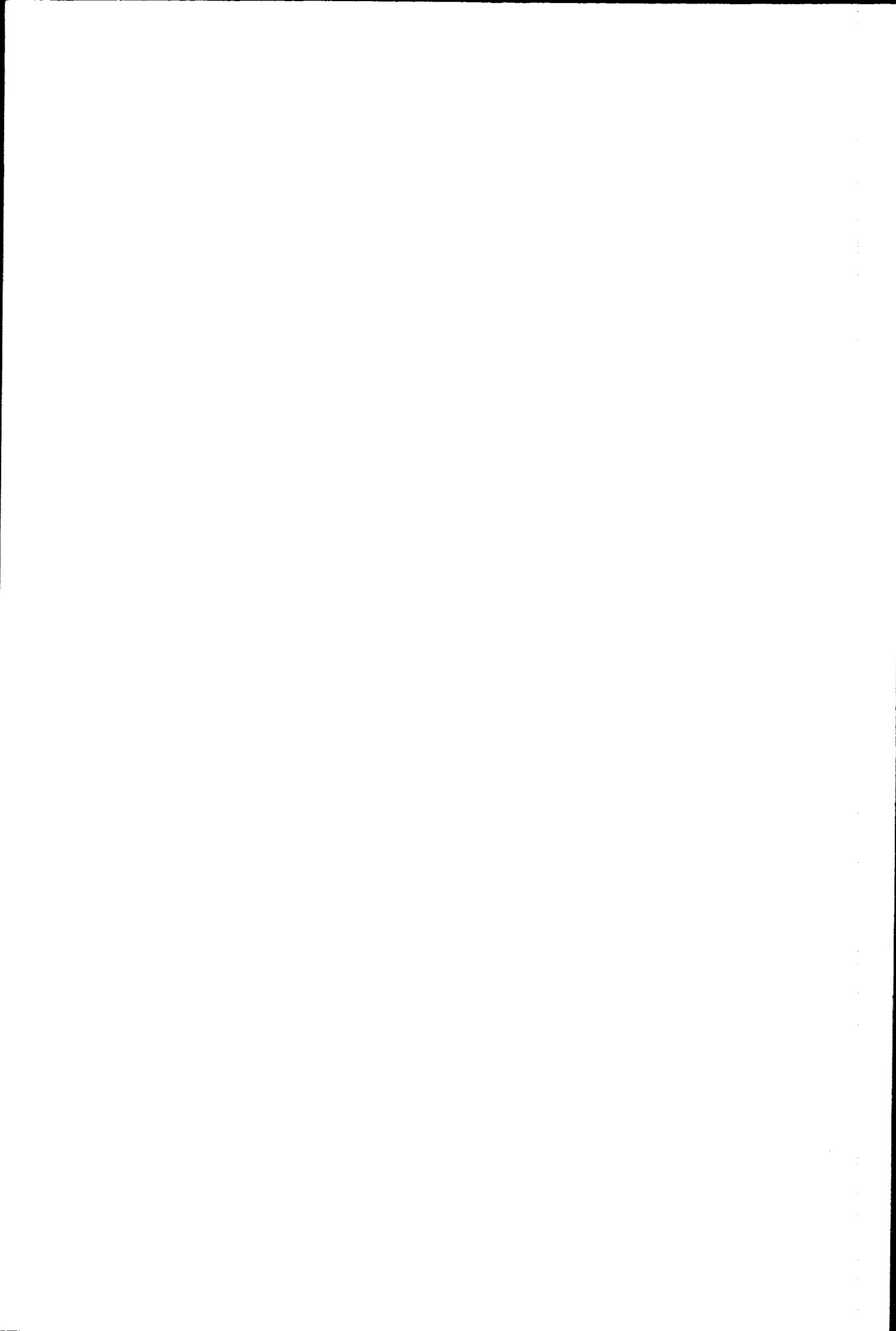
Construction of Buildings

Names of Faculty Members

Administration

Budget Proposals

Statement of Accounts 1984 - 85





## QUALITY IMPROVEMENT PROGRAMME

### Serving Teachers Programme

	<i>M. Tech.</i>	<i>Ph.D.</i>
No. admitted during 1985-86	11	11
No. on rolls on each of these courses	31	46
Short Term Courses conducted during 1985-86	4	

## INDO-GERMAN PROGRAMME

Number of Faculty Members permitted to visit the Federal Republic of Germany :

Long-term	...	Two
Short-term	...	Fifteen

## CENTRAL LIBRARY

The significant activities of the Central Library during the period April 1985 to March 1986 are as follows :

The following staff members attended seminars/conferences/workshops mentioned below :

Shri V. S. Nazir Ahmed, Librarian and Ms. D. Shobaa Rao, S. T. A. attended the seminar on Library Automation and Retrieval held at I.I.Sc., Bangalore from 7th October to 9th October 1985.

The Librarian also attended the SIS Convention and Conference in the Use of Microprocessors in Information Analysis and Library Applications at I.I.T. Bombay from 9-12-85 to 11-12-85.

Shri C. Deenadayalu, Deputy Librarian, attended the International Conference on Ranganathan's Philosophy: Assessment, Impact and Relevance - held at New Delhi from 11th November to 14th November, 1985.

He has also attended the Workshop on Computerisation of Science and Technology Libraries held at I.I.T. Delhi from March 22-23, 1986.

Shri P. Venkatesan, Asst. Librarian, attended the seminar on Libraries and the Challenge of Education organised by MALA held at Mylapore, Madras on 22-12-1985.

He has also attended the National Seminar on Assessment of Public Libraries Development in India held at the University of Madras in March 1986.

Mrs. J. Durairaj, Asst. Librarian, attended the Workshop on Collection Development of Library and Use of Engineering Literature in Science and Technology Libraries held at Suratkal from 15th to 18th January 1986.

M/s K. Sankaran, M. Murugan and Mrs. Padma Venkatesan have attended the seminar on User Studies and User Education held at C.L.R.I. Madras on 24-3-86.

The following staff members have contributed papers on Library and Information Science as mentioned below :-

### **V. S. Nazir Ahmed, Librarian :**

1. No Time for the Professionals, Hindu, Jan. 14, 1986, also reprinted in RILISAR Bulletin, Vol. 4, No. 1, 1986, p. 42.

### **C. Deenadayalu, Deputy Librarian :**

1. Impact of Ranganathan's philosophy in his own state, Tamilnadu : Assessment and future prospects, RILISAR Bulletin, 1985, Vol. No. 3 (4), pp. 29-33.
2. Proposal for the establishment of Advanced Media Centre, RILISAR Bulletin, 1985, Vol. No. 3 (4), pp. 46-47.
3. National Policy on Library and Information System - a draft policy statement, RILISAR Bulletin, 1986, Vol. 4 (1), pp. 38-41.
4. A working paper on Establishment of a National Document supply centre for quick and reliable access to documents in India in the DST Meeting in Delhi, 12-13, March, 1986.

### **P. Venkatesan, Asst. Librarian :**

Reprographic services in Libraries, RILISAR Bulletin, 1985, Vol. 3 (4), pp. 34-37.

### **Administration, Reprography and Bindery ARB Division :**

The Reprographic Services of the Library continued to be made available to all members of the Institute as well as the external members of the Library. As the demand for xerox copies of literature are increasing, plans are afoot to acquire two more Plain Paper Copiers for the Library.

External Binders continued to be engaged to clear the bindery works of the Library. 5288 publications have been got bound during the year under review.

### **Acquisition & Processing (A & P) Division :**

The annual Library Book Grant of Rs. 5.5 lakhs and Rs. 2 lakhs for Centres have been fully utilised.

The compilation of the abstracts of Institute's Ph.D. thesis for the period 1980-85 is in progress.

### **Circulation reference and maintenance (CRM) division :**

With NV 370 National Panasonic VCR and Keltron Colour T.V. available in the Library, Video demonstrations have been conducted by the Library as part of User Education Activity with the following Video Cassettes aquired during the year under review :

1. Four cassettes on Welding
2. One on Computer Science
3. Two on BBC Micro and
4. Two on Library Science.

This facility is also extended to groups of Library Science students, who visit our Library on educational tour from various universities in India.

The Book Bank (General) and the Book Bank (Weaker Section) continued to be actively used by the student.

### **Periodical & Serials (P & S) Division**

The amount allotted for Periodicals and Serials was fully utilised by sending timely renewals and follow up action. By systematic collection of journals and sending them to Binders expeditiously issues of a major portion of 1985 journals have been bound and made available to Readers.

During the period under review the Library continued to receive Documents in German language from M/s Bharat Dynamics Limited, Hyderabad and arranged for their translation.

## **STATISTICS ON OTHER LIBRARY ACTIVITIES**

### **Library Membership :**

1. Institute Members (Staff & Students)	...	4,880
2. Outside Members - Individual	...	54
- Corporate	...	52
3. Consultation Permits	...	275

**Circulation :**

1. Number of Readers Visited	...	1,05,498
2. Number of Volumes Issued	...	1,13,557
3. Number of Reservation for Books :		
(a) Registered	...	6,554
(b) Fulfilled	...	3,621
4. Amount of Over Due charges and other charges realised	...	1,59,169
5. Inter - Library Loans :		
(a) Borrowed for Institute Members	...	97
(b) Lent out from the Institute Library	...	172

**Acquisition :**

1. Books	...	3 578
2. Bound Volumes of Periodicals	...	4,108
3. Pamphlets and Reports	...	337
4. Microfilms and Microfiche	...	5
5. Institute Ph.D. Theses	...	82
6. Total Intake during the year	...	8,110
7. Total Accessions	...	2,21,386

**Current Periodicals :**

1. By Subscription	...	1,243
2. By Exchange/Gift	...	195
3. Translations Arranged	...	3

**Reprographic Services :**

1. Xerox Copies made	...	1,56,141
2. Korestat Copies made	...	345
3. Gestafax (Electronic Stencils)	...	451
4. Rotamasters Prepared and Printed	...	639

**Binding :**

1. Number of Books and Journals Bound from the Library	...	1,214
2. Number of Publications (Reports, Lecture Notes etc.)	...	600
3. Number of Back Volumes of Journals and Books bound through External Binders	...	4,074

## CENTRAL WORKSHOP

In the year 1985-86, Workshop has undertaken the fabrication of parts and assembly required for the B.Tech., M.Tech. and Ph.D. research from the departments of the Institute in addition to the regular training programme for the students of B. Tech. and M.Sc.

Advanced Workshop Course was conducted during the Summer (May-June) to the B.Tech. students.

No. of work orders completed during the period 1985-86	827
No. of Students trained in the Advanced Workshop Training during Summer Term Course	44

During the above period IC & SR work also were undertaken and completed.  
Some of the IC & SR were undertaken.

1. Gear Cutting for C.V.R.D.E., Avadi.
2. Calibration of pressure gauges for M/s. Naga Pump Factory.
3. Fabrication of model fixture for heave-pitch experiments with ship models.

## INSTITUTE HOSPITAL

The Institute Hospital is a 30 bedded hospital rendering medical aid to a population of nearly 10,000 (Students and Staff and their families) - on an average of 400 patients are daily treated in the Out-Patient Department. The Hospital offers Out-Patient and In-Patient services for Medical, Surgical, Obstetrics, Gynaecological, ENT and Paediatric treatment.

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

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

1. Dr. N. A. Jayavelan, M.B.B.S.	Medical Officer/Resident Medical Officer
2. Dr. Sumathi Khangaonkar, M.B.B.S., D.A.	Anaesthetist
3. Dr. Lalithakumari, M.B.B.S., D.G.O.	Gynaecologist
4. Dr. P. Subramanian, M.B.B.S.	Medical Officer
5. Dr. Girija Krishnan, M.D., D.C.H.	Paediatrician
6. Dr. Dr. S. Kameswaran, M.S., Ph.D., F.R.C.S. (Ed) F.R.C.S., (Glax), F.R.C.S., D.L.O	ENT Consultant (Part-time)
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 Psychiatrists (Part-time)
9. Dr. R. Thara, M.D., D. P. M.	

Sri L. Palaniappan is the Lay Secretary and is assisting the Chief Medical Officer in administration work of the Hospital.

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 Urine, Blood and Motion. 2 ECG machines are available with the Hospital. Some major operations for conditions like Hernia and Peptic Ulcer and minor operations are undertaken with the modernised operation Theatre.

