TWENTY EIGHTH
ANNUAL REPORT

1986-87

INDIAN INSTITUTE OF TECHNOLOGY
MADRAS

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SECRETARY

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Dean of Admn. and Registrar

REPORT BY THE DIRECTOR

for the period

APRIL 1986 TO MARCH1987

This report attempts to give details of some of the major activities of the Institute during the year under report.

Student Strength

There were 1084 undergraduate students and 910 post - graduate students and research scholars at the Institute.

Awards to Faculty

Dr. V. Ramamurthi, Professor, Applied Mechanics Department, won the Vasvik Research Awards for 1983 in the category of Mechanical Sciences and Technology.

The Central Board of Irrigation & Power, New Delhi, awarded a Gold Medal to the paper entitled "Aerodynamic Characteristics of 'S' Blade Profiles" authored by Dr. H. C. Radhakrishna, Professor, Mechanical Engineering Department, Dr. P. A. Aswathanarayana, Applied Mechanics Department and Dr Rm. Ramachandran, Project Officer of the DST Project.

Dr. K A. Padmanabhan, Professor, Metallurgical Engineering Department, has been elected a Fellow of the Institution of Engineers (India).

Dr. D.R G. Achar, Associate Professor, Metallurgical Engineering Department, along with coauthors from Welding Research Institute, Trichy received the Govindaraj Memorial Award for the research paper presented during the National Welding Seminar 1985 at Calcutta. The award carries a cash prize of Rs. 2000/- and a certificate of merit.

The Indian Institute of Metals, Calcutta, has awarded the Bihani Gold Medal for the best technical paper in non-ferrous group published in the Transactions in the year 1985, to Dr. D.G.R. Sharma, Lecturer, Metallurgical Engineering Department, the principal author. The title of the paper is "Computer Simulation of Solidification with Feed Metal Transfer", which is co-authored by Dr. O. Prabhakar, Professor, Metallurgical Engineering Department.

Dr. S. R. Sivaraja Iyer, Emeritus Professor, Department of Chemistry, has been given the prestigious Hari Om Award (1986) for his outstanding contributions to the Physical Chemistry and Thermodynamics of Absorption in Dye-Textile Fibre Systems.

Paper entitled "Condition Monitoring — Condition Based Maintenance" by Dr. B. V. A. Rao, Professor, Applied Mechanics Department, published in March 1985 has been selected for the Prize Award "The Corpa of Electrical and Mechanical Engineers Prize for 1985-86 by the Institution of Engineers (India).

The National Council of the Indian Institution of Industrial Engineering Journal has awarded the National Award 1986 for the best article in Non-traditional Area to the Technical Paper entitled "Accident Analysis in Ferrous Foundries" published by Shri M. Lakshmanan, Research Scholar, Dr. O.V. Krishnaiah Chetty, Asst. Professor, Mechanical Engineering Department and Prof. E. Unnikrishnan, NITIE. Bombay.

Dr. K. K Balasubramanian, Asst. Professor, Chemistry Department, has been awarded the "Prof T. R. Govindachari 60th Birthday Commemoration Award" for the year 1985—86.

AWARDS TO STUDENTS

Shri A. G. Ramakrishnan, Ph D Research Scholar, Bio-medical Engineering Division, Applied Mechanics Department, won the "Thangam Vasudevan Best Student Paper Award" of the Indian Association of Biomedical Scientists during their annual conference in Tirupathi in December 1985.

Dr. S Ramaprabhu, Senior Project Officer, Physics Department, won the Alexander Von Humboldt Fellowship

The undermentioned research papers presented by M. Balasubramanin, B. Ramesh Babu and Alice Sebastian, Research Scholars. Department of Chemistry, at the All India Chemists Convention held in November 1985, have been awarded the certificates of merit :

1. Studies in the Synthesis of Pentacyclic Polythene Systems
2. Synthesis of Novel Tetracyclic and Pentacyclic heterocyclic compounds
3 Investigation concerning the total synthesis of 12-thiosteroids.

The Ph.D. thesis entitled "Investigations on the Ultimate Strength and Behaviour of Conical and Spherical Shell Foundations under Vertical Loads and Moments" submitted by Dr. Syed Hussain Shah under the guidance of Prof. Nainan P. Kurian, Civil Engineering Department, has been awarded Prof. Leonard's Prize, instituted through the Indian Geotechnical Society for the best Doctoral thesis In Geotechnical Engineering submitted in India in 1985.

12th All India Machine Tool Design and Research Conference, IIT New Delhi, 1986, presented the Best Paper Award on Machine Tool Analysis to Shri N. G. S Udupa, Dr. M. S. Shunmugam and Prof V. Radhakrishnan, Mechanical Engineering Department, for their paper entitled "Process Monitoring in Centreless Grinding for out of Roundness and surface Finish Criteria."

Out of 12 Teams participated in the METQUIZ — National Metallurgy Quiz Contest—conducted by the Indian Institute of Metals, Nagpur Chapter and the Metallurgical Engineering Department, Visvesvaraya Regional College of Engineering. Nagpur, on 12th and 13th December 1986 at Nagpur, IIT Madras Team comprising of Sridharlal and Rajendrakumar (IV-Met) Won the second prize. The prize amount of Rs. 1002/- is being shared by the two students.

Kum. S. Jayashree, Mr. P. Vinod Menon and Mr. Thomas Uday Singh of II M Sc. class have secured the FIRST, SECOND AND THIRD prizes in thc Annual Chemistry Quiz conducted by Royal Society of Chemistry, Madras Chapter.

Miss. R. Kokila, Research Scholar, Humanities and Social Sciences Department, has been awarded the Olive. I. Reddick Prize for the best paper presented at last year's Indian Association of American Studies Conference.

Shri Philip Samuel, M. S. Scholar, Aeronautical Engineering Department, has been awarded Special Prize during the student seminar held by Aeronautical Association Madras Institute of Technology, Madras, on 27th February 1987.

NEW FACILITIES

Humanities and Social Sciences

Aurelec 'Local Area Network' computer system with a PC/AT as file server and 3 PC's as workstations.

Regional Sophisticated Instrumentation Centre

A new Matrix Isolation Equipment for Infrared and Raman studies have been installed through a project for Prof. Surjit Singh from M/s. Volkswagen Co., West Germany.

Materials Science Research Centre

A low speed Diamond Wheel Saw to cut fragile single crystals and ceramics materials has been procured (South Bay Tech. Inc., U.S.A.).

CENTRE FOR CONTINUING EDUCATION

Continuing Education Programmes in the areas of Quality Improvement, Short and Long Term Courses uuder QIP, ISTE and similar Agencies, Curriculum Development in the fields of Mechanical Engineering and Chemical Engineering, etc. have all been merged into a single Centre called Centre for Continuing Education (CCE). Dr. K. A. Padmanabhan, Professor, Metallurgical Engineering Department, was nominated as the Chairman of the Centre for a period of two years.

AGE REFERENCE CENTRE

The Geotechnical Engineering Division of thc Civil Engineering Department has been selected as an Asian Geotechnical Engineering (AGE) Reference Centre. The Centre has already started functioning with Dr. Nainan P. Kurian, Professor, as Co-ordinator. AGE is an organisation based at the Asian Institute of Technology, Bangkok, committed to the collection of dissemination of geotechnical information pertaining to the Asian Region.

IMPLEMENTATION OF FORTRAN IV (G) COMPILING FACILITY UNDER VM / 370 (IPL-4443 INTERACTIVE SYSTEM)

FORTRAN IV (G) Compiler has been implemented under CMS of VM/370 System. Programs written in FORTRAN IV with G level syntax can now be compiled, link edited with libraries and then executed under CMS. The source file should be of FORTRAN type. Some of the highlights of the Compiler are:

i) FORTRAN IV G Syntex is fully supported.

ii) Unit numbers upto 25 are supported.

iii) Object version of the program can be saved.

iv) User can supply his library (TEXT version) for linkage purposes.

v) Final executable module can be saved as MODULE file for future and repeated use.

vi) Debugging is easy and routed to screen. Supports TRACE, SUBCHK, SUBTRACE, etc. as per FORTRAN G Syntex.