From April 1985 to March 1986, 682 doses (comprising of 5 doses to each child getting primary doses) against Polio, and 592 doses of Triple Antigen (against Diphtheria, Pertusis and Tetanus) as 3 primary dose a month apart and a single Booster dose 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 Institute Hospital.

### Statistics :

1. Total number of out - patients	— 2,34,695
2. Total number of in - patients	— 835
3. Emergencies attended	— 9,113
4. Dressing	— 51,465

5. Injections	—	34,685
6. Delivery	—	22
7. Pathology		
a) Urine	—	3,124
b) Motion	—	2,312
c) Blood	—	4,213
8. Bio - Chemistry		
a) Blood sugar	—	612
b) Urea	—	86

## 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 year. 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 200 companies during the year. As a result, about 90 companies visited this office to hold campus interviews. From those who chose to use the Placement Office for making their career, these companies selected as many as 300 students.

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.

With the introduction of three semester M. Tech programme the Post-Graduates in the engineering disciplines started passing out in December from this academic year. The Placement Office has, therefore to stagger the placement separately for M. Tech and B. Tech. Graduates. The Placement Office, started corresponding with the prospective industries from September and opened up the campus interviews for the Post-Graduates in October itself. Because of the early commencement of the campus interviews most of the Post-Graduates who used the services of this office could get employments 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 the 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 as many as over 100 companies and the response from them was as good as was in previous years.



## WEAKER SECTION & FOREIGN STUDENTS

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 students of the general category to get qualified for admission. 16 SC/ST students joined the B.Tech. programme during the academic year 1985-86. Students admitted against this quota are given :

1. Free messing with pocket allowance of Rs. 70/- per mensem depending upon the means criteria as stipulated by the Govt. of India. From the semester beginning January, 1986 the above benefits will be extended to all the SC/ST students irrespective of their parents' income.
2. Free Lodging.
3. Free Tuition fee.
4. Exclusive use of Weaker section Book Bank.
5. Drawing instruments free of cost.
6. Help in getting placements.
7. Financial help for need of students through part-time jobs.

The Preparatory course of one academic year duration for SC/ST students who did not get admission through JEE was started during the year 1983-84. During the academic year 1984-85, the course was run for the 2nd year in succession. For the current academic year the Preparatory course could not be conducted in this IIT because of the lack of response from the SC/ST students. However, for this current academic year IIT, Delhi is conducting this preparatory course taking the SC/ST students from all over the country.

The Institute conducted an 'Introduction to IIT' programme on 15th & 16th January, 1986 for the benefit of the SC/ST students of the southern region studying in the 12th Std. or its equivalent with Physics, Chemistry and Mathematics as elective subjects and who are interested in writing the Joint Entrance Examination, 1986.

Circular letters were sent to the Principals/Headmasters/Headmistresses of all the Junior Colleges/Higher Secondary Schools of the southern region. Based on the performance in the 10th Std. We have called 100 SC/ST students out of which about 70 students attended the programme. The students who attended the programme were reimbursed travelling expenditure (both ways) and were given free boarding & lodging at the IIT Hostels. During this programme the students were exposed to the various concessions available to the SC/ST at the IITs and were shown round the Library and a few laboratories of interest.

The Ministry of External Affairs, Government of India has commissioned a study of "Experience of Foreign students in India" and the Indian Institute of Management, Ahmedabad carried out the study. Prof. Ramadhar Singh of IIM, Ahmedabad visited the Institute on 20th October, 1985 met the Foreign students of IITM and collected the completed questionnaire on 'Study of Experience of International Students in India'.

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 Sportsmeet

The Inter I.I.T. Sportsmeet was organised and conducted by the Indian Institute of Technology, Delhi in December 1985 as part of its Silver Jubilee celebrations. Both men and women teams practised hard and underwent a rigorous coaching camp. Our boys had to be content with the **THIRD** place in the General Championship event though we had won 12 times earlier.

The Institute won Gold in Cricket, Tennis, Shuttle Badminton and Volleyball, won silver in Basketball and Bronze in Table Tennis, Gymnastics, Athletics, Swimming and Waterpolo. Our congratulations to our Women contingent who won the general championship in their events. The Institute also won gold in Basketball and Shuttle Badminton and won silver in Table Tennis and Athletics.

### 2. Sportfest 1985

The sportfest was planned promptly in August 1985 but due to sudden closure of the city colleges we had to cancel the tournaments. However, open tournaments were conducted later in the indoor games like Shuttle Badminton, Table Tennis and Chess.

### 3. The All India Gerhard Fischer and Kokila Rajiah Basketball Tournaments.

The above tournaments for Men and Women attracted 17 and 12 teams respectively. The Loyola College, Madras won the trophy and the R.V.C.E. College, Bangalore was the runner-up in the men section.

The Mount Carmel College, Bangalore were the winners and the Stella Mary's College, Madras were the runner-up in the women section. The tournaments were keenly contested as usual. Our students organised and conducted the event like professionals. The events lasted for a week in January '86 and it was a feast for the sports-loving community of our Campus. Due to continuous rains, the major part of the tournaments was held in the indoor basketball court of the Student Activities Centre.

### 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 March '86. The Philips trophy has been instituted by Paico Electronics and Electricals Limited and the Trinity Shiled has been donated by Prof. J.C. Kuriacose family. The auditorium gave the spectators a panoramic view of the game. 11 Men and 8 Women teams comprising both outstation and local teams were invited to participate. St. Joseph's College, Trichy won the men's event and the Loyola College, Madras were the runner-up. Visalakshi College for Women from Coimbatore were the champions and the Ramakrishna Vidyalaya Girls School, Madras claimed the runner-up in the women section. All the teams enjoyed their participation in our 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 Gerhard Fischer and Kokila Rajiah Basketball tournaments.
- b) All India Philips and Trinity Inter Collegiate flood-lit Volleyball tournaments.
- c) Inter Collegiate Shuttle Badminton, Table Tennis and Chess tournaments.
- d) Three-a-side Basketball tournament.

- e) Institute Volleyball and Basketball teams' practice.
- f) An exhibition Volleyball match between our Institute team and the Volleyball team of the American Consulate General.
- g) During the Inter IIT 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.

## 7. Open Bridge Tournament

In the above Bridge tournament organised by us during April 1985, 22 teams from the various parts of the city participated. This tournament has found a permanent place in our sports programme. Pair Event was won by our Institute team and the Swiss League was won by our Ex. IIT ans (Technocrats).

## Lawn Tennis Tournaments for the Prof. E. G. Ramachandran's Shield and for Mr. Nikolaus Merten's Cup,

These Inter Collegiate flood lit Tennis tournaments were organised and conducted by us during March '86. Prof. E. G. Ramachandran Shield was instituted for the staff section while Mr. Nikolaus Merten's cup was donated for the students section. In the staff section Ten (10) teams participated and in the Students category six (6) outstanding teams entered.

The winning team in the staff section was H.I.E.T. of Madras and the Runner-up team was our IIT Staff team. In the students section Loyola College, Madras won the trophy while Madras Medical College were the runner-up in the tournament.

8. In order to secure maximum participation from the students and staff, the following competitions were organised and conducted.

- a) Annual Road race ... 150 competitors.
- b) Open cycle race ... 150 competitors.
- c) 3-a-side Basketball ... 50 teams
- d) 3-a-side Volleyball ... 55 teams
- e) 4-a-side Hockey ... 38 teams
- f) 6-a-side football ... 42 teams
- g) Skating Hockey.
- h) Institute Chess Meet
- i) Institute Open Bridge etc.

9. The Gymkhana started conducting the summer coaching camp programmes in Swimming for the benefit of the Campus residents as well as outsiders. Swimming is an activity that functions throughout the year.

10. Our Institute Football and Hockey teams had the honour of becoming the runner-up in the sports festival organised by the Stanley Medical College, Madras.

11. 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. It aims at 'a game for each and each for a game'. Competitions were held in 15 disciplines.

12. The National Sports Organisation programme for the I and II year B. Tech students and the Physical training and games programme for the H.A.L. management and design trainees were effectively organised by the Sports Officers of the Gymkhana.

## CULTURAL EVENTS

### **Intramural Events :**

The main aim of the intramural events was to provide continuous activity through out the year. The Staff Vs Students debate was revived after four years and the Staff Vs Students quiz continued with. Amalgamations was dropped as it was felt that it did not serve its purpose and was pointless as a means of promoting staff-student interaction. We had four distinct series of events this year.

#### **a) Institute open events :**

These were conducted in the odd semester with the aim of selecting the best participants to represent I. I. T. at the Inter College level and to give all students an opportunity to actively participate in events. More than 35 events were held in the period between August and October.

#### **b) Inter collegiate event :**

These were held to enable IIT ians to watch top quality student competitions and also to give the best of the city talent an opportunity to perform at IIT. We hosted, as usual the Inter College Quiz in September.

A new feature this year was the introduction of invited open events. There was a Festival of Plays, Anubhava-an evening of Classical Music, Anuraag an evening of light Music and Rondo Nite - an evening of Western Music. These programmes featured the best students from all the city colleges participating as mixed teams in a non-competitive basis. This was done because we felt that there would be more in it for the spectators if they witnessed a few good teams perform for long rather than many mediocre teams play one after the other in a meaningless competition. All these four events were held in October.

#### **c) Inter-Hostels Events :**

These were held in March and April to identify the best hostel with the emphasis on team participation rather than individual excellence.

#### **d) Professional Performance and Lecture Demonstrations :**

Every year the Campus gets the chance to witness top quality performance in classical Music and Dance only during MARDI GRAS. This year the main emphasis was on promoting all professional performance. A series of Lecture Demonstration was staged in September featuring Hariprasad Chaurasia, D.K. Jayaraman and Chitra Visweswaran. This was followed up with a concert by M.S. Gopalakrishnan in October and a dance recital by Sonal Mansingh in February. Although it was the first time that Lecture Demonstrations were held in IIT, they drew full houses and received a fantastic response. We hope that this feature continues. We thank SPIC-MACAY for all the help that they gave us.

In January, Badal Sircar, the well known exponent of Street theatre, held an intensive 12 day workshop. Mr. Alan Maley of the British Council held a three day workshop on the rudiments of theatre and acting in September.

### **Inter-College Events :**

The association of the cultural secretaries from all the city colleges was revived. Three meetings were held at the initiative of IIT, with the purpose of ensuring a mutually acceptable schedule and better participation in Inter-Collegiate events. The need for an Inter-College magazine was expressed. I.I.T. has offered to fund the magazine.

IIT Madras was able to participate in only 2 outstation festivals due to inconvenient dates. We won the literary section of the festival conducted by BITS, Pilani. In the local Inter College competitions, we continued our dominance. Our teams won the events they participated in at the competitions conducted by the Madras School for social work, W.C.C, M.C.C., Loyola College and College of Eng. Guindy. Our quiz team came third in the National Limca Open Quiz at Bangalore.

## **MARDI GRAS**

The Festival was held from the 22nd to the 26th of January. The unprecedented attention this year's festival received from the press was due mainly to its uniqueness.

The Central themes of this year's festival were the promotion of traditional and classical Indian culture through a series of professional performances in art, music and dance and high quality student inter collegiate competitions. Special care was taken to see that the artists were provided the best facilities both on stage in terms of P.A., Stage design etc., and off stage in terms of hospitality and accommodation. The high lights of the festival in terms of professional shows were : Talavadya — a unique performance in pure percussion featuring Zakir Hussain, Umayalpuram Sivaraman, Vikku Vinayakaram and Hari Shankar. This was followed on the same evening by a 'Shahnai-Vionin Jugalbandhi' featuring Ustad Bismillah Khan, Dr. (Smt.) N. Rajam and Zakir Hussain. The second day of the festival saw lecture demonstrations by Badal Sircar on street theatre and by Chitra Visweswaran on Bharatnatyam. On the 25th evening there was a Mandolin recital by Master U. Srinivas accompanied by A. Kanyakumari, Umayalpuram Sivaraman and G. Harishankar, All these concerts marked musical milestones as it was the first time that they were being held in the South and the Talavadya was taking place for the first time anywhere.

## NATIONAL CADET CORPS

The National Cadet Corps is an organisation aiming at development of leadership, character comradeship and spirit of adventurism among the educated youth.

The Institute has sponsored an Air Wing NCC unit namely : 4 (TN) Air Sqn (Tech) NCC which is located in the NCC Building inside the campus. About 200 students are admitted every year to enable the students to fulfill the partial requirement of the B. Tech. Degree course. Students who choose NCC are to undergo a minimum of one year NCC consisting of 20 parades conducted on Saturdays / Holidays.

The training in NCC comprises of drill with and without arms, weapon training, general service knowledge, principles of flight, aeromodelling aero engines, air craft instruments, tele-communication and radar. Further the cadets are given air experience through gliders. Technical/Industrial visits to service and industrial establishments in and around Madras are also organised. As a part of weapon training the cadets are given firing practice in rifles, revolvers and Air guns. Aeromodelling opportunities exist in the Unit to build various types of models with the assistance of a qualified aeromodelling instructor.

The cadets are sponsored for various types of camps such as Annual Training Camp, Attachment Camp (with regular Air Force Technical Establishments), basic and advanced leadership and mountaineering courses. In addition, the cadets of this unit underwent Cycle expedition to Muttukadu, donated blood to Red Cross Society of India, and a few cadets have given declaration to donate their eyes as their Social service activities.

(TN) Air Sqn (Tech) NCC is Commanded by Wing Commander G. Kandaswami and the Administrative Officer is Flight Lieutenant TPT Pillai, IAF. The NCC part time officers are Sqn Ldr V. Subrahmanyam and Flt Lt KV Chalapathy Rao who are the faculty members of the Institute. The NCC training is imparted by the NCC part time officers and permanent instructional staff from IAF,

## HOSTEL MANAGEMENT

The Indian Institute of Technology is a residential institution and all the students shall reside in the Hostels. At present there are 11 men's hostels and 1 women's hostel. In addition there is a Central Supplies Unit (CSU) for the procurement and distribution of milk and the other provisions centrally for hostels. This Unit also undertakes the supply of milk to the staff residing in the Campus.

Each hostel and CSU is administered by a Warden appointed by the Director from among the senior faculty members of the Institute. Hostel Management is the appointing authority of the mess staff and is the centrally administered body that manages the work and affairs of the hostels and CSU. The Chairman, Council of Wardens is the Chairman of the Hostel Management. Dr. R. RADHAKRISHNAN, Professor, Department of Civil Engineering is presently the Chairman of the Hostel Management.

Twentyfour Flats have been constructed for allotment to the hostel staff during the year 1984-85. The facility of the Co-operative and Thrift Society of IIT., Madras has been extended to the employees of the Hostel Management also during the year. Dr. R. NATARAJAN, Professor, Department of Mechanical Engineering is presently the Dean, Students.

## CENTRAL SUPPLIES UNIT

The Unit procures under the milk supply scheme milk from the nearby villages and from the Tamil Nadu Co-Operative Milk Producers Federation and distributes to the student hostels, to the residents of the campus and to the staff of the Institute residing around the campus.

Under the provision supply scheme, the Unit procures items of major consumption like Rice, Wheat, Dhalls, Sugar, Edible Oils, Coffee, Tea, Bournvita, Drinking chocolate, Butter, Coconut, Potato, Onion etc., at the wholesale rate and distributes them to the individual hostels.

## CONSTRUCTION OF BUILDINGS

During the period the following works have been taken and completed.

1. Extension to Community Centre	— Rs. 1.03 lakhs
2. Brick paving in front of Administration Block	— Rs. 21,000/-
3. Modifications to T.V. Lab	— Rs. 38,000/-
4. Formation of Roads for C1-5, C1-6 & C1-8 blocks	— Rs. 37,500/-
5. Rear side fencing at Sarayu Hostel	— Rs. 22,800/-
6. Improving Acoustic Treatment at Student Activity Centre	— Rs. 15,340/-
7. Approaches to C1-6, C1-7, C1-8 and other quarters	— Rs. 13,300/-
8. Wooden partitions in Admn. Block	— Rs. 13,880/-
9. Teak wood partitions at ESB	— Rs. 22,300/-
10. Quarters for Hostel Employees	— Rs. 4.36 lakhs
11. Civil works for CVD systems	— Rs. 20,500/-
12. Internal Fixtures for CRI—IITM collaboration project	— Rs. 57,000/-

Besides the above the following works are in progress.

1. New Computer Centre Building and connected sub works	— Rs. 90.00 lakhs
2. Chemical Kinetics and Catalysis lab for Chemistry Department	— Rs. 7.50 lakhs
3. Godown for Indane Gas Cylinders	— Rs. 75,000/-
4. 'D' type (Faculty type) quarters (1 x 12) Qrs.	— Rs. 15.00 lakhs
5. Building for Maintenance Office (Institute and Workshop Zones)	— Rs. 1.60 lakhs
6. Store and Toilet shed for Aero Engineering Block	— Rs. 66,000/-
7. Additional Rooms for IC Engines Lab	— Rs. 2.20 lakhs
8. Additional room for Maths Dept.	— Rs. 38,000/-
9. Extension to Metallurgical Engineering Dept.	— Rs. 1.60 lakhs
10. Chain link fencing for Kendriya Vidyalaya	— Rs. 86,700/-
11. Replacement of Steel tank at Thermo dynamics lab.	— Rs. 52,500/-
12. Shed for Chlorine cylinders	— Rs. 39,400/-
13. Providing platform and Approach Road for D1 and MOH Qrs.	— Rs. 47,000/-
14. Partitions at Stacks in Central Library	— Rs. 87,000/-
15. Room for ME & MH Lab.	— Rs. 69,000/-
16. Warden's Room and Cellar at Brammaputra Hostel	— Rs. 1,18,000/-
17. Providing storm water drain	— Rs. 15,300/-
18. Extension in First floor for JEE office	— Rs. 1.70 lakhs

In addition to the above, many minor works pertaining to various departments have been undertaken and successfully executed.



## NAMES OF FACULTY MEMBERS, DEPARTMENT-WISE

### AERONAUTICAL ENGINEERING

#### Professors

- |                          |  |
|--------------------------|--|
| 1. Dr. K. A. V. Pandalai | 5. Sri K. Balaraman                    |
| 2. " A. K. Sreekanth     | 6. Dr. K. A. Damodaran ( <i>Head</i> ) |
| 3. " T. K. Bose          | 7. Dr. G. Subramanian                  |
| 4. " N. R. Rajappa       | 8. Dr. T. K. Varadan                   |

#### Associate Professor

Dr. S. Krishnan

#### Assistant Professors

- |                               |                     |
|-------------------------------|---------------------|
| 1. Dr. R. M. Siddaveere Gowda | 4. Dr. A. Krishnan  |
| 2. " E. G. Tulpurkara         | 5. " S. Santhakumar |
| 3. " S. S. Gokhale            |                     |

#### Lecturer

Sri S. C. Rajan

#### Senior Scientific Officer Grade-I

Sri Job Kurian

### APPLIED MECHANICS

#### Professors

- |                                  |   |
|----------------------------------|---|
| 1. Dr. N. V. Chandrasekharaswamy | 6. Dr. R. S. Srinivasan ( <i>Head</i> ) |
| 2. " B. V. Aswathanarayana Rao   | 7. " T. M. Srinivasan                   |
| 3. " R. S. Alwar                 | 8. " K. M. Patil                        |
| 4. " V. Ramamurthi               | 9. " Megha Singh                        |
| 5. " P. S. Srinivasan            | 10. " Dr. N. Ganesan                    |

#### Associate Professors

- |                            |                  |
|----------------------------|------------------|
| 1. Dr. B. Srinivasa Prabhu | 2. Dr. V. Ramjee |
|----------------------------|------------------|

#### Assistant Professors

- |                            |                       |
|----------------------------|-----------------------|
| 1. Dr. S. Venkatesan       | 5. Dr. S. Narayanan   |
| 2. " M. Balakrishnan       | 6. " J. Ramachandran  |
| 3. " B. H. Lakshmana Gowda | 7. " S. Radhakrishnan |
| 4. " P. A. Aswathanarayana | 8. " P. Krishna Iyer  |

#### Lecturer

Sri J. Lakshminarasimhan

#### Senior Scientific Officer Grade-II

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

## CHEMICAL ENGINEERING

### Professors

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

### Associate Professors

- |                     |                     |
|---------------------|---------------------|
| 1. Dr. T. Venkatram | 2. Dr. G. S. Davies |
|---------------------|---------------------|

### Assistant Professors

- |                         |                             |
|-------------------------|-----------------------------|
| 1. Dr. K. Remananda Rao | 7. " R. Vedaraman           |
| 2. " R. Subramaniam     | 8. " D. V. Seetharamamurthy |
| 3. " A. Baradarajan     | 9. " T. K. Ramanujam        |
| 4. " S. Subba Rao       | 10. " K. Krishnaiah         |
| 5. " C. Chandraprasad   | 11. " V. Ravichandran       |
| 6. " N. R. Neelakantan  |                             |

### Lecturer

Dr. V. Sriramachandra Rao

### Technical Officers

- |                     |                         |
|---------------------|-------------------------|
| 1. Sri S. Shanmugam | 3. Sri B. V. Sreeramulu |
| 2. " V. Raman       |                         |

## CHEMISTRY

### Professors

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

### Associate Professor

Dr. K. Narayanan

### Assistant Professors

- |                              |                             |
|------------------------------|-----------------------------|
| 1. Dr. M.S. Gopinathan       | 6. Dr. D.V. Ramana          |
| 2. " M. Srinivasan           | 7. " (Kumari) T. S. Chandra |
| 3. " K. K. Balasubramanian   | 8. " R. Ramaswamy           |
| 4. " B. Viswanathan          | 9. " C. S. Venkatachalam    |
| 5. " V. R. Satyanarayana Rao | 10. " S. Vancheesan         |

### Lecturers

1. Dr. T. K. Varadarajan
2. " N. Balasubramanian
3. " R. P. Viswanath
4. Dr. N. Sundram
5. " (Smt.) K. Lalitha
6. " M. N. Sudheendra Rao

### Senior Scientific Officer Grade II

1. Dr. M. S. Subramaniam
2. Dr. T. Subramaniam

## CIVIL ENGINEERING

### Professors

1. Dr. K. S. Sankaran
2. " P. Srinivasa Rao
3. " D. Johnson Victor
4. " L. N. Ramamurthy
5. " H. Raman (Head)
6. " T. P. Ganesan
7. " C. S. Krishnamurthy
8. Dr. R. Radhakrishnan
9. " N. Rajagopalan
10. " K. Elango
11. " Nainan P. Kurian
12. " V. Paramasivam
13. " H. Suresh Rao

### Associate Professors

1. Dr. V. Kalyanaraman
2. " P. Kalyanasundaram
3. Dr. P. K. Aravindan

### Assistant Professors

1. Dr. H. Achyutha
2. " N. R. Krishnaswamy
3. " V. R. Rengaraju
4. Dr. B. S. Thandaveswara
5. " M. S. Mathews

### Lecturer

Sri K. Gopalakrishna

### Senior Scientific Officer Grade II

1. Sri M. Subbi Reddy
2. " R. Ambalavanan
3. " A. Ramachandriah
4. " K. Ananthanarayanan
5. Sri V. Tamizharasan
6. " K. Srinivasan
7. " S. Rajeev

### Technical Officers

1. Sri V. Raman
2. Sri M. Innaci
3. Sri P. R. Kothandaraman

### Chief Techno Economic Officer

Sri D. Hariharan

## ELECTRICAL ENGINEERING

### Professors

1. Dr. M. Venugopal
2. " V. G. K. Murthi
8. Dr. Y. Narayana Rao (Head)
9. " J. P. Raina

- |                      |                            |
|----------------------|----------------------------|
| 3. .. M. K. Achuthan | 10. .. V. V. Sastry        |
| 4. .. D. K. Banerjee | 11. .. K. Radhakrishna Rao |
| 5. .. B. Ramaswamy   | 12. .. P. Sankaran         |
| 6. .. V. Seshadri    | 13. .. P. Subbarami Reddy  |
| 7. .. A. Kuppurajulu | 14. .. V. Venkata Rao      |