CONVOCATION

The Twentythird Convocation was held on 25th July 1986 in the Student's Activities Centre. Prof. C.N.R. Rao, Director, Indian Institute of Science, Bangalore, delivered the Convocation Address. At this Convocation 218 B. Tech , 311 M. Tech., 47 M. Sc., 53 M.S. and 85 Ph. D. degrees were awarded.

INDUSTRIAL CONSULTANCY AND SPONSORED RESEARCH

Consultancy activities continued to be on the lines similar to previous years. The earnings for the year was Rs. 65 lakhs.

There was tremendous increase in the sponsored research activities showing a tremendous growth with the grants rising to the tune of Rs. 33 million, agencies like Department of Electronics and ARDB sponsoring quite a few large value projects.

PATENTS

Three patents were issued in the name of the Institute and two patent application were made during the year.

SEMINARS/CONFERENCES

Department of Humanities and Social Sciences

The following international conference and courses were held in the Department during the year 1986-87 :—

1) Short-term course on Physics of Materials conducted by the APSO 5—12—86 to 19—12—86

2) Laser Applications in Spectroscopy and Optics (LASO) 5—1—87 to 10—1—87.

Department of Chemical Engineering

All India Chemical Engineering Students' Congress was organised in the Institute on January 17, 18 and 19th. The Institute has sponsored the event. In all, eighty papers were pressented by the students belonging to the 20 institutes offering UG chemical engineering courses. A technical QUIZ, a design competition and a debate were part of the congress. The paper entitled "Computer Aided Design of Multiequipment Distillation Colums" by V. Kumaran and B. D. Ramani, VIII Semester students of Chemical Engineering, IIT Madras is one of the three highly commended papers. Anna University, CSIR, Institute of Chemical Engineers, Madras Chapter and Ms Enviro Tech. have generously cosponsored the congress.

The Proceedings of the International Symposium on Particulate Science and Tecnnology, held at IIT Madras during December 1982, has been brough out in the form of a Book entitled "Advance in Particulate Technology". The Book was edited by Dr. M. Ramanujam with the assistance of Dr. R. Vedaraman, Dr. T. K. Ramanujam and Dr. D. V. S. Murthy.

STAFF MATTERS

Dr. D. R. G. Achar, Associate Professor, Metallurgical Engiaeering Department, was nominated to be the Chairman of the Organizing Committee of the National Welding Seminar 1986 by the Indian Institute of Welding, Madras Branch.

Shri V. N. Shukla, Design Engineer, Microprocessor Systems Laboratory, Centre for Systems and Devices, is inducted as a Member of the National Steering Committee for the Centre for Digital Techniques in Broadcasting in India, a UNDP assisted scheme of AIR/TV Research Department.

A paper titled "A Novel Electrochemical Isomerisation of cis-cinnamyl alcohole to trans-cinnamyl alcohols by K Shyamsundar, K. K. Balasubramanian and C S. Venkatachalam was accepted for presentation at the International Symposium Electroorganic Synthesis, held at Karashiki, Japan, during October 31 — November 3, 1986.

Dr. D. Srinivasan, Visiting Professor, Ocean Engineering Centre, has been nominated by the CSIR Governing Council to be a Member of the CSIR Physical Research Committee for a further period of three years.

Shri N. Malayalam, Executive Engineer, has successfully completed the International Advanced Course on Water Resources Management with high proficiency organized by the Ministry of Foreign Affairs, Department for Cooperation and Development, Italy, from 27th January to 27th June 1986.

Prof D. Johnson Victor, Civil Engineering Department, was invited to be Chairman for a Technical Session and also to present a paper at the 13th ARRB/5th REAAA Combined Conference at Adelaide, Australia, during August 25 — 29, 1986.

The paper entitled "Electrochemical Behaviour of 2, 4—dinitro and 2, 4, 6—trinitro diphenylamines in dipolar aprotic media" by V. John Koshy, C. S. Venkatachalam and C. Kalidas, Chemistry Department, published in Electrochemical Society Journal **34**, 81—87 (1985) has been adjudged as the best paper for 1985 at the annual meeting of the Electrochemical Society of India (ECSI) held during August 18—22, 1986 at Indian Institute of Science, Bangalore.

A Book on "Thermodynamics for Students of Chemistry" (Vishal Publishers, New Delhi) has been published by Prof. J. Rajaram and Prof. J. C. Kuriacose, Chemistry Department.

Shri C. Sivaprasada Rao, Senior Techno-Economic Officer IC & SR, has been elected to the following two sub-committees of Indian Institute of Chemical Engineers, Calcutta, at its annual sessions held on 22nd December 1986:

(i) Industry-Research Education Coordination Committee.

(ii) Publication Committes for the year 1986—87.

Prof. J. P. Raina and Prof. M. Mukunda Rao, Electrical Engineering Department, were elected as Chairman and Honorary Secretary respectively of the Institution of Electronics and Telecommunication Engineers (India), Madras Centre, for the year 1986—87.

CONCLUSION

Over the years, the Institute has attained a prominent position among the Institutions of its kind not only within the country but also abroad. The credit for this goes primarily to the Members of the faculty and Scientific Staff who have maintained very high standards in their academic pursuits. The Contribution of the administrative and supporting staff to make this possible are also noteworthy. They will not rest on their laurels but shall rededicate themselves to the tasks ahead in realizing the objectives of the Institute in the years to come.

DETAILS OF THE REPORT

Admissions, Award of Degrees and Prizes

Student Admission 1986-87

The number of students and scholars admitted to various courses (1986-87) is given in Table-1.

TABLE 1

ADMISSION 1986-87

Sl. No.	Department	B. Tech	M. Tech	M Sc.	MS	Ph.D.	Total
1.	Aeronautical Engineering	16	7	...	1	4	28
2.	Applied Mechanics	...	14	...	9	4	27
3.	Chemical Engineering	33	20	...	1	10	64
4.	Chemistry	...	...	18	...	12	30
5.	Civil Engineering	35	37	...	8	10	90
6.	Computer Science & Engg.	28	28	...	5	3	64
7.	Electrical Engineering	62	49	...	9	10	130
8.	Humanities & Soc. Sciences	...	17	...	2	3	22
9.	Mathematics	...	...	18	...	3	21
10.	Mechanical Engineering	68	74	...	12	20	174
11.	Metallurgical Engineering	24	11	...	4	11	50
12.	Naval Architecture	15	...	...	...	...	15
13.	Ocean Engineering	...	14	...	4	5	23
14.	Physics (solid State Tech)*	...	5*	21	...	7	33
	Total	281	276	57	55	102	771

The total 771 includes the following :

Foreign Nationals	6	Sponsored Candidates	43
Scheduled Castes	61	External Registration	18
Scheduled Tribes	8	Project Staff	15
Women	58		
QIP Scholars	25		

Degrees Awarded

The number of degrees awarded at the Twenty-third Convocation of the Institute on 25th July 1986 is given below in Table 2. Dr. C.N.R. Rao, delivered the Convocation address.