#### Associate Professors

- |                             |                          |
|-----------------------------|--------------------------|
| 1. Dr. S. S. Yegnanarayanan | 4. Dr. M. Mukunda Rao    |
| 2. .. K. N. Bhat            | 5. .. G. Sridhara Rao    |
| 3. .. C. Dattatreyan        | 6. .. Vedam Subrahmanyam |

#### Assistant Professors

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

#### Lecturers

- |                                  |                              |
|----------------------------------|------------------------------|
| 1. Sri Varadharajan Subrahmanian | 4. Sri G. Govardhanagiri Rao |
| 2. .. M. Krishnamurthi           | 5. .. K. Palaniswami         |
| 3. .. P. C. Majhee               |                              |

#### Senior Design Engineers

- |                        |                              |
|------------------------|------------------------------|
| 1. Sri R. Ramachandran | 3. Sri P. Rama Seshagari Rao |
| 2. Sri S. Raman        |                              |

#### Senior Scientific Officers Grade II

- |                     |                          |
|---------------------|--------------------------|
| 1. Sri S. Karmalkar | 2. Sri V. Jagadesh kumar |
|---------------------|--------------------------|

#### Technical Officers

- |                             |                          |
|-----------------------------|--------------------------|
| 1. Sri C. Srikumara Menon   | 6. .. M. Nijmin Hariffin |
| 2. .. A. S. Satheesan       | 7. .. D. Sadasiviah      |
| 3. .. P. S. Kalyanasundaram | 8. .. K. N. Jothi        |
| 4. .. R. Balasubramanian    | 9. .. C. R. Ramaswamy    |
| 5. .. T. V. Gopal           |                          |

### HUMANITIES & SOCIAL SCIENCES

#### Professors

- |  |                         |
|--|-------------------------|
| 1. Dr. S. Ramani (on deputation to NITE) | 5. .. L. V. L. N. Sarma |
| 2. .. S. Ambirajan (Head)                | 6. .. R. Rajagopalan    |
| 3. .. Dr. A. V. Krishna Rao              | 7. .. Manfred Dutschke  |
| 4. .. Dipak Chaudhuri                    |                         |

#### Assistant Professors

- |                        |                           |
|------------------------|---------------------------|
| 1. Dr. C. Ramachandran | 3. Dr. R. N. Anantharaman |
| 2. Sri V. S. Kumar     | 4. Dr. T. T. Narendran    |

### Lecturers

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

### Senior Scientific Officer Grade II

Sri S. Jayachandran

### Mathematics

#### Professors

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

#### Associate Professors

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

#### Assistant Professors

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

#### Lecturer

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

### Senior Scientific Officer Grade II

1. Dr. K. Swaminathan

### MECHANICAL ENGINEERING

#### Professors

1. Dr. H. C. Radhakrishna
2. „ Prithviraj
3. „ G. V. N. Rayudu
4. „ M. A. Parameswaran (*Head*)
5. „ V. M. Krishna Sastry
6. „ M. V. Krishnamurthy
7. „ V. Radhakrishnan
8. „ R. Natarajan
9. „ K. Lakshminarayana
10. „ K. A. Bhaskaran
11. „ K. V. Gopalakrishnan
12. „ K. N. Seetharamu
13. „ V. Sriramulu
14. „ A. Rammohana Rao
15. „ N. Venkatarayulu
16. „ P. K. Philip
17. „ M. A. Veluswami

#### Associate Professors

1. Dr. V. Ganesan
2. „ S. Srinivasamurthy
3. Dr. T. Rajagopalan
4. „ R. Raman

### Assistant Professors

- |                         |                                |
|-------------------------|--------------------------------|
| 1. Dr. P. Srinivasa Rao | 11. " O. V. Krishnaniah Chetty |
| 2. " M. Madhusudana Rao | 12. " K. R. Govinda Mallan     |
| 3. " R. Krishnamurthy   | 13. Dr. K. Narayanaswamy       |
| 4. Dr. M. S. Shanmugam  | 14. " K. V. Chalapathi Rao     |
| 5. " A. Venkatesh       | 15. " T. Nagarajan             |
| 6. " Vijay R. Raghavan  | 16. " K. N. Gopalan            |
| 7. Dr. B. Nagalingam    | 17. " V. Balabaskaran          |
| 8. " U. S. P. Shet      | 18. " K. Kolar                 |
| 9. " K. Gopinath        | 19. " K. Ramakoteswara Rao     |
| 10. " K. Srinivasan     |                                |

### Lecturers

- |                               |                          |
|-------------------------------|--------------------------|
| 1. Sri K. S. Padiyar          | 7. Dr. G. Muthuveerappan |
| 2. " V. N. Rajan              | 8. Sri V. Jayaprakash    |
| 3. " D. V. Ramalingeswara Rao | 9. " S. Krishnamurthy    |
| 4. " K. V. Thyagarajan        | 10. Dr. N. Sivaprasad    |
| 5. " S. Kumaraswamy           | 11. " N. Sitaram         |
| 6. Dr. Y. G. Srinivasa        |                          |

### Design Engineers

- |                        |                |
|------------------------|----------------|
| 1. Sri M. Singaperumal | 2. Sri A. Arun |
|------------------------|----------------|

### Senior Scientific Officers Grade II

- |                          |                     |
|--------------------------|---------------------|
| 1. Sri B. Ramamoorthy    | 3. Sri M. Govardhan |
| 2. Dr. L. Vijayaraghavan |                     |

### Technical Officers

- |                        |                            |
|------------------------|----------------------------|
| 1. Sri M. Velayudhan   | 5. Sri V. M. Swamy         |
| 2. " S. Krishnaswamy   | 6. " V. Sankaran           |
| 3. " B. N. Somasekhara | 7. " A. K. Madhavakrishnan |
| 4. " U. P. Das         | 8. " R. Srinivasan         |

## METALLURGICAL ENGINEERING

### Professors

- |                            |                                 |
|----------------------------|---------------------------------|
| 1. Dr. E. G. Ramachandran  | 5. Dr. K. Ananthapadmanabhan    |
| 2. " K. Srinivasa Raghavan | 6. " V. M. Radhakrishnan (Head) |
| 3. " R. Vasudevan          | 7. " O. Prabhakar               |
| 4. " H. M. Roshan          |                                 |

### Associate Professor

Dr. D. R. Gopafakrishna Achar

### Assistant Professors

- |                                   |                          |
|-----------------------------------|--------------------------|
| 1. Sri R. K. Srikantakumaraswamy  | 4. Dr. S. K. Seshadri    |
| 2. Dr. K. J. Lakshminarayana Iyer | 5. " P. Venugopal        |
| 3. " C. V. Gokulrathnam           | 6. " S. Ramakrishna Iyer |

### Lecturers

1. Dr. S. Raghavan
2. Sri V. Jagasivamani
3. " S. D. Pathak
4. Sri P. Kesavan Nair
5. Dr. K. Prasada Rao
6. " Ganpath Ram Sharma

### Senior Scientific Officers Grade II

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

### Technical Officers

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

### PHYSICS

#### Professors

1. Dr. R. Srinivasan
2. " S. Radhakrishna
3. " Y. V. G. S. Murti (Head)
4. " J. Sobhanadri
5. " V. Balakrishnan
6. Dr. K. V. S. Rama Rao
7. " V. Sivaramakrishnan
8. " G. Rangarajan
9. " R. Ramji Rao
10. " S.B.S. Sastri

#### Associate Professors

1. Dr. C. K. Narayanaswamy
2. Dr. B. M. Sivaram

#### Assistant Professors

1. Dr. S. Swaminathan
2. " A. V. Narasimham
3. " K. Viswanatha Reddi
4. " (Smt.) Maha Seshasayee
5. " T. A. Prasada Rao
6. " B.S.V.S. Ramachandra Charyulu
7. " V. Damodara Das
8. Dr. V. Ramachandran
9. " S. Srinivasan
10. " K. Srinivasan
11. " B. S. Venugopalan
12. " V. Ramakrishnamurthy
13. " P. C. Deshmukh
14. " Sriraman Srinivasan

### Lecturers

1. Sri V. Ramabhadran
2. " B. Subramanyam
3. Dr. G. Sreenivasamurthy
4. " Jagabandhu Majhee
5. Dr. V. Subrahmanya Murthy
6. " K. Hariharan
7. " A. Subrahmanyam
8. " T. S. Natarajan

### Senior Scientific Officer Grade I

Dr. Y. Syamasundar Rao

### Senior Scientific Officers Grade II

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

#### Lecturer Grade II

Kumari T. M. Vimala

#### Technical Officers

1. Sri A. P. Venugopal
2. Sri U. D. Venkatarangaiah

## COMPUTER SCIENCE AND ENGINEERING

### Professors

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

### Associate Professor

Dr. K. B. Lakshmanan

### Assitant Professor

1. Dr. (Smt.) Kamala Krithivasan
2. Dr. N. Parameswaran
3. Dr. M. Manohar

### Lecturer

Dr. C. Pandurangan

### Assistant Manager (Operations)

Sri P. Seshasayi

### Senior Systems Programmers

1. Sri M. Kothanda Ramanujam
2. Sri V. Aravamudhan

### Systems Engineers (Operations)

1. Sri R. Dheenadayalu
2. Sri S. V. Raghavan

### Shift Engineer

Sri K. G. Sundarajan

### Programmers Grade I

1. Sri G. Kannan
2. Smt. Vatsala Krishnan
3. Smt. Vijayalaxmi Sirohi

### Senior Scientific Officer Grade II

Sri M. Kumaravelu

## OCEAN ENGINEEING CENTRE

### Professors

1. Dr. V. Satyanarayana Raju
2. Dr. C. Ganapathy Chettiar (Head)
3. Dr. P. V. Indiresan

### Associate Professors

1. Dr. M. Ravindran
2. Dr. K. Muthukrishnaiah
3. Dr. S. Narasimha Rao

### Principal Scientific Officer

Dr. M. R. Pranesh



**Assistant Professors**

- |                          |                            |
|--------------------------|----------------------------|
| 1. Dr. C. P. Vendhan     | 4. Sri R. L. Roy Chaudhury |
| 2. Dr. K. Ganesh Babu    | 5. Sri P. Sambandam        |
| 3. Dr. S. P. Subramanian | 6. Dr. R. Mahadevan        |

**Senior Scientific Officer Grade I**

- |                             |                     |
|-----------------------------|---------------------|
| 1. Sri S. Meenakshisundaram | 4. Sri R. Natarajan |
| 2. Sri V. G. Idichandy      | 5. Dr. V. Sundar    |
| 3. Dr. K. Rajagopalan       |                     |

**Senior Scientific Officer Grade II**

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

**REGIONAL SOPHISTICATED INSTRUMENTATION CENTRE**

**Professors**

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

**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 Officer**

Sri K. Raman

**MATERIAL SCIENCE RESEARCH CENTRE**

**Professor**

Dr. G. V. Subba Rao



### Technical Officers

- |                           |                           |
|---------------------------|---------------------------|
| 1. Sri K. S. Venugopal    | 3. Sri G. S. Ramachandran |
| 2. „ K. S. Veeraraghavalu | 4. „ A. V. Sundaram       |

### CENTRAL GLASS BLOWING SECTION

#### Technical Officer

Sri N. T. Kumaraswamy

### MECHANICAL ENGINEERING EDUCATION DEVELOPMENT CENTRE

#### Senior Scientific Officers Grade I

- |                      |                        |
|----------------------|------------------------|
| 1. Dr. G. Kuppaswamy | 2. Dr. J. Rammohan Rao |
|----------------------|------------------------|

### CHEMICAL ENGINEERING EDUCATION DEVELOPMENT CENTRE

#### Senior Scientific Officer Grade I

Sri K. D. Chandrasekharan

#### Senior Scientific Officer Grade II

Dr. Sriman Narayanan

### GYMKHANA

#### Senior Physical Training Instructors

- |                      |                    |
|----------------------|--------------------|
| 1. Sri V. Srinivasan | 3. Sri S. Joga Rao |
| 2. „ H. Shaukatali   |                    |

### LIBRARY

- |                         |     |                       |
|-------------------------|-----|-----------------------|
| 1. Librarian            | ... | Sri V. S. Nazir Ahmed |
| 2. Deputy Librarian     | ... | „ C. Deenadayalu      |
| 3. Assistant Librarians | ... | „ P. Venkatesan       |
|                         |     | Smt. J. Durairaj      |
|                         |     | „ N. Satyamurti       |
| 4. S. T. A. (S. G.)     | ... | „ K. Sankaran         |