Table 2

NUMBER OF DEGREES AWARDED

Sl. No.	Discipline	B Sc. (TA)	B Tech.	M Tech.	M.Sc.	M.S.	Ph.D.	Total
1.	Aeronautical Engineering	...	12	41	...	3	5	61
2.	Applied Machanics	...	...	10	...	6	4	20
3.	Chemical Engineering	...	27	22	...	5	3	57
4.	Chemistry	...	...	...	21	...	11	32
5.	Civil Engineering	...	21	50	...	3	6	80
6.	Computer Science & Engg.	...	16	25	...	4	2	47
7.	Electrical Engineering	...	59	51	...	10	7	127
8.	Humanities & Soc. Sciences	...	...	28	...	6	5	39
9.	Mathematics	...	...	...	14	...	7	21
10.	Mechanical Engineering	...	57	63	...	6	15	141
11.	Metallurgical Engineering	...	15	10	...	2	4	31
12.	Naval Architecture	...	11	...	...	...	...	11
13.	Ocean Engineering	...	...	6	...	8	1	15
14.	Physics	...	...	5	1	...	15	32
		2	...	...	...	...	...	2
	Total	2	218	311	47	53	85	716

With this Convocation in July 1986 the number of degrees awarded so far by the Institute is :

B.Sc. (TA)	20	DIIT	245
B. Tech.	5645	M. S.	524
M. Tech.	3471	Ph. D.	979
M.Sc.	812		

Grand Total : 11696

PRIZES

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

1. PRESIDENT OF INDIA PRIZE:

(For the student of the B. Tech. Degree courses with the best Academic Record) — Shri. B. Narendran
B.Tech. (Computer Science and Engineering)

2. GOVERNOR'S PRIZE:

(For all round proficiency in B. Tech. degree course/curricular and Extra Curricular) — Shri. Hathiram Daraius K.
B. Tech. (Electrical Engineertng (Power)

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

B. TECH. COURSE:

Civil Engineering	Shri. Ajay Singhal
Metallurgical Engineering	Shri. Srinivasan K.
Naval Architecture	Shri Ponnappa Kalappa B.
Electrical Engineering (Electronics) (Philips India Prize)	Shri. Rajiv Vijayan
Electrical Engineering (Power) (Siemens Prize)	Shri. Sekar R. C.
Mechanical Engineering (Banco Foundation Prize)	Shri. Arun R. S.
Chemical Engineering (Reliance Heat Transfer (P) Limited Prize)	Shri. Sudhakar P.
Aeronautical Engineering (HAL Prize)	Shri. Balasubramaniya T. N.
Computer Science & Engineering (Alumni Association Prize)	Shri. Narendran B.

M. TECH COURSE:

Civil Engineering	Shri. Venkataramanamurthy Challa
Engineering Mechanics	Shri. Krishnan P. A.
Maintenance Engineering and Management	Shri. Radhakrishnan K. N.
Ocean Engineering	Shri. Rivankar Shashikant Vinayak
Solid State Technology	Shri. Sadhana Vasudeva Madhyastha
Electrical Engineering (Siemens Prize)	Miss. Mini Paul T.
Mechanical Engineering (Prof. B. Sengupto Prize)	Shri. Chinchanikar Suneel Anant
Electrical Engineering (Television) (Prof. A. Achim Bopp Prize)	Miss. Lillykutty Jacob
Industrial Metallurgy (Sudharshan Bhat Memorial Prize)	Shri. Seshagiri Rao Kanakala

Mechanical Engineerjng (Production Engineering) (Dr. S. Vaidyanathan Memorial Prize)	Shri. Mahale Balasaheb Bajirao
Aeronautical Engineering (Air India Prize)	Shri. Keshava Kumar B. L.
Chemical Engineering (Dr K Subbaraju Memorial Prize)	Shri. Kulkarni Deepak Ramachandra Shri. Deshpande Shrikant Marutrao
Industrial Management (K. V. Arunkumar Memorial Prize)	Shri. Murali A. V. Shri. Thazon Joseph Mathews
Computer Science & Engineering (CMC Prize)	Shri. Venugopal Reddy P.

M.Sc. COURSES

Chemistry (V. Ratna Rao Memorial Prize)	Shri. Rajagopal S.
Mathematics	Miss. Padma P.
Physics	Miss. Subhashree Srinivasan

RESEARCH CENTRES

Centre for Biosciences and Biotechnology

Centre for Continuing Education

Centre for Systems and Devices

Fibre Reinforced Plastics Research Centre

Materials Science Research Centre

Ocean Engineering Centre

CENTRE FOR BIOSCIENCE AND BIOTECHNOLOGY

1. Courses Offered :

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

2. Lectures and Seminars

A weekly seminar group for Centre for Biosciences and Biotechnology has been organised.

3. Visitors to the Lab

1. Prop. R. C. Schroter,
   Imperial College,
   London.

4. Work Done

1. Studies are carried out on the biological treatment of wastewaters from a perfumery manufacturing unit. Work was also carried out on the biological treatment of Phenol Containing Waste Water from a producer gas plant. Studies were carried out on the treatment distillery and sago mill wastes using anaerobic contact filters.

2. In the following areas the Work has been carried out (a) Biomedical Lazer applications in Biology and medicine (b) Analysis of blood-flow.

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

4. Work in the following areas of bioenergy has been continued.

   1. Biomass Conversion.
   2. Biomethanation.
   3. Selenium Biochemistry.

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

5. ASSISTANCY TO INDUSTRY

Retainer Consultancy :

(a) M/s. Lakshmi Starch Bombay ... Dr. C. A. Sastry
(b) M/s. Harihar Polyfibres, Kumarapatnam ... Dr. C. A. Sastry
(c) M/s. Seshasayee Paper and Boards Ltd., Erode. ... Dr. C. A. Sastry

Consultancy :

1. Indian Space Research Organisation Govt. of India. Bangalore ... Dr. C. A. Sastry
2. Bush Boake allen Pvt. Ltd., Madras-600 016. ... Dr. C. A. Sastry
3. Hydraulics Ltd., Madras-600 002 ... Dr. C. A. Sastry
4. Namasthe Leather Garments Pvt. Ltd., Bangalore ... Dr. C. A. Sastry

6. On-Going Sponsored Project

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

Project Proposals Sent

1. "Colour removal from industrial waste" proposed to CSIR. ... Dr. C. A. Sastry
2. Study on biomethanation of food wastes ... Dr. K. Lalitha
3. Biomethanation and energy form of **L. Leucocephala** integrated applications ... Dr. K. Lalitha

7. MAJOR EQUIPMENTS PURCHASED

(a) B.O.D. Incubator
(b) Sortorious Electronic balance
(c) C.O.D. apparatus
(d) Muffle Furnace
(c) Incubated Shaker
(f) Peristaltic Pump
(g) Anaerobic Glove box

(h) Oil free air compressor

(i) Brookfield viscometer

(j) Disolved oxygen analyser.

8. PUBLICATIONS

1 Biomass used for biogas generation and their digestibility, Sastry C.A. **Reg I Energy Heat Mass Transfer 8** No. 1, p 15-25, 1986.

2. Characteristics and treatment of wastewater from tanneries, Sastry C.A. **Indian J. Env. Protection, 6** No. 3, 154-168, July 1986.

3. Colour removal from pulp and papermill wastes. Sastry C.A. **Ibid 6,** No. 2, 105-114, 1986.

4. Indstrial waste biodegradation Sastry, C.A. **Encology, 1** No. 6, 10-34, 1986.

5. Studies on characteristics and treatment of waste water perfumery industry — A case study Gurunadha Rao, B.V.S. and Sastry C.A. U **Indian J. Env. Protection, 6** No. 4, Oct. 1986.

6. Treatment of wastewater from a producer gas plant- a case study Kothandaraman, V. Aboo,K.M. and Sastry, C.A. **Indian J. Env Protection, 7,** No 1, 11, 1987.

7. S. Swarnamani, A. William and Megha Singh
Monitorinn of tumor growth and its drug-induced regression by laser and ultrasound reflectometry. **Current Soi. 55,** 765, 1986.

8. G. Ramachandran and Megha Singh
Laser speckle displacement cardiography during I and II Sounds.
Proc. IEEE/VIII Conf. EMBS 1986, P. 198.

9. A. William, Swarnamani and Megha Singh
He-Ne laser and ultrasound reflectometry:
Combined approach to monitor tissue structural changes.
Biomedical Engineering V. Recent Developments
(S. Saha, Editor) Pergamon Press, New York, 1986
pp 89—92.

10. E. Muralidharan and Megha Singh
Multiangle scattering of laser light from blood and its application to hemorheological studies.
Biorheology 23:283, 1986.

11. P. Kanakaraj, R. Sridharan and Megha Singh
Effect of Hypercholesterolemia on the Hemoreological and ultrasonic characteristics of Blood.
Biorheology 23, 237, 1986.

12. Megha Singh and A. William
Calculation of Erythrocyte Deformability by Biochemical and Hematological Parameters: An approach based on its variation in Disease.
Biorheology. 23,251, 1986.

13. Mary Babu, R. Padma Bai, N. Vasanthy and K. Lalitha
Skin Collagen Characteristics in low Selenium status in Japanese quails.
Proc. of 21st Tanners get-together, Feb' 86. PS—6.

14. Vasanthy N, Padma Bai R, Mary Babu and Lalitha K.
Selenium mediated biochemical changes in Japanese quails I. Formulation of semi-purified low-Se diet and effect on glutathrone peroxidase.
Biological trace Element Research, **10,** (2), 79, 1986—

15. Vasanthy N, K. Sankar, P. M. Chandrasekaran and Lalitha K.
Biomethanation of **L. Leucoaphala**— A potential biomass substrate.

Fuel, 65, 1129, 1986

16. Mary Babu, Padma bai, R Vasanthy N, and Lalitha K, Selenium mediated biochemical changes in Japanese quails Part III. Preliminary studies on skil collagen and glutathione peroxidase.

—Biological Trace Element Research, **10,** 3, 7, 1986

17. Vasanthy N., Sriman Narayanan, S., and Lalitha, K., Glutathrone related metabolism and a regulatory role for selenium in the insect **lercyra lephalonica**
—J. Protein Chemistry (in press)

18. Vasanthy, N., Padma Bai, R., Mary Babu, and Lalitha, K., Metabolic significance of selenium. Some aspects of of glutathrone and hydroperoxide metabolism,
—Contemporary themes in Biochemistry, ICSU Reports, Vel. 6, 1986.

19. Regulatory role for selenium in mitochondrial oxygen and hydroperoxide metabolism.
—Vasanthy, N , Lalitha, K., and Britton Chance Archives of Biochemistry and Biophysics (Communicated).

9. PAPERS PRESENTED:

1. Studies on bi-conversion of starch using immobilized enzyme in Stirred Tank Reactor.
Promod Rao, A. Baradarajan & M. Satyanarayan.
Chem. Eng. Congress, 11 CHE, Hyderabad, Dec. 1986

2. Biotransformation of Penicillin G to 6 APA using E. Coli
Bhuvaragamurthy, Mrs Chandra & A. Baradarajan.
Chem. Eng. Congress, 11 CHE, Hyderabad, Dec 1986.

3. Chandra T. S., O. Meyer, F. Mayer & C. G. Friedrach Molybdo-Pterin dependent oxidation of thiosulfate by Thiosphaera pantobeoplia
VAAM Meeting March 1886, Minister, W. Germany.

4. Friedrach, C. G. & Chandra T. S.
Mutations affecting inorganic sulfur oxidation in faueltatively litho antobeoplia thiobacteria.
C I Meeting, Aug, 1986, Haren, Holland

5. Chandra T. S., and M. V. S. Murthy, Isolatian and characterization of Zylose and xyland utilising anaerogic bacteria.
XIV Intern. Congress Microbial (IUMS) Sep, 1986,
Manchester U. K.

6. Chandra T. S. & S. Soundar
"Cellulose degradation by a mixed bacterial culture".
XIV Intern. Congress Sep. 1986, Manchester U.K.

7. Metabolic significant of selenium. Aspects of hydroperoxide and oxygen metabolism
Vasanthy, N. and Lalitha, K.
Paper presented in the IV FAOB Congress Singapore, Dec. 3-6, 1986.

10. CONFERENCES :

1. Environment Pollution Control in power plants-Need and state of Art. Sastry, C.A., National conference on Thermal Power Station, Bangalore, November 1986.

2. Solid wastes management in developing countries, Sastry, C.A.
International Congress on Safety and Pollution, Delhi, OCT.-December 1986.

3. Env-protection measures in space, programmes Sastry, C. A., Seminar on Env. Protection measures in IS RO SHAR Centre, Sriharikota 1986.

CENTRE FOR CONTINUING EDUCATION

Since the establishment of the Centre for Continuing Education in June 1986, the Centre has taken up the following activities:

(i) The IIT Madras Series in Science and Engineering

(ii) Establishment of an Education Technology Cell and

(iii) Introduction of a Reinvitation Programme for former QIP/FIP scholars,

The Centre also encourages faculty members to write books. Financial assistance towards the cost of stationery, for typing, drawing, cyclostyling, etc. are provided. The Centre is also presently engaged in an exercise with regard to the starting of a Co-operative Education Programme in Mechanical Electrical and Chemical Engineering in the first Instance in collaboration with the Confederation of Engineering Industries (South Zone) and Post Graduate Certificate level courses for persons working in the industries. A detailed report of the activities of the Centre is given below:

1. QUALITY IMPROVEMENT PROGRAMMES

(1) Serving Teachers Programme

a)	No. of Teachers from their Engineering Colleges working for the Ph.D.Degree of IIT Madras at present	45
b)	No. of Teachers from other Engineering Colleges working for the M.Tech. Degree of IIT Madras at present.	13
c)	No. of Teachers awarded the Ph.D. degree of IIT Madras in 1986-87	20
d)	No. of Teachers awarded the M.Tech. degree of IIT Madras in 1986--87.	16

(2) Short Term Courses

a)	Short term courses conducted during 86-87	4
b)	Short term courses since inception	108
c)	Total No. of participants benefitted by the scheme till 86-87	2320

(3) Reinvitation Programme

The Centre has introduced a Reinvitation Programme for former QIP/FIP scholars who have obtained their Ph.D degree from this Institute. In the current year 17 former QIP/FIP scholars have been extended invitation. They will visit the Institute for 3 months period at a time convenient to them and their former guides. Their visit will be used to write up pending papers from their thesis and/or complete small experimental programmes.

(4) Curriculum Development Activities

The Centre has prepared Teacher's Manuals for 20 core subjects in Chemical Engineering during the year and these were sent to ISTE for printing,

(5) Writing of Text Books

This is a new scheme started recently. As mentioned above financial help towards the cost of stationery, for typing, drawing, cyclostying, etc. is provided by the Centre to faculty members of IIT Madras interested in writing text book for Graduate and Post Graduate level students. During this year 6 proposals have been received for writing books. They have approved and financial help in this regard has been provided.

2. CONTINUING EDUCATION PROGRAMMES

Total number of continuing Education Programmes held during 1986-87 was 16.

3. OTHER ACTIVITIES

i) IIT Madras Series in Science and Engineering

This is a new activity. We have received confirmation from 21 eminent persons working in different areas of Science and Technology to produce a booklet each for the IIT Madras Series in Science and Engineering. The first book in this Series is expected to be published within the next few months.

ii) Education Technology Cell

The Ministry of Human Resource Development has sanctioned an amount of Rs. 35 lakhs as a first instalment of grant towards the above programme and action is taken towards the effective utilisation of funds with a view to developing audio-visual and video aids for teaching programmes in Engineering and Technology.

iii) Co-operative Education Programmes

The Confederation of Engineering industry (SZ) and a few firms have shown interest in starting a Co-operative Education Programme (also called the Sandwich Programme in the U.K) initially in Mechanical, Electrical and Chemical Engineering. The Centre is presently exploring the possibilities in this regard.

CENTRE FOR SYSTEMS AND DEVICES

DIGITAL SIGNAL PROCESSING LABORATORY

1) EQUIPMENT PROCURED

A PC/XT with 80286, one floppy disc, one Winchester, serial-parallel port and a monochrome monitor has been installed.