### DEANS

- |   |     |                                 |
|---|-----|---------------------------------|
| Academic Courses                            | ... | Dr. Surjit Singh                |
| Administration                              | ... | „ N. V. C. Swamy (from 24-1-86) |
| Academic Research                           | ... | „ H. N. Mahabala                |
| Industrial Consultancy & Sponsored Research | ... | „ V. Radhakrishnan              |
| Staff Affairs                               | ... | „ V. Srinivasan (upto 31-1-86)  |
|   |     | „ D. Prithviraj (from 1-2-86)   |
| Students                                    | ... | „ Dr. R. Natarajan              |

#### ADVISERS

Foreign and Weaker Section Students	...	Sri G. T. Manohar
Sports Activities	...	Dr. P. K. Philip
Cultural Activities	...	„ C. K. Muthukrishnan
Training and Placement	...	„ V. Radhakrishnan

#### Director

Dr. L. S. Srinath

#### DEANS

Prof. H. N. Mahabala, Dean, Academic Research  
Prof. Surjit Singh Dean, Academic Courses  
Prof. D. Prithviraj, Dean, Staff Affairs  
Prof. R. Natarajan, Dean, Students  
Prof. V. Radhakrishnan, Dean, IC & SR

#### Heads of Departments

Prof. K. A. Damodaran	...	Aeronautical Engineering
Prof. P. S. Srinivasan	...	Applied Mechanics
Prof. N. Subramanian	...	Chemical Engineering
Prof. C. N. Pillai	...	Chemistry
Prof. H. Raman	...	Civil Engineering
Prof. Y. Yegnanarayanan	...	Computer Science and Engineering
Prof. Y. Narayana Rao	...	Electrical Engineering
Prof. S. Ambirajan	...	Humanities & Social Sciences
Prof. R. Subramanian	...	Mathematics
Prof. M. A. Parameswaran	...	Mechanical Engineering
Prof. V. M. Radhakrishnan	...	Metallurgical Engineering
Prof. Y. V. G. S. Murti	...	Physics

#### CENTRAL ADMINISTRATION

##### Dean Administration

Dr. N. V. C. Swamy

##### Deputy Registrars

Sri W. Hannmesi Rao  
(General Administration)

Sri M. Gopalan  
(Academic)

Sri V. Shanmugam  
(Administration)

##### Finance and Accounts Officer

Sri A. V. Karunakaran Nambiar

##### Stores and Purchase Officer

Sri A. Thirunavukarasu

##### Internal Audit Officer

Sri S. R. Radhakrishnan

##### Chief Security Officer

Sri T. N. Venkataraman

**Assistant Registrars**

Sri D. Thiagarajan (Administration)	Sri G. R. Raghunatha Rao (Academic)	Kum. G. Saroja (Academic)	Sri K. Sekar (Administration)
--	--	------------------------------	----------------------------------

**Assistant Finance & Accounts Officers**

Sri R. Kannan	Sri R. N. Subramanian
---------------	-----------------------

**Assistant Stores and Purchase Officers**

Sri M. C. James	Sri M. Manickam
-----------------	-----------------

**ENGINEERING UNIT**

**Executive Engineer**

Sri N. Malayalam

**Estate Officer**

Sri V. N. Murty

**Assistant Engineers**

Sri D. Ramanathan	Sri J. C. Jinadoss
.. D. R. Patel	.. A. Angamuthu
.. Abraham Varghese	.. C. Ganesan
.. M. Doorvasulu Reddy	.. A. Sardar Jhan
.. S. Swaminathan	.. T. Seshan
.. S. K. Pathi	.. K. Ramakrishnan

**Horticultural Superintendent**

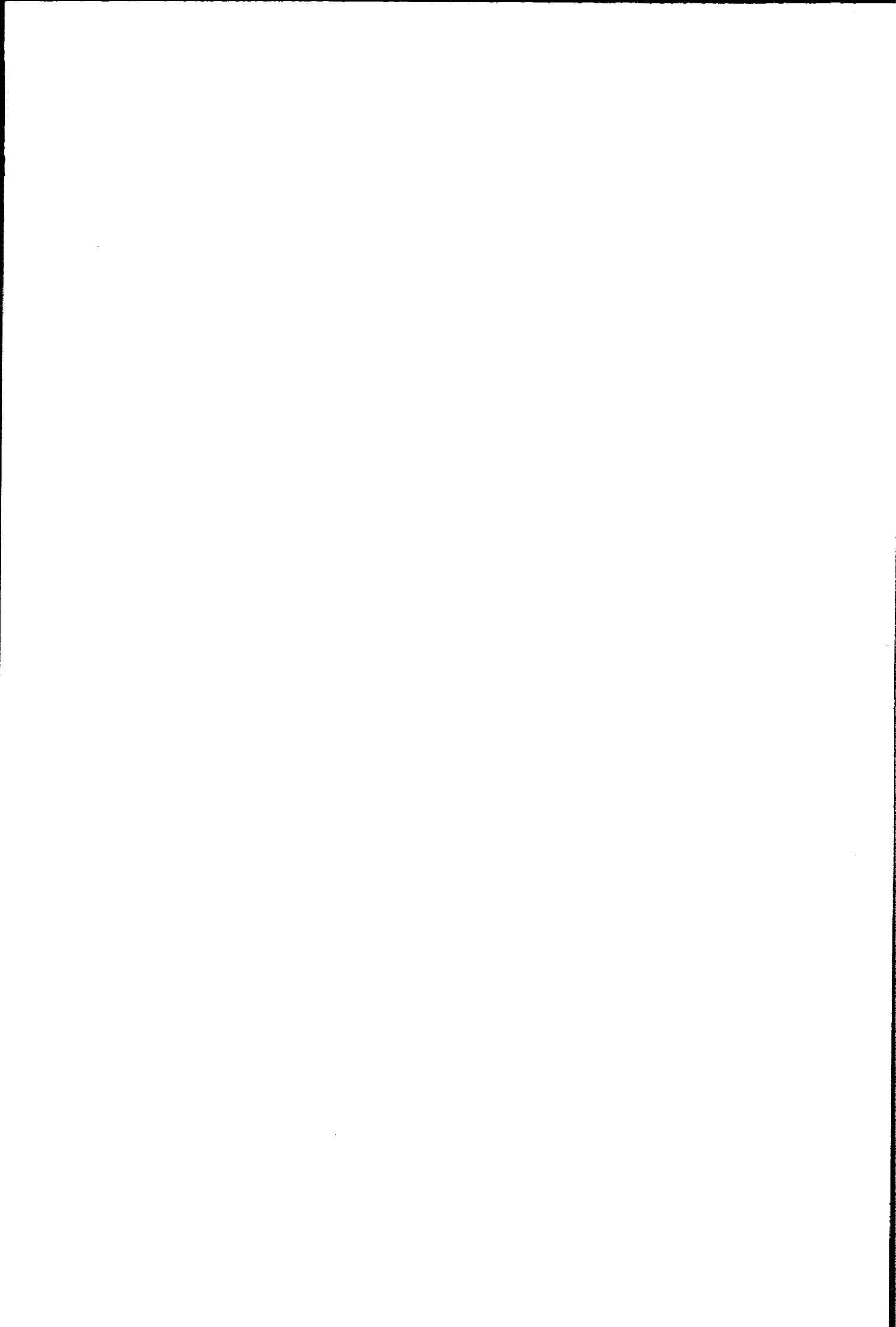
Sri P. Manickavasagam

**BUDGET PROPOSALS**

(1985-86 & 1986-87)

(Figures in lakhs of Rupees)

Description	Budget Estimates for 1985-86		Revised	Budget
	as per Finance Committee	as allocated by Board of Governors	Estimates 1985-86	Estimates 1986-87
(1)	(2)	(3)	(4)	(5)
Recurring	860.75	892.75	1050.26	1117.87
Non-Recurring	80.00	80.00	110.00	150.00
Total (Non-Plan)	940.75	972.75	1160.26	1267.87
Recurring	46.76	4.50	11.90	27.98
Non-Recurring	374.48	108.15	322.86	494.75
Total (plan)	421.24	112.65	334.76	522.73
Income	124.80	124.80	118.65	114.07



**Statement of Accounts  
1984 - 85**

INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE

Educational Expenses	Rs.	Rs.
<b>Pay of Teaching Staff</b>		
Department of Chemistry	14,90,371	
Physics	14,95,212	
Mathematics	9,97,337	
Humanities & Social Science	7,33,432	
Civil Engineering	14,13,521	
Mechanical Engineering	24,81,720	
Electrical Engineering	22,57,795	
Chemical Engineering	10,10,568	
Metallurgical Engineering	9,80,006	
Applied Mechanics	9,69,236	
Aeronautical Engineering	7,04,688	
Computer Science and Engineering	8,28,186	
	<u>1,53,62,072</u>	1,53,62,072

C/o

1,53,62,072



TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31ST MARCH 1985.

INCOME

	Rs.	Rs.
<b>Grant from Govt. of India</b>		
on Revenue Account)	7,72,96,000	
<i>Less:</i> 1983-84 transfer	87,95,000	
	<u>6,85,01,000</u>	
<i>Add:</i> 1984-85 Outstanding Adjustment	44,50,000	
	<u>7,29,51,000</u>	
<b>General Income</b>		
Tuition Fees	4,91,006	
Hostel Seat Rent	2,42,551	
Gymkhana Management	50,220	
Medical Fees	17,578	
Students Amenities Fund	37,944	
Fine	6,891	
Examination Fees	71,500	
Degree in Absentia	1,090	
Application Fees from Students	16,30,189	
Application Fees from Appointments	2,180	
Admission Fees	9,892	
Grade Card	18,924	
	<u>25,79,965</u>	

7,55,30,965

INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE (Contd.)

	Rs.	Rs.
B/f.		1,53,62,072
<b>Pay of Non-Teaching Staff :</b>		
Department of Chemistry	5,28,414	
Physics	9,20,532	
Mathematics	85,583	
Humanities and Social Sciences	1,91,031	
Civil Engineering	9,74,941	
Mechanical Engineering	15,13,659	
Electrical Engineering	12,17,105	
Chemical Engineering	5,90,778	
Metallurgical Engineering	6,84,555	
Applied Mechanics	5,04,616	
Aeronautical Engineering	3,91,899	
Computer Science & Engineering	4,50,671	
	80,53,784	
<b>Pay and Allowances :</b>		
Centres — Officers	6,86,770	
Centres — Others	8,39,693	
	15,26,463	
<b>Pay and Allowances :</b>		
Indo-German Projects		2,10,155
C/o.		2,51,52,474

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1985.

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INCOME (Contd.)

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	B/f.	Rs.	Rs.
<b>Miscellaneous Receipts :</b>			7,55,30,965
Institute Bus Collections		5,02,937	
Hire Charges on Institute Vehicles		34,007	
Licence Fee		14,83,396	
Electricity, Water and Service Charges		5,82,223	
Lawns and Gardens (Action sales of trees Usufructs)		84,966	
Due to Change over to G. P. F. Scheme		24,01,152	
Other Receipts		33,60,723	
Income from Computer Centre		21,05,404	
		<hr/>	1,05,54,808

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8,60,85,773

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INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE		Rs.	Rs.
	B/t		2,51,52,474
<b>Departmental Expenses :</b>			
Chemistry		4,96,829	
Physics		4,78,361	
Mathematics		46,350	
Humanities & Social Sciences		80,563	
Civil Engineering		3,29,590	
Mechanical Engineering		7,06,002	
Electrical Engineering		5,71,423	
Chemical Engineering		4,55,932	
Metallurgical Engineering		5,37,158	
Applied Mechanics		3,25,154	
Aeronautical Engineering		2,89,202	
Computer Science and Engineering		25,49,056	
		68,65,620	
<b>Library</b>			
<b>Pay and Allowances :</b>			
Officers		2,28,788	
Establishment		10,77,712	
Contingencies - Operating Cost & Building Charges		1,68,185	
Journals of General Interest		2,151	
		14,76,836	
	C/o		3,34,94,930

TECHNOLOGY, MADRAS-600 036

FOR THE YEAR ENDED 31st MARCH 1985

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INCOME (Contd.)