2) PUBLICATIONS AND PRESENTATIONS

a) K. M. M. Prabhu and A. Raghavendra Rao, 'Optimum MTI simulation studies with DFT and ME processors', Proc. of the CIE Intl. Radar Conf., held in China during November 4-7, 1986.

b) A. Raghavendra Rao, K. M. M. Prabhu and R. Suthendran, 'Comparison of Linear and Non-linear spectral estimation methods', Proc. of the CIE Intl. Conference held in China during Nov. 4-7, 1986,

c) K. M. M. Prabhu, 'Effect of range sidelobe reduction on signal-to-noise ratio', Proc. of the CIE Intl. Radar Conference held in China during November 4-7, 1986.

d) K. M. M. Prabhu, 'Generalized Families of Time Windows for use in Signal Processing', IERE, London, March-April 1987.

e) K. M. M. Prabhu and R. D. Shenoy, 'Some results on spectral estimation using combined time and lag weighting', Conf. Record, ICASSP-87, Apr. 6-9, 1987.

f) K. M. M. Prabhu, K. V. S. Prakash and V. Srinivasan, 'Simulation and evaluation of an experimental Radar Clutter Model', Conf. Record, ICASSP-87, Apr. 6-9, 1987, Dallas, Texas, U.S A.

SEMICONDUCTOR DEVICE RESEARCH LABORATORY

New Project Sanctioned :

'Study of Multilayered Structures of Compound Semiconductors Grown by MBE Technique with special reference to Integrated Optical Circuits. Sponsored by DST Value : Rs. 30.80 lakhs.

Papers Published :

1. P. R. Vaya, J. Majhi, B. S. V. Gopalam and C. Dattatreyan, 'Study on n-PbTe/p-Si, Heterostructure' phys. Stat. Sol. (a) 93, 353-360 (1986).

2. K. Ponnuraju and P. R. Vaya, 'Study of $Pb_{1-x}Sn_x$ Te Epitaxial films deposited by MBE Techniques', J. IETE 32,5 (1986).

Papers Presented :

1. V. Suresh Babu, K. R Murali and P. R. Vaya 'Analysis of Optical spectra of epitaxial zinc phosphide films grown by HWE Technique', 5th National seminar on Physics of Semiconductors and Devices, Varanasi, Dec. 1986.

2. K. Ponnuraju and P. R. Vaya, Development of Pb_{1-x} Sn_x Te photoconductive IR Detectors by MBE', 14th Yugoslavia conference on microelectronics, MIEL-86, May 1986.

3. V. S. Ranga Reddy and P. R. Vaya, 'Diffusion on Zn in Gallium Arsenide using Zn_3 As_2 source', 14th Yugoslavia conference Microelectronics MIEE-86, May 1986.

4 J. Majhi, M. Sadhana and P. R. Vaya, 'C V and IR absorption study of the thin oxide. (500 A^0) films thermally grown on silicon', 18th International conference on the physics of semiconductors, Stockholm, Sweden, August, 1986.

5. P. R. Vaya and J. Majhi, 'Some studies on Al-Si schottky Diodes', VI National Seminar on Semiconductor and Devices IACS Calcutta, Dec. 1986.

6. K. Ponnuraju, P. R. Vaya and J. Sobhanadri, 'The Optical properties of MBE Pb_{1-x} Sn_x Te films,' VI National Seminar on Semiconductor and Devices, IACS Calcutta, Dec. 1986.

7. T. Srinivasan, P. R Vaya and J. Sobhanadri, 'Analysis of the Optical Absorption Spectra in the Interference Range of the Pb Sn Te films grown by MBE Techniques', VI National Seminar on Semiconductor and Devices, IACS Calcutta, Dec. 1986.

8. B. B. Dixit, P. Suryanarayana, B. C. Joshi, P. D. Vays, W. S. Khokle and P. R. Vaya, MPCVD Amorphous and polysilicon Films: Studies of Structural and Electrical Properties', VI National Seminar on Semiconductors and Devices, IACS Calcutta, Dec. 1986.

9. R. W. Ferrendeen, J. Sobhanadri, K. Ponnuraju, and P. R. Vaya Laser Induced Microwave Photoconductivity and Decay of MBE grown Pb Sn Te films'.

10. V. Suresh Babu, P. R. Vaya and J. Sobhanadri, 'Dependence of Transport properties of single crystalline Zn_3 P_2 layers on the growth parameters,' III National Seminar on crystal Growth Anna University, Madras — Feb. 1987.

ANTENNAS LABORATORY

Paper Published:

M. S. Narasimhan, K. Varadarangan and S. Christopher 'A new technique of synthesis of the near or far-field patterns of arrays', IEEE Transactions on Antennas and propagation, Vol. AP-34, No. 6, pp. 773-778, June 1986.

FIBRE REINFORCED PLASTICS RESEARCH CENTRE

Courses Offered

The following elective courses were offered by the Centre during the year.

1.	Composite Technology First Semester	Post-graduate Elective
2.	Composite Strcture, First Semester	Post-graduate Elective
3	Composite Materials First Semester	Post-graduate Elective
4.	Composite Techno'ogy Second Semester	Post-graduate Elective

The Centre has formulated the following three new Post-graduate level elective courses during the year for which Senate approval has been received. These courses will be offered from the first Semester of 1987—88.

1. Theory of Composite Materials
2. Composite Product Design
3. Advanced Testing and Quality Control of Composites.

All the elective courses are offered to students admitted to various departments.

Continuing Education Programme.

During the year, the Centre offered the following short term courses and seminars.

No.	Tittle of course	Duration	No. of Participants
1.	Design and Fabrication of Chemical Equipments	8-9-86 to 13-9-86	21
2.	Workshop on FRP Technology	8-3-87 to 21-3-87	19
3.	One day Seminar on Testing and Quality Control of Composites	21-11-87	50

In addition, the Centre is planning to organise an International Conference on Composite Materials and Structurers during Jan. 6-9, 1988. This programme will have 54 papers presented in various topics on Composite and 35 of these papers are from other countries including USA, Canada, Russia, U.K. Europe and China. The proceedings are being printed and preparations are being worked out.

Academic Research Programme

B. Tech. projects completed	5
M. Tech. projects completed	2
M. Tech project on going	1
M.S. project completed	1
M.S project on-going	3
Ph. D. project on going	4

Research and Development

The following R & D projects taken up in the previous year have been continued during the year.

1. Analysis and Design of Heated structure for Defence Application-Phase II (Continuation from previous year).
2. Design and Development of Vibration mounting for the vibration studies of PSLV Rocket Motor casing (continuation from previous year).
3. Development of FRP High Voltage Disk insulators
4. Development of self lubricating carbon fibre reinforced thermoplastics machine element.
5. Studies on Polymer Concrete.
6. Process Development of Reinforced Reacters Injection Moulding.
7. Studies on Metal Matrix Composites by powder Metallugy Techniques.

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

(1) Buckling analysis of composite laminates using Finite Element Method.
(2) FEM analysis of laminates for predicting interlaminar shear stresses.
(3) Analysis of composite laminate by variational method.
(4) Development of computer aided design of moulds and dies for FRP moulding.
(5) Development of ceramic matrix composites by the soil gel process.
(6) Development of compression moulded SMC components simulating timber
(7) Use of Expert system for code of practice based design of FRP Chemical Equipments.
(8) Study of re-entry vehicle dynamics.
(9) Evaluation of Dielectrometry for monitoring the cure of polymer matrices.

The following sponsored project has been taken up during the year:-

Development of testing and quality control system for the general and industrial use of Composites sponsored by Department of Science and Technology, New Delhi.

Consultancy

The Centre has taken up Rs. 15000/- worth consulancy during the year and continued the remaining work of the Rs. 5.6 Lakhs consultancy taken up during the previous year.

Assistance to Industry

The Centre has continued its programme of technical assistance to industry by offering technical advice, testing and quality control services and design consultancy.

Research Publications

Six

Visitors to the Centre

Dr. Taraman, Chairman Mechnical Engineering Department, University of Detroit visited the Centre and delivered lecture.

Other Activities

Dr. N.G. Nair has served as a member of the Technical Advisiry Committee for DST for sponsored proiect. He has served as Vice-President of the Indian Society for Composite Materials and has delivered lectures at four seminars organised by other organisations.

MATERIALS SCIENCE RESEARCH CENTRE

1 search and Development:

(a)	Papers published	6
(b)	Papers presented at National and International Conferences	9

2. Equipment added :

A low speed diamond wheel saw to slice fragile single crystals and ceramic materials has been procured (South Bay Tech.. USA).

3. Invited Lectures delivered by the Faculty :

During the period, Prof G. V. Subba Rao attended International Conferences and gave invited talks at Univ. of Singapore, Univ. of Groningen (Netherlands), and Universities in Germany and Soviet Union.

4. Visitors to the Centre :

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

5. (a) New Projects Sanctioned :

1. 'Studies on High Temperature, High Critical Field Superconducting Materials Synthesis, Characterization and Search for High Temperature Superconductivity in Metal Excess Ternary Systems'— Sponsored by the DST, New Delhi.

2. 'Study and Development of Semiconductor Based Photo— electrosynthesis and Liquid Junction Solar Cells'— DNES, New Delhi.

(b) New Project Submitted :

1. An Industry—Institution collaborative project: entitled, 'Development of Process Technology for Mixed Oxide Electric Furnace Heating Elements', has been submitted to the DST, New Delhi.

2. A proposal for West German Aid to Strengthen the Research and Development of the Materials Science Research Centre, Indian Institute of Technology, Madras, has been submitted.

6. New Areas of Research Started:

Research on

(i) Fast ion conductors based on Nasicon.

(ii) High T_c superconductors based on Rare earth-Barium-Copper-Oxygen system.

OCEAN ENGINEERING CENTRE, IIT MADRAS

CONTINUING EDUCATION PROGRAMME :

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

ACADEMIC RESEARCH :

MASTER OF SCIENCE (Completed in 1986)

1. Breakout Resistance of seabed Anchors
2. Free Fall Penetrometer Studies.
3. Remote Sensing and Evaluation of Coastal Geomorphology.
4. Marine Corrosion of Steel Embedded in Concrete Structures.
5. Development of a flap type wave generator.
6. Computer aided ship lines.

MASTER OF SCIENCE (ongoing)

1. Morphodynamics of the coast around Madras.
2. Analysis of deep sea moorings.
3. Design of laterally loaded piles.
4. Side launching of ships.

DOCTOR OF PHILOSOPHY (ongoing)

1. Application of catastrophy theory to nonlinear oscillation of ships.
2. Installation operations of offshore steel jeckets.
3. Scour around offshore structure due to waves and currents.
4. Wave forces on pile groups.
5. Strength behaviour of marine clays under repetitive loading.
6. Behaviour or piles subjected to lateral loads.
7. Deformation behaviour of carbonate soils.
8. Geophysical evaluation techniques for geological formations
9. Dynamics of articulated towers.
10. Dynamics of guyed towers.

11. Studies on action of waves on pipelines.
12 Studies on oscillating water column wave energy system.
13. Wells turbine characteristics in oscillatory flow.
14. Propagation of acoustic and elastoacoustic waves in underwater shells.
15. Dynamics of floating bodies.

C. Sponsored Project: (ongoing)

1.	Ocean Thermal Energy System	— Dept of Nonconventional Energy Sources New Delhi.
2.	Articulated towers for Offshore structures	— Indo-German Project.
3.	Studies on instrumentation for integrity monitoring of offshore steel jackets.	— Oil & Natural Gas Commission
4.	Studies on wave induced transport near Paradeep Port.	— Central Board of Irrigation and Power
5.	Studies on the design of Cargo Ships with soil propulsion.	— Ministry of Surface Transport
6.	Studies on the influence of after body form of tugs, trawlers and offshore supply vessels on the propulsion perforamnce of ducted propellers.	— Ministry of Surface Transport
7.	Preparation of a project report for sea trials on wave energy.	— Dept. of Ocean Development
8.	Development of numerical models for storm surge prediction along the east coast of India	— Dept. of Science & Technology

D. Consultancy Services:

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.

E. Major Consultancy Projects (ongoing)

1. Stability and performance evaluation of drill ship 'Sagar Probhat', ONGC.
2. Structural analysis of critical components of a naval ship, NHQ, New Delhi.

3. Design and development of a longitudinal and a transverse wave beach system for towing tanks, NSTL, Visakhapatnam.
4. Design analysis, testing and fabrication of a deep tow system for seabed Photography, NIO Goa.
5. Hydrodynamic analysis of sloshing of liquid fuel in tanks during flight of rocket/missile, ISRO, DRDL.
6. Static, dynamic and stability analysis of liquid Upper stage of PSLV, ISRO.
7. POGO instability analysis, DRDL.
8. Design of ducted propellers.
9. Feasibility studies of transport by seaway in Tuticorin, DCW Tuticorin.
10. Stability Analysis of Driilship for ONGC.

F. Short Term Courses Conducted

1. Finite Element Analysis, a Short term course for Scientists and Engineers of NSTL Visakhapatnam, June 17-Aug. 14, 1986.
2. Finite Element Analysis of Ocean Structures, Nov. 24-Dec. 5, 1986.

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

1. Research and Development :

1 Broaching Tool Dynamometer for Force Measurement M. Tech Project for Machine Tools Tools Lab., Department of Mechanical Engineering, IIT, Madras.

2. Numerical Control Machine Refrofitting— M. S. Project for Machine Tools Laboratory, Dept. of Mechanical Engineering.

2. Assistance to Industry :

1. Servicing, Repair and Calibration of Harmonic Wave Analyser for M/s. Hackbridge. Hewettic and Easun Ltd., Madras-600 019 and earned Rs. 2,000/-.

2. Feasibility Report on Electronic Timer for M/s. RIC Auto Electronics and Electricals, ARCOT and earned Rs 2,000/-.

3. Servicing and Repairing of Signal Averger of Medical Research Foundation, Madras-600 006 and earned Rs. 3,000/-.

4. Development of Three component Dynamometer for RANE (Madras) Ltd., Madras-600 032 and earned Rs. 4,500/-.

5. Repair of Ultrasonic Cleaning welder for M/s. International Computer Ribbon Corporation, Madras-600 087 and earned Rs 4,000/-.

6. Repair and servicing of Control Circuits of variable speed Lathe for Regional Engineering College (Department of Mechanical Engineering) Warangal and earned Rs. 2,500/-.

7. Servicing and Calibration of Tektronix Oscilloscope for Visvesvarayya Regional College of Engineering, Nagpur and earned Rs. 5,000/-.

3. Work Under Progress :

1. Servicing of Printed Circuits Boards of Hofmann Dynamic Balancing Machine for M/s. Carborandum Uuiversal Ltd., Madras-600 001.

2. Servicing and Calibration of Loadcells for Ordnance Factory, Bhandara (Nagpur).

3. Servicing and Calibration of Hetrodyne Voltmeter for Visvesvarayya Regional College of Engineering, Nagpur.

4. Academic Involvement :

Sl. No	Course Description	Course No.	Credits	Student Strength.
1.	Electronics Lab. (H.C.)	EC 361	1	30
2.	Electrical Engg. Drawing/Practice (Part of the Lab.)	EC 205	3	60
3.	Electronics Lab. for M.Sc. (Chemistry)	CY 720	1	18
4.	Switching Theory and Digital Design.	CS 220	4	27
5.	—DO—	CS 204	1	27

5. New Major Equipment Added :

S. No.	Name of Equipment	Qty.
1.	Distortion Level Meter APLAB make	One
2.	Power Supyly 0-30 V, 20 Amp. APLAB make	One
3.	Digital Storage Oscilloscope Kikusi Make	Two
4.	Tiny 85F Microprocessor Kit	One
5.	Dual Trace Oscilloscope 0-15 MHz Philips make	Two
6.	Electronic Typewriter Model 635 PCL make	One
7.	Dual Trace Oscilloscope 0-35 MHz BPL make	Two
8.	Three and half Digit — Digital Multimeter PLA make	Five
9.	Personal Computer WIPRO make	One

6. Apprentice Training Programme :

The Centre also conducted an Apprentice Training Programme for Electronics Technicians.