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Rs.  
8,60,85,773

C/o

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8,60,85,773

INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE (Contd.)

B/f.	Rs.	Rs.
		3,34,94,930
<b>Workshops :</b>		
Pay and Allowances of Workshop Superintendents	99,815	
Pay and Allowances of other staff	20,35,637	
Working expenses (Instruments, Tools and other Consumables)	1,26,767	
	—————	22,62,219
Stipend to apprentices		80,212
Sub-Centre in Cryogenics Engineering		25,733
<b>Ocean Engineering Centre :</b>		
Pay and Allowances : Officers	7,18,529	
Pay and Allowances Others	2,85,889	
Working Expenses (Instruments and Other Consumables)	4,74,063	
	—————	14,78,481
		—————
C/o.		3,73,41,575

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1985.

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INCOME (Contd.)

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B/f.

Rs.  
8,60,85,773

C/o

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8,60,85,773

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INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE (Contd.)

B/f.	Rs.
	3,73,41,575
Central Electronic Centre — Pay and Allowances	2,27,166
Air-Conditioning Unit — Pay and Allowances	1,85,566
Regional Sophisticated Instrumentation Centre	90,500
Electron Microscope Lab.	24,363
Electronic Instruments Servicing and Development Centre (C.E.C.)	62,012
Central Photographic Section	63,959
Central Glass Blowing Section	41,598
Air-Conditioning Unit	1,06,828
X-Ray Diffraction Laboratory	34,645
Energy Research Centre	14,037
Centre for Rural Development	1,47,087
Fibre Reinforced Plastic Research Centre	1,41,185
Television Engineering Lab.	1,08,283
Engineering Design Centre	1,21,791
Material Science Research Centre	1,89,867
Indo-German Project	2,15,388
Collaboration & Cultural Exchanges between IIT, Madras and other Nations	6,994
Microprocessor Lab.	9,530
Naval Architecture	94,534
Central Gas Supply Unit	4,087
Bio-Science and Bio-Technology	91,088

C/o.

3,93,22,083



TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1985.

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INCOME (Contd.)

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B/f.

Rs.  
8,60,85,773

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8,60,85,773

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INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE (Contd.)

B/f	Rs.	Rs.
		3 93,22,083
<b>Institute Scholarships</b>		
Post Graduate & Research	45,41,559	
Under Graduate	5,65,347	
	<hr/>	51,06,906
<b>N. C. C. / N. S. S.</b>		
Pay and Allowances	41,095	
Other Expenditure	52,948	
	<hr/>	94 043
Contribution to Gymkhana Management (Athletic & Gymkhana)		4,88,677
Part Time Lectures		21,040
Visiting Professors		24,295
Technical Bulletin & Journals		37,044
Symposia and Seminars		22,433
Inplant Training Courses/Visits		1,08,363
Continuing Education Programme Organised by the Institute		71,256
Guidance & Counselling Unit		21,024
J. E. E. Special Coaching Programme for SC/ST Students		89,307
		<hr/>
	C/o	4,54,06,471

TECHNOLOGY, MADRAS-600036.  
FOR THE YEAR ENDED 31st MARCH 1985

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INCOME (Contd.)

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B/f

Rs.  
8,60,85,773

C/o

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8'60.85773

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INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE (Contd.)

		Rs.
	B/f	4,54,06,471
Quality Improvement Programme initiated by the Ministry of Education		16,063
Director's Discretionary Fund for Research		93,157
Membership Fees to outside Bodies		45,300
Remuneration to External Examiners		67,057
Joint Entrance Examination		7,06,534
Convocation		92,700
Prizes for Academic Distinction		13,687
Common Examination for P. G. Admission		
Graduate Aptitude Test in Engineering		14,67,212
Contribution towards Institute participation in Programme of National Conference		47,000
H. A. L. Trainees		1,00,647
Contribution to Societies		807
<b>Hostels :</b>		
Allowances to Wardens		8,926
Subsidy to Hostels		21,06,565
<b>Central Administration :</b>		
Pay and Allowances - Officers	12,23,753	
Pay and Allowances - Establishment	52,65,111	
	64,88,864	

C/o

5,66,60,990

TECHNOLOGY, MADRAS-600 036.  
FOR THE YEAR ENDED 31st MARCH 1985

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INCOME (Contd.)

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B/f

Rs.  
8,60,85,773

C/o

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8,60,85,773

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INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE (Contd.)

	B/f.	Rs.	Rs.
<b>Contingencies :</b>			5,66,60,990
Postage		2,88,340	
Entertainment		55,398	
Telephones		9,26,273	
Liveries		3,80,366	
Stationery		6,58,104	
Printing		2,15,499	
Advertisement		4,23,959	
Sundries (Misc. Expenses)		4,22,998	
		—————	33,70,937
<b>Other Items :</b>			
Directors' Discretionary Fund			3,985
<b>Stores :</b>			
General Stores		5,085	
Pay & Allowances — Officers		94,514	
Pay & Allowances — Estt.		4,90,771	
		—————	5,90,370
<b>Security :</b>			
Other Charges		14,900	
Special Security Guards		3,45,565	
		—————	3,60,465
<b>Lawns and Gardens :</b>			
Pay and Allowances of Horticultural Superintendent		33,037	
Pay & Allowances — Others		1,53,371	
		—————	1,86,408
			—————
	C/o.		6,11,73,155

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1985.

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INCOME (Contd.)

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B/f.

Rs.  
8,60,85,773

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8,60,85,773

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INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE (Contd.)

	B/f.	Rs.	Rs.
			611,73,155
Power			33,96,657
Mosquito Control			13,042
Water			5,10,160
Oil and Petrol			1,09,584
<b>Repairs and Maintenance :</b>			
a) Furniture		3,77,084	
b) Typewriters and Duplicators		76,629	
c) Motor Vehicles		1,46,782	
		6,00,495	6,00,495
Fire Fighting Operating Cost			4,896
Duty Insurance & Road Taxes			80,972
<b>Works and Maintenance :</b>			
Pay and Allowances — Officers		1,42,281	
Pay and Allowances — Estt.		46,41,307	
Other Charges		31,48,663	
		79,32,251	79,32,251
Property Tax			9,87,376
<b>Hospital :</b>			
Pay and Allowance — Medical Officers		2,15,042	
Pay and Allowance — Estt.		3,80,578	
Purchase of Medicines		7,06,537	
		13,02,157	13,02,157
			7,61,10,745
	C/o.		



TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1985.

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INCOME (Contd.)

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B/f.

Rs.  
8,60,85,773

C/o.

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8,60,85,773

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INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE (Contd.)

	B/f	Rs.	Rs.
Subsidy to Vana Vani School			7,61,10,745
Audit Charges			1,73,980
Legal Expenses			62,085
Reimbursement of Stamp Duty			52,700
			41,700
<b>Travelling Allowances :</b>			
Board of Governors		5,688	
Staff Selection Committee and other committee		56,998	
Candidates called fer Interview for appointments		59,946	
Joint Entrance Examination		1,22,333	
		2,44,965	2,44,965

C/o

7,66,86,175

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1985

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INCOME (Contd.)

---

B/f

Rs.  
8,60,85,773

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8,60,85,773

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INDIAN INSTITUTE OF  
INCOME AND EXPENDITURE ACCOUNT

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EXPENDITURE (Contd.)

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	Rs.
B/f.	7,66,86,175
Leave Salary and Pension Contribution on account of personnel on Foreign Services	50,491
Training and Welfare Activities of Staff Members	1,239
Employees Welfare Scheme	1,231
Campus Amenities	38,626
G.P.F. Contribution etc.	52,19,131
Silver Jubilee Celebration	1,32,495
Chairman, Council of Wardens	5,580
Excess of Income over Expenditure	39,50,805

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TOTAL : 8,60,85,773

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

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1985

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INCOME (Contd.)

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B/f.

Rs.  
8,60,85,773

TOTAL :

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8,60,85,773

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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

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 Equipt.	9,91,78,771	
Technical Books and Journals per contra	15,55,480	10,07,34,251
Value of aid Alexander Van Humboldt Foundation	10,83,000	
Value of aid from German Volks Wagon Foundation	2,99,860	13,82,860
<b>Computer systems per contra :</b>		
As per last Balance Sheet		1,54,50,458
Capital Grants and balance of Income and Expenditure a/c as on 31-8-84	25,49,36,350	
<i>Add:</i> RSIC receipts per contra	1,13,641	
<i>Add:</i> Adjustment relating to 83-84 per contra.	6,92,412	
<i>Add:</i> Capital Grant during 84-85	2,37,32,000	
	27,94,74,403	
<i>Add:</i> Excess of income over Expenditure during 84-85	39,50,805	

C/o

28,34,25,208 12,87,84,831

TECHNOLOGY, MADRAS-600 036.

AS ON 31-3-1985

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 31-3-84	11,40,27,572		
Add: Buildings completed during the year	64,38,773		
	<u>11,40,27,572</u>	12,04,66,345	
Building under construction as on 31-3-84	53,91,477		
Add: Adjustment relating to 83-84 per contra	6,30,644		
	<u>53,91,477</u>		
Add: Expenditure for the year	59,58,143		
	<u>59,58,143</u>		
	1,19,80,264		
Less: Transferred to completed building account	64,38,773		
	<u>64,38,773</u>	55,41,491	
		<u>55,41,491</u>	12,60,07,836
Diesel Generator Equipment			2,14,232

C/o

13,74,39,330

INDIAN INSTITUTE OF  
BALANCE SHEET

CAPITAL FUND AND LIABILITIES (Contd.)

	Rs.	Rs.
B/f.	28,34,25,208	12,87,84,831
<i>Less</i> : Value of Equipment written off	71,213	
	28,33,53,995	28,33,53,995
Cost of projector etc. (Gymkhana) per contra		49,811
Endowment Fund (Governors Prize etc).		2,95,350
<b>Deposits :</b>		
EMD/ICC and other deposits	2,66,50,026	
Refund of Customs duty (projects)	4,21,000	
<b>New plan schemes emerging Technology approved by G. O. India</b>		
Opening Balance	73,67,615	
Receipts 84-85	22,00,000	
	95,67,615	
Payment for the year	61,77,196	
	33,90,419	3,04,61,445
<b>Sundry Creditors :</b>		
On works accounts	9,56,049	
For the supplies made for service rendered dept./Sec.	3,57,057	
	13,13,106	13,13,106
C/o.		44,42,58,538



TECHNOLOGY, MADRAS-600 036.

AS ON 31 3.1985

PROPERTY AND ASSETS (Contd.)

	B/f	Rs.
		13,74,39,330
Equipment. Furniture and fittings at cost as per B/s as at 31-3-84	7,32,86,574	
<i>Add:</i> Additions during the year	1,35,04,850	
<i>Add:</i> RSIC cost of improvement to office per contra	1,13,641	
	<u>8,69,05,065</u>	
<i>Less:</i> Cost of equipment written off during the year	34,032	<u>8,68,71,033</u>
<b>Computer acquired thro' German food aid funds under the Indo-German Agreement</b>		
At cost as per B/S as on 31-3-85		1,54,50,458
Block value of Equipment from Alexander Von Humboldt Foundation on 31-3-85	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 Equipment from W-Germany as per B/S as on 31-3-84	9,79,74,098	
<i>Add:</i> Additions during the year	12,04,673	<u>9,91,78,771</u>
Customs duty and clearance charges on equipment from W-Germany as per B/S on 31-3-84	2,85,07,976	
	<u>2,85,07,976</u>	<u>34,03,22,452</u>
C/o		

INDIAN INSTITUTE OF

BALANCE SHEET

CAPITAL FUND AND LIABILITIES

	B/f.	Rs.	Rs.
<b>Outstanding Expenses Payable :</b>			44,42,58,538
a) Pay and Allowances		30,33,475	
b) Scholarships		5,05,678	
c) Other Allowances Medical		74,305	
d) Wages to NMR labourers Dept./Section etc.		17,534	
e) Audit fees		50,000	
f) Stipend to apprentices		7,122	
g) Computer centre remuneration to staff		12,000	
		-----	37,00,114
P.F. contribution and interest payable			2,41,361
Computer receipts received in advance			47,486
<b>Grant-in-aid from American Chemical Society (per contra)</b>			
Balance as per last year balance sheet			1,10,934
			-----
	C/o.		44,83,58,433

TECHNOLOGY, MADRAS-600 036

AS ON 31.3.1985

PROPERTY AND ASSETS (Contd.)

	B/f.	Rs.	Rs.
		2,85,07,976	34,03,22,452
<i>Add</i> : Customs Duty paid during the year		40,39,518	
		<u>3,25,47,494</u>	
<i>Less</i> : Refund of Customs Duty		48,91,861	2,76,55,633
Mototor vehicles at cost as per balance as at 31.3.84		16,36,633	
<i>Add</i> : Additions during the year		1,24,344	17,60,977
Library book and Scientific Journals at cost as on 31 3.84		1,87,58,373	
<i>Add</i> : Additions during the year		28,88,634	2,16,47,007
Block value of Technical books Journals from West Germany as per balance sheet as at 31.3.84		15,41,113	
<i>Add</i> : Additions during the year		14,367	15,55,480
Typewriters and Duplicators at cost as per balance sheet as at 31.3.84		8,80,974	
<i>Add</i> : Additions during the year		1,71,725	
		<u>10,52,699</u>	
<i>Less</i> : Cost of Typewriters written-off during the year		15,980	10,36,719

C/o.

39,39,78,268

INDIAN INSTITUTE OF  
BALANCE SHEET

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CAPITAL FUND AND LIABILITIES (Contd.)

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	Rs.
B/f	44,83,58,433
Unpaid items as on 31-3-1985 as per Undisbursed Pay Register.	45,046

C/o

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44,84,03,479

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TECHNOLOGY, MADRAS-600 036

AS ON 31-3-1985

PROPERTY AND ASSETS(Contd.)

	B/f	Rs.	Rs.
Tools and Plants as at 31-3-1984		3,91,963	
<i>Add</i> : Additions during the year		1,17,370	
		<u>5,09,333</u>	
<i>Less</i> : Written-off during the year		19,460	
		<u>59,842</u>	4,89,873
Cycles at cost as per balance sheet as at 31-3-1984		59,842	
<i>Less</i> : Cost of Cycles written-off during the year		1,741	
		<u>58,101</u>	
<i>Add</i> : Additions during the year		10,950	
		<u>69,541</u>	69,541
Investment Account Endowment Fund Governor's prize etc. as on 31-3-85			2,95,350
<b>Stock as on 31-3-85</b>			57,15,255
Consumable stores with depts.			27,35,696
Construction materials with Engg. Unit work account			352
Guest House provisions			4,87,164
Stationery Articles			
Consumable store with Central stores Tyres and Tubes spares parts liveries etc.			36,226
UNESCO COUPONS			65,510

C/o

40,38,72,745

INDIAN INSTITUTE OF  
BALANCE SHEET

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CAPITAL FUND AND LIABILITIES (Contd.)

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	Rs.	Rs.
B/f.		44,84,03,479
<b>Industrial research and development fund account :</b>		
Balance as on 1.4.84 (as per separate statement of accounts)	7,57,877	
Add : Receipts of the year	51,29,892	
	58,87,769	
Less : Payments during the year	3,01,534	
	55,86,235	55,86,235
<b>Gymkhana management :</b>		
Opening Balance 1.4.84 as per the separate statement of accounts	16,253	
Add : Receipts of the year	6,88,238	
	7,04,491	
Less : Payments during the year	6,69,300	
	35,191	35,191

C/o.

45,40,24,905

TECHNOLOGY, MADRAS-600 036

AS ON 31.3.1985

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PROPERTY AND ASSETS (Contd.)

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	Rs.
B/f.	40,38,72,745
Projector and Tape recorders (Gymkhana Assets) at cost as per last year Balance Sheet	49,811
Grant receivable from Govt.	44,50,000
Licence Fees etc. recoverable	1,79,218
Fees recoverable	51,968
Income receivable for the computer centre	6,34,527
Hire charges of Institute vehicles etc. recoverable	7,692
Pre-paid taxes	27,468
Stamps on hand	8,872
Equipments procured from Grant-in-aid received from the American Chemical Society :-	
Balance carried over from last year	1,10,934

C/o.

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40,93,93,235

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INDIAN INSTITUTE OF

BALANCE SHEET

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CAPITAL FUND AND LIABILITIES (Contd)

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B/f.

Rs.  
45,40,24,905

C/o.

45,40,24,905

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TECHNOLOGY, MADRAS-600 036

AS ON 31-3-85

PROPERTY AND ASSETS (Contd.)

	B/f	Rs.	Rs.	Rs.
				40,93,93,235
<b>Advances and deposits</b>				
Works Advance				8,47,524
Central Supplies Unit (Advance recoverable)				5,00,000
Other: (General) Depts.				1,01,61,537
Tamil Nadu Electricity Board				3,75,800
Collector of Customs Air Cargo Complex			10,21,961	
Collector of Customs A/c No. I			2,87,370	
Collector of Customs A/c No. II			2,828	
			<u>          </u>	13,12,159
<b>Unpaid Balanced per contra with SBI of India A/c</b>				
Cash on hand UPD		45,046		
Imprest.		500		
		<u>          </u>	45,546	
Cash on hand (other than 'C' a/c)		21,604		
With SB of India (other than IRD Fund a/c)		2,53,48,098		
With IIT P.O. Savings a/c		3,97,976		
		<u>          </u>	2,57,67,678	
With SBI IRD Fund			55,86,235	
With SBI Gymkhana management a/c.			35,191	
			<u>          </u>	3,14,34,650

C/o

45,40,24,905

INDIAN INSTITUTE OF

BALANCE SHEET

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CAPITAL FUND AND LIABILITIES (Contd.)

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B/f.

Rs.  
45,40,24,905

TOTAL Rs.

45,40,24,905

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

TECHNOLOGY, MADRAS-600 036.

AS ON 31-3-85

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PROPERTY AND ASSETS (Contd.)

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	Rs.
B/f.	45,40,24,905
Earnest Money, Caution and other Deposits	2,66,50,026
New Plan Schemes	33,90,419
	<hr/>
	3,00,40,445
Less : Drawn from refundable deposits	42,72,767
	<hr/>
	2,57,67,678
	<hr/>

TOTAL Rs.

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45,40,24,905

*Registrar*

Indian Institute of Technology  
Madras-600 036.

*Director*

Indian Institute of Technology  
Madras-600 036.

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

---

RECEIPTS

---

	Rs.
<b>Opening Balance</b>	1,93,96,902
<b>Receipts on Capital Account</b>	
Grant From Government of India on Capital Account	2,37,32,000
<b>Other Capital Receipts</b>	
Refunds of Customs Duty	48,91,861
Refunds of Customs Duty (Projects)	4,21,000

C/o

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4,84,41,763

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TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1984-85

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PAYMENTS

---

	Rs.	Rs.
<b>On Capital Account</b>		
(i) Building and Works		65,66,880
(ii) (a) Equipments Furniture and Fittings:		
<b>Departments :</b>		
(1) Chemistry	1,43,311	
(2) Physics	2,60,851	
(3) Mathematics	7,936	
(4) Humanities & Social Sciences	22,319	
(5) Civil Engineering	1,99,531	
(6) Mechanical Engineering	2,48,813	
(7) Electrical Engineering	2,30,543	
(8) Chemical Engineering	1,14,951	
(9) Metallurgical Eng.	1,44,865	
(10) Applied Mechanics	1,27,240	
(11) Aeronautical Engineering	88,998	
(12) Computer Science and Engineering	20,86,370	
	<hr/>	36,75,728
(b) Central Service Units		2,33,322

C/o

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1,04,75,930

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INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

RECEIPTS (Contd.)

	Rs.	Rs.
B/f		4,84,41,763
<b>Grant from Government of India :</b>		
On Revenue Account		7,72,96,000
<b>Receipts from Academic Section :</b>		
Tuition Fees	4,88,981	
Hostel Seat Rent	2,39,619	
Gymkhana Management	49,940	
Students and Amenities Fund	37,089	
Medical Fees	17,480	
Fines	6,891	
Examination Fees	59,4000	
Degree in Absentia	1,090	
Thesis Fee	12,100	
	—————	9,12,590
<b>Other Receipts :</b>		
Application Fees from Students	16,30,189	
Application Fees for Posts in Institute	2,180	
Admission Fees	9,892	
Grade Card	18,924	
Institute Bus Collection	5,01,827	
Hire Charges on Institute Vehicles	32,888	
Library over due Collection	62,172	
Institute Day & Association Fees	4,830	
Library Membership Fee	47,405	
Migration Certificate	135	
	—————	23,10,442
	—————	12,89,60,795
C/o		

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1984-85

PAYMENTS (Contd.)

	B/f	Rs.	Rs.
			1,04,75,930
<b>d) Research Centres :</b>			
Engineering Design Centre		25,222	
Regional Sophisticated Instrumentation Centre		76,829	
Composite Structure FRP Research Centre		1,85,128	
Energy Research Centre		77,164	
Material Science Research Centre		75,292	
Inter University Partnership Projects		1,20,225	
T.V. Engineering Lab		1,59,764	
			<u>7,19,634</u>
e) Central Workshops			41,026
f) Ocean Engineering Centre			1,96,822
g) Centre for Rural Development			2,15,569
h) Replacement of Obsolete Equip.			70,74,121
i) Sub-centre in Cryogenic Engg.			38,977
j) Bio-Science & Bio-Technology			1,35,934
k) Naval Architecture			1,15,996
l) Capital Equipments for Departments by rotation			2,90,991
m) Microprocessor Lab			165
<b>Customs Duty on West Germany Equipment</b>			
Customs Duty		38,77,087	
Clearance Charges		1,71,930	
			<u>40,49,017</u>
<b>Furniture and Fittings :</b>			
Office, Library, etc.		8,50,646	
Utensils of Hostels		94,900	
			<u>9,45,546</u>
			<u>2,42,99,728</u>
	C/o		

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

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RECEIPTS (Contd.)

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	B, f	
		12,89,60,795
Short Term and other Courses		26,459
Miscellaneous Receipts		4,74,905
Breakages from students		10
Hire Charges for Gowns		1,760
Guest House Boarding Charges		15,061
Subscription to Journal of Mathematical & Physical Sciences & Sale Proceeds of Institute Publications		53,606
Hostel Establishment Charges Receipts for Students		24,162
Interest on Conveyance Advance		21,765
Interest on Deposit from TNEB		17,592
Interest on Call deposits with SBI and Endowments		5,83,752
Interest on F. F. Investments		20,25,910
Interest on House Building Advance		404
Furniture Hire Charges		2,787
Central Photographic Section		8,663
Silver Jubilee Receipts		75,475
Publication of year book		240

C/o

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13,22,93,346



TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1984-85

PAYMENTS (Contd)		
	B/f.	2,42,99,728
<b>(v) Library :</b>		
a) Books	6,25,448	
b) Journals & Back Volumes	23,25,810	
c) Equipment	1,28,369	
d) Film Media Resources	7,600	
	<u>          </u>	30,87,227
<b>(vi) Others :</b>		
Motor Vehicles	2,87,986	
Cycles	10,950	
Typewriters and Duplicators	1,71,725	
Hospital Equipment	4,417	
	<u>          </u>	4,75,078
(vii) Silver Jubilee Celebrations		74,604
(viii) Campus Amenities		51,270
	<u>          </u>	<u>          </u>
	C/o	2,79,87,907



TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1984-85

PAYMENTS (Contd.)

	Rs.	Rs.
	B/F	2,79,87,907
<b>Revenue Account :</b>		
i) Academic Section :		
Pay & Allowances of Teaching Staff		
1. Chemistry	14,66,091	
2. Physics	14,65,774	
3. Mathematics	9,87,145	
4. Humanities & Social Sciences	7,29,743	
5. Civil Engineering	13,88,188	
6. Mechanical Engineering	24,51,493	
7. Electrical Engineering	22,22,812	
8. Chemical Engineering	10,02,987	
9. Metallurgical Eng.	9,68,393	
10. Applied Mechanics	9,57,635	
11. Aeronautical Engineering	7,00,866	
12. Computer Science & Engg.	8,09,212	
	-----	1,51,50,339
ii) Pay & Allowances of Non-Teaching Staff :		
1. Chemistry	5,26,669	
2. Physics	9,15,917	
3. Mathematics	82,207	
4. Humanities & Social Sciences	1,91,117	
5. Civil Engineering	9,72,347	
6. Mechanical Engineering	15,16,663	

C/o

42,04,920

4,31,38,246

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

RECEIPTS (Contd.)