No. of candidates — Seven

Duration of Training — January 1986 to August 1987

Subsequently extended upto March 1987 (15 Months — total)

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

7. The Centre will shortly be starting a New Indo-German Project through GTZ, to strengthen the Training Facilities at Central Electronics Centre.

CENTRE FOR INDUSTRIAL CONSULTANCY & SPONSORED RESEARCH

In the year 1986-87, the Centre for Industrial Consultancy and Sponsored Research launched the new activities like (1) Industrial Associateship and (2) ISRO-II T Space Technology Cell which were inaugurated in September 1986 and January 1987 respectively. Under the Industrial Associateship Scheme, 95 Industries have become members out of which 48 of them are from Small Scale Sector. Two Technology Appreciation Programmes on Micro Electronics and on Finite Element Techniques, were organised in the months of January and march 1987, under this scheme. A few more new activities are being contemplated under this programme.

Under the ISRO-II T Cell, 3 projects have been taken up and they are in progress. A Training programme for VSSC Scientists is being contemplated. A few more projects are under processing.

The consultancy activities of IIT continue to be on the lines similar to the previous years. The earnings for the year 1986-87 was Rs. 65 Lakhs. (444 Jobs).

The Sponsored Research activities showed a tremendous growth with the grants increasing to the tune of 33 Million Rupees for the year 1986-87 particularly, agencies like Department of Electronics and ARDB Sponsoring quite a few large value projects in thurst areas. (37 sponsored projects).

Also the Centre looks after the following activities .

1. Collaborative research projects such as Indo-German Joint Res. NSF etc. were coordinated by the cenrte. About 4 collaborative projects have come to an end by 31-3-87. GTZ held discussions with ITI to improve the facilities of some of the laboratories of the Institute with the financial support from GTZ.

2. New plan scheme of Ministry of Education.

3. An Orientation Programme for the admission to MS Entrepreneurship was organised between August and December 1986.

4. The Centre also organised visits of the faculty to the Industry during the summer vacation.

5. A Desk Level Programme to up-date working knowledge for the staff in the Centre for ICSR was organised in September 1986.

6. 3 Patents were issued in the name of the Institute and 2 Patent applications were made during 1986-87.

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. Appaswamy and Associates, Madras.

(ii) Tamilnadu Poultry Development Corporation, Madras.

(iii) RRC Kalpakkam, Facit (Asia) Madras, Machine Tool and Accessories Pvt. Ltd Madras.

(iv) Design and Dovelopment of a discretely switchable FOV (TV) optical system, ADE. Bangalore.

(v) Andhra Foundry Co. Hyderabad.

(vi) L & T Mc Neil, Madras,

(vii) Hindustan Teleprinters Ltd., Madras.

(viii) Associated Industries, Madras.

(ix) TVS Lucas, Madras.

(x) Thagadur Product, Erode.

(xi) BHEL, Hyderabad.

Teaching and Research .

The centre assists the other departments of the Institute in teaching and laboratoty. It has its own research programme,

Sponsored Research :

(a) Sponsored projects that were carried out :

(i) Investigations on image subtractions technique.

(b) Sponsored projects that are currently in progress :

(i) Hologram interferometry and speckle technique for NDT - DST supported

(ii) Development of a low cost launcher.

Development Projects :

The following projects were carried out :

(i) Indirect ophthalmoscope-for M/s. Appaswamy Associate

(ii) 15x microscope eye-piece Design and fabrication.

(iii) Design and development of a centering microscope for CNC milling machine.

Projects Under Negotitation :

(i) Development of an engineered model of a fibre optic current sensor-DOE.

(ii) Phase Shifting interferometry-DST

(iii) Investigation of biomethanation of food-wastes

(a) Papers published/accepted : 15

Communicated : 4

Presented : 9

Ph. D. completed : 4

(b) Book/monograph : Book entitled

'Modern Pressure Vessels and piping Design' being written in colloboration with a few industries.

(c) M. Tech. projects guided : 2

B. Tech. projects guided : 2

REGIONAL SOPHISTICATED INSTRUMENTATION CENTRE

1. Courses :

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

2. Research and Development :

Faculty members of RSIC guide research work in Molecular Spectroscopy and Instrumentation leading to Master's and Ph.D. degrees. A total of 12 students are registered under the faculty members for Ph.D. and 4 M.S/M.Tech/M.Sc degrees. Besides, the Centre has 4 post-doctoral fellows and one Pool Officer. 5 students got their Ph.D. degrees during the academic year 1986—87.

A total of 26 research papers have been published in Journals of International repute.

3. Assistance to Industry and other Academic Institutions :

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

Sl. No	Instrument	Int.	Ext.
1.	Varian Techtron Atomic Absorption Spectrometer — AA6	55	471
2.	UV — Vis IR (Varian 2390)	124	176
3.	Perkin Elmer PE — 781	1330	79
4.	PE 983 IR	408	381
5.	EM 390 NMR	2057	341
6.	Varian XL — 100 — NMR	279	100
7.	Varian E — 4 EPR	255	287
8.	Cary — 82 Laser Raman	218	176
9.	Polytech FIR — 30 — FAR IR	184	276
10.	Single Crystal X-Ray Diffractometer	410 hrs.	300 hrs.
11.	Aminco Bowman Spectro of luorometer	280	35
12.	Scanning Electron Microscope	387	51
13.	Varian E — 112 EPR Spectrometer	697	66
14.	ESCA — AUGER	474	25
15.	Vibrating Sample Magnetometer	50	25
16.	Finnigan Mat GC — MS Mass Spectrometer	490	108

4. Sponsored Project :

1. NMR investigations of structure and dynamics of molecules.
2. Vibrational Spectroscopic studies using matrix isolation.
3. Vibrational Spectral studies of aqueous solutions.
4. Magnetic resonance studies of spin labelled biological systems.
5. Design and Development of a digital data processor for instrumentation.
6. VHRR radiant cooler analysis.
7. Preparation and magnetic properties of EDA complexes.

5. Invited talks presented by Faculty :

Speaker	Topic	Institution
Dr. Surjit Singh	Optical Spectroscopy (4. lectures)	Anna University, Madras.
	Vibrational Spectroscopy (3. lectures)	S.V. University, Tirupathi.
	Raman Spectroscopy	RRC, Kalppakkam.
	Raman Spectra of Solutions	M. S. University, Baroda.
	MO Calculation on Force	Punjab University,
	Fields	Chandigarh
	Molecular Interactions	Banaras Hindu University,
	and Raman Spectroscopy	Varanasi.
	Spectra of liquid water	Annual Meeting of IASc. Varanasi.
	Raman Spectroscopy- Analytical Tool	S.V. University, Tirupathi.
Dr. P. T. Manoharan	Exchange Interactions in Transition Metal Dithiolenes	ISMAR, Brazil.
	Metals in Biology	Gordan Research Conference, California
	Electron Paramagnetic	NIH, Bethesda, USA. NIH, NIA, Baltimore, USA.
	Resonance, Exchange	George Town University, Washington, USA.
	Interactions, metal	Howard University, Washington, USA.
	binding sites in recon-	Renusler Polytechnic Institute, Troy
	stituted hemoglobins,	USA. University of Cincinnati, Cincinnati, USA.
	liquid crystallinity of	Arizona State University, Arizona, USA.

Speaker	Topic	Institution
	human hemoglobins.	Caltech, Pasadena, USA. National Biomedical ESR Centre, Milwankee, USA. University of Hyderabad, Hyderabad. CSMCRI, Bhavnagar. I.I.Sc., Bangalore.
Dr. S. Subramanian	Nuclear Magnetic Resonance	Anna University, Madras.
	Electron Spin Resonance	Anna University, Madras.
	Recent Advances in Hjgh Resolution NMR (8 lectures)	NIH, Betheseda, USA.
	Product operations and some novel 1D and2D experiments in NMR	Radiation Research Lab, Univ. of Notredame, Southbend, USA.
	Nuclear Magnetic resonance in structural ellucidation.	Georgetown University, Washington, USA.
	Product operator formalism in NMR	NIH, Baltimore, USA.
	Zeroquantum 2D using homo-nuclear Hartmann-Hahn Mixing	Experimental NMR Conference, Baltimore, USA.
	Operator methods in High Resolution NMR	Medical Centre, Univ. of Rochester, Rochester, USA.
	Some Applications of isotropic mixing in 1D and 2D NMR spectroscopy	I.I.Sc., Bangalore.
	Some novel correlation and editing experiments in homonuclear correlation NMR	TIFR, Bombay.
Dr. T.K.K. Srinivasan	Raman and IR spectra of phase transitions in substituted ammonium nitrates and perchlorates,	X International Confeterence on Raman spectroscopy, Eugena, Oregon, USA.
	Bromate ion dynamics in orthorhombic, monoclinic and cubic metal bromates.	X International Conference on Raman Spectroscopy, Eugena, Oregon, USA,
	Raman effect and its applications in Chemistry.	Central Leather Research Institute, Madras.
Dr. S.P. Venkateshan	Acoustic temperature Profile measurement systems	JPL, Caltech, Pasadena, USA.
	Approximate analysis of heat diffusion problems using hybrid profiles.	JPL, Caltech, Pasadena, USA.

6. Workshop — Short Term Courses:

A Winter School—cum—Work shop on the Applications of Mass Spectrometry was conducted under the sponsorship of DST and Indian Society for Mass Spectrometry in Feb. 1987. About 50 participants from Universities, Industries and National Laboratories participated.

7. Lectures from Visiting Scientists :

1. DR. MINEEVA, USSR Academy of Sciences, Moscow.
2. DR. STEPHEN PEIL, Philips University, Marburg, W. Germany.

8. Developmental Programs on the anvil :

1. Matrix isolation studies of Molecular interactions.
2. Development of instrumentation for Electron Nuclear Double Resonance.
3. Construction of low frequency EPR Spectrometer.
4. Calculation of second order molecular properties by coupled Hartree Fock Perturbation Theory.
5. Development of facilities for time domain EPR.
6. Pulsed and CW study of Paramagnetic molecules by NMR.
7. Development of an infrared spectrometer.
8. Study of Chemically Induced Dynamic Nuclear Polarization.
9. Biradical studies using spin labels on model systems.
10. Evaluation of vibrational correlation functions.
11. ESR, EXAFES and Mossbauer studies on Metalloproteins.
12. Study by 1D and 2D NMR molecular structure and dynamics.
13. Study phase transitions using Raman and IR spectroscopy.
14. Spectroscopic studies on excited molecules.
15. Liquid crystalline character of human hemoglobins at room temperature.

CENTRAL SERVICES, FACILITIES

Airconditioning Unit

Central Gas Supplies Unit

Central Glass Blowing Section

Central Photographic Section

AIRCONDITIONING UNIT

Dr. N. Venkatrayulu, Professor of Mechanical Engineering has assumed office as the Head, Air conditioning Unit vice Mr. V. N. Murthy with effect from 30th April 1986.

The Institute has about 475 window Air conditioners as on date. The proposal to give all these Air conditioners on service contract to an outside agency has not been implemented and the maintenance of window Air conditioners is again entrusted to the Air conditioning Unit. During the period May 86 — April 87 almost all the defective window Airconditioners were rectified and in all about 450 Airconditionings are in good working condition.

The packaged Airconditioner in the Structural Engg., Laboratory of Civil Engg. Dept. which was out of operation for a long time was reactivated with a new masonry basin for the Cooling Tower.

Construction of masonry sumps for the Cooling Towers for the A/c plants at Applied Chemistry, measurements laboratory and Electronic Circuits Laboratory of Electrical Engg., Dept. and the Senate room are taken up. The Senate room plant is also being provided with a separate masonry make-up water tank.

Two nos. induced draft FRP Cooling Towers have been erected for the A/c plants at Central Library and CLT and piping work is being undertaken before the commissioning of these cooling Towers.

The new A/c plant at the New Computer Centre Building is under installation after the order is placed on M/s. Utility Engineers and the plant is likely to be commissioned in Sept. '87. The work is being monitored and supervised by the A.C. Unit.

Efforts are made to put the Applied Chemistry A/c plant back into operation. The spares for the Compressor are ordered out and the Cooling Tower - civil works are already completed.

The A/c plant of the Computer Center (IBM 370) is being maintained and kept in good working condition.

CENTRAL GAS SUPPLIES UNIT

To procure gases like nitrogen, oxygen argon etc. from the supplier and distribute to various departments, sections and centres.

All the gases like nitrogen, oxygen and argon needed by the various departments and sections are procured and distributed by a Central Unit called Central Gas Supply Unit.

CENTRAL GLASS BLOWING SECTION

The central glass blowing section is one of the important infra structural facilities of the Institute since its inception in 1972 Being a central facility this section undertakes design and manufacture of scientific glass apparatus for research and development applications of various departments. Besides meeting the in-house needs, this section also frequently undertakes jobs for the industry under the industrial consultancy programme.

The section has a range of modern sophisticated glass working equipments largely procured from Federal Republic of Germany as a component of a collaborative programme and these include Horizontal cum Vertical Lathe, Universal Lathe, Forming Lathe and High Vacuum System. It is also well equipped with a good number of sophisticated burners, hand torches. and other necessary tools for manufacturers of a variety of glass apparatus and instruments. Though the section's services are utilised by of the student community and researchers of different departments, its contribution in specialised areas like Cryogenic Glass systems, H. V. Systems is quite significant in recent years. The section has also been offering short term training programmes in the fundamentals of glass blowing for post-graduate students in Science Departments every year. This section has adequate facilities for Quartz working and has developed high level of expertise in this area.

A 12 day workshop on Modern Laboratory Glass Working Techniques was organised by the Central Glass Blowing Section, I.I.T., I.S.S.G., Madras and C.L.R.I,, Madras during 22 Dec. '86-2 Jan. 87 for the benefit of junior level glass blowers. The workshop course comprised of modern techniques in the manufacture of cryogenic system, standard ground glass joints, Spherical joints Stop-cocks and sintered glass discs. Delegates from various parts of India were sponsored by their respective organisations and they were given intensive training laying equal emphasis on theoretical and practical aspects of the techniques practised in I.I.T. Madras.

CENTRAL PHOTOGRAPHIC SECTION

Since the inception of the Section in 1967, it has been catering to the different photographic needs of the various faculties in the Institute (both staff and students) such as Photo-taking, Movie Taking and processing of Black and White 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, high speed photography, documentation etc.

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	— Upto 1986	215
	— Added in 1986—87	11
Departmental Projects (1986—87)	— Ph. D.	5
	M. S.	3
	M. Tech.	7
	B. Tech.	12

SPONSORED PROJECTS :

	Title :	Sponsor :	Amount
1.	Hot Cascade Test Rig	ARDB	21·18 Lakhs
2.	Erosive Burning of Solid Propellents	ARDB	6·95 Lakhs
3.	Theoretical and experimental Investigation of Rarefied Gas Flows	ARDB	8·70 Lakhs
4.	Theoretical and Experimental Investigation of Wake boundary Layer Interaction of an airfoil	ARDB	6·1 Lakhs
5.	Nozzle Deposition Problem	ARDB	2·436 Lakhs
6.	Development of Reverse Flow Combustion Chamber	ARDB	1·675 Lakhs
7.	Development of an axi-symmetric supersonic Intake	ARDB	2·5 Lakhs
8.	Development of a Gas Turbine fuel Control System Using Microprocessors	ARDB	2·0 Lakhs
9.	Non-Linear Analysis of multilayered structures, using finite element Methods	ARDB	2·71 