	B/f	Rs.	Rs
<b>Deposits:</b>			14,54,54,123
Contractors Deposits (Works)		8,61,284	
Suppliers Deposits (Instt.)		2,02,554	
External Scholarship		6,71,720	
C.S.I.R.		4,43,561	
Students Caution Deposits		38,799	
New plan Schemes, etc.		1,14,38,448	
Miscellaneous Deposits		10,07,340	
QIP and CSD Schemes		11,78,800	
I.C. & S.R. Projects		1,78,58,323	
R.S.I.C. Receipts		63,268	
Library Deposits		76,609	
Students aid & Welfare Fund Receipts from Students		23,131	
Alumini Association		53,715	
Interest on Endowments		17,472	
		3,39,35,024	

C/o

17,93,89,147

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1984-85

PAYMENTS (Contd.)

	B/f	Rs.	Rs.
		42,04,920	4,31,38,246
7. Chemical Engineering		5,86,519	
8. Electrical Engineering		12,08,280	
9. Metallurgical Eng.		6,78,997	
10. Applied Mechanics		5,01,764	
11. Aeronautical Engineering		3,88,580	
12. Computer Science and Engineering		4,51,132	
			80,20,192
<b>(iii) Departmental Expenses:</b>			
1. Chemistry		4,97,856	
2. Physics		5,12,794	
3. Mathematics		46,350	
4. Humanities and Social Science		76,972	
5. Civil Engineering		3,43,819	
6. Mechanical Engineering		7,86,035	
7. Electrical Engineering		6,08,402	
8. Chemical Engineering		3,79,183	
9. Metallurgical Eng.		5,66,551	
10. Applied Mechanics		3,44,610	
11. Aeronautical Engineering		3,31,709	
12. Computer Science & Engg.		27,52,656	
			72,46,937
Indo-German Projects (P&A)			2,06,719
Micro-processor Lab.			9,530
			5,86,21,624
	C/o		

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

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RECEIPTS (Contd.)

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B/F

Rs.

17,93,89,147

C/o.

17,93,89,147

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TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1984-85.

PAYMENTS (Contd.)

B/f.	Rs.	Rs.
		5,86,21,624
<b>Library :</b>		
Pay and Allowances — Officers	2,26,779	
Pay and Allowances — Estt.	10,64,885	
Journal of General Interest	2,151	
Contingencies Operating Cost	36,424	
Binding Charges	54,550	
Library NMR Charges	12,065	
	<u>          </u>	13,96,854
<b>Ocean Engineering :</b>		
Pay and Allowances — Officers	6,94,557	
Pay and Allowances — Establishment	2,80,040	
Other Charges	4,70,834	
	<u>          </u>	14,45,431
<b>Research Centres :</b>		
Pay and Allowances — Officers	6,70,185	
Pay and Allowances — Establishment	8,34,095	
	<u>          </u>	15,04,280
<b>Central Services :</b>		
Pay and Allowances — Officers	87,872	
Pay and Allowances — Establishment	20,22,031	
Working Expenses : Tools and other consumables	1,80,698	
	<u>          </u>	22,90,601
<b>Central Electronic Centre :</b>		
Pay and Allowances		2,24,866
		<u>          </u>
	C/o.	6,54,83,65

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

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RECEIPTS (Contd.)

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	Rs.
B/f.	17,93,89,147

C/o.

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17,93,89,147



TECHNOLOGY, MADRAS-600 036

ACCOUNTS FOR THE YEAR 1984-85.

PAYMENTS (Contd.)

	Rs.
B/f.	6,54,83,656
<b>Air Conditioning Unit :</b>	
Pay and Allowances	1,87,239
Stipend for Apprentices	75,189
<b>Centres etc. :</b>	
Regional Sophisticated Instrumentation Centre	1,27,923
Electron Microscope Lab	21,050
(Instruments Servicing & Development Centre) CEC	1,25,030
Central Photographic Section	63,805
Central Glass Blowing Section	41,598
Air Conditioning Unit	1,46,497
X-Ray Diffraction Laboratory	43,298
Energy Research Centre	23,106
Centre for Rural Development	1,45,129
Fibre Reinforced Plastic Research Centre	1,16,210
Bio-Science and Bio Technology	83,949
Naval Architecture	1,32,811
Sub-centre in Cryogenic Engineering	26,033
Television Engineering Lab.	1,87,602
Engineering Design Centre	1,40,634
Material Science Research Centre	1,86,209
Indo-German Project	2,15,388
Cultural Exchange between IIT, Madras & Other Nations	6,994
C/o.	6,75,79,350

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

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RECEIPTS (Contd.)

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	Rs.
B/f.	17,93,89,147

C/o.	<u>17,93,89,147</u>
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TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1984-85

PAYMENTS (Contd.)

	Rs.	Rs.
B/f.		6,75,79,350
<b>Institute Scholarships :</b>		
Post Graduate and Research	44,14,520	
Under Graduate	5,59,813	
	<u>          </u>	49,74,333
<b>N. C. C. :</b>		
Pay and Allownces	39,676	
Other Expenditure	27,462	
<b>N. S. S.</b>	24,983	
	<u>          </u>	92,121
<b>Athletic &amp; Gymkhana :</b>		
Transfer of Funds to Gymkhana Management & other Gymkhana items		4,88,677
<b>Other Items :</b>		
Part-time Lecturers		21,040
Visiting Professors		24,295
Technical Bulletins & Journals		47,967
Guidance & Counselling Unit		21,024
Symposia and Seminars		22,433
Inplant Training/Courses/Visits		52,119
Visit of Students to West Germany		56,244
Continuing Education Programme Organised by the Institute		71,256
Quality Improvement Programme		16,063
H. A. L. Trainees		1,00,647
Director's Discretionary Fund for Research		1,19,389
Membership to outside bodies		45,300
Remuneration to external examiners		67,057
		<u>          </u>
C/o.		7,37,99,315

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

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RECEIPTS

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	Rs.
B/f	17,93,89,147

C/o

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17,93,89,147

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TECHNOLOGY, MADRAS-600036.

ACCOUNTS FOR THE YEAR 1984-85

PAYMENTS		Rs.	Rs.
	B/f		7,37,99,315
Convocation			99,016
Prizes for Academic Distinction			13,687
Joint Entrance Examination			7,06,322
Common Examination for Post-Graduate Admission (CEPA)/			
Graduate Aptitude Test in Engg. (GATE)			14,62,065
Contribution towards Institute Participation of			
Programme of National conference			47,000
JEE Special coaching programme for			
SC/ST Students (1984-85)			89,307
<b>Hostels:</b>			
Allowances to Wardens		9,576	
Subsidy to Hostels		21,06,565	
		-----	21,16,141
<b>Other Sections:</b>			
<b>(a) Central Administration:</b>			
Pay and Allowances - Officers		11,85,428	
Pay and Allowances - Others		52,42,166	
		-----	64,27,594
<b>(b) Contingencies:</b>			
Postage		2,65,226	
Entertainment		54,839	
Telephones		9,26,273	
Liveries		38,161	
Stationery		8,94,580	
Printing		2,15,838	
Advertisement		4,34,976	
Miscellaneous Expenses		4,43,059	
		-----	32,72,952
			-----
	C/o		8,80,33,399

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

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RECEIPTS (Contd.)

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	Rs.
B/f.	17,93,89,147

C/o.	<u>17,93,89,147</u>
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TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1984-85

PAYMENTS (Contd.)		Rs.	Rs.
	B/f.		8,80,33,399
<b>c) Other Items :</b>			
	Director's Discretionary Fund Payments	6,960	
	Recoveries (Less)	2,975	
		<u>          </u>	3,985
<b>d) Stores :</b>			
	Pay and Allowances — Officers	89,501	
	Pay and Allowances — Others	4,92,503	
		<u>          </u>	5,82,004
<b>General Stores :</b>			
	Purchases	41,542	
	Less: Issues	38,242	
		<u>          </u>	3,300
	Security — Other Charges	14,588	
	Special Security Guards	3,45,565	
		<u>          </u>	3,60,153
<b>Lawns and Gardens :</b>			
	Pay and Allowances of Horticulture Superintendent	32,727	
	Pay and Allowances — Others	1,53,371	
		<u>          </u>	1,86,098
	Power		33,96,657
	Mosquito Control		13,042
	Water		5,10,160
	Oil and Petrol		2,56,089
			<u>          </u>
			9,33 44,887
	C/o.		

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

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RECEIPTS (Contd.)

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B/f

Rs.  
17,93,89,147

C/o

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17,93,89,147

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TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1984-85

PAYMENTS (Contd.)

	Rs.	Rs.
B/f		9,33,44,887
<b>Repairs and Maintenance</b>		
Vehicles	2,12,917	
Furniture	3,77,084	
Typewriter/Duplicator	57,529	
Duty, Insurance and Road Taxes	82,384	
Fire fighting operating cost	4,896	
	-----	7,34,810
Silver Jubilee		1,31,533
<b>Works and Maintenance</b>		
Pay and Allowances (Officers)	1,38,676	
Pay and Allowances (Others)	46,37,017	
Other Expenditure on Maintenance	41,43,613	
	-----	89,19,306
Property Tax		9,87,376
<b>Hospital</b>		
Pay and Allowances (Medical Officer)	2,12,656	
Pay and Allowances (Others)	3,72,445	
Purchase of Medicines etc.	7,24,414	
	-----	13,09,515
Subsidy to Vanavani School		1,73,980
Audit Charges		62,085
Legal Expenses		52,700
Reimbursement of Stamp Duty		41,700
		-----
C/o		10,57,57,892

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

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RECEIPTS (Contd.)

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B/f.

Rs.  
17,93,89,147

C/o

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17,93,89,147

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INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

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RECEIPTS (Contd.)

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B/f.

Rs.  
17,93,89,147

C/o

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17,93,89,147

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TECHNOLOGY, MADRAS-600 036

ACCOUNTS FOR THE YEAR 1984-85

PAYMENTS (Contd.)

	B/f.	Rs.	Rs.
			10,60,65,932
Campus Amenities			39,166
<b>Provident Fund/Gratuity/Pension</b>			
CPF (Contribution and Interest)		3,91,101	
CPF-cum-Gratuity (Contribution and interest)		46,21,028	
GPF-cum-pension-cum-Gratuity		1,51,020	
Gratuity and Pension		8,75,864	
			<u>60,39,013</u>
<b>Advances</b>			
Motor car and other conveyance		4,55,425	
Customs Duty on Equipment from W. Germany		34,00,000	
Customs Duty (Non-Plan)		12,00,000	
Festival Advance		1,95,275	
Other Misc Advance		10,41,961	
Drought Advance		7,91,616	
House Building Advance		14,94,951	
			<u>85,79,228</u>

C/o

12,07,23,339

INDIAN INSTITUTE OF  
RECEIPTS AND PAYMENTS

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RECEIPTS (Contd.)

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B/f.

Rs.  
17,93,89,147

TOTAL : Rs.

17,93,89,147

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

TECHNOLOGY, MADRAS-600 036

ACCOUNTS FOR THE YEAR 1984-85

PAYMENTS (Contd.)

	B/f.	Rs.	Rs.
			12,07,23,339
<b>Refund of Deposits</b>		2,64,521	
Suppliers Deposits (Institute)		8,73,912	
Contractors Deposits (Works)		7,02,288	
External Scholarship		8,20,957	
CSIR		27,86,229	
Misc Deposit		21,525	
Students Caution Deposit		200	
Library Deposit		85,11,379	
Microprocessor Laboratory Centre, etc.			
QIP Programme organised by		16,34,951	
Government of India, CSD (Defence)		1,76,63,523	
Industrial Consultancy work and projects		1,13,642	
RSIC payments		5,003	
Interest on Endowments		<u>          </u>	3,28,98,130
<b>Closing Balance</b>		21,604	
Cash in hand		2,53,48,098	
With SBI		3,97,976	
Savings Bank account (IITPO)		<u>          </u>	2,57,67,678
			<u>          </u>
			17,93,89,147
		TOTAL : Rs.	

*Registrar*  
Indian Institute of Technology  
Madras-600 036

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

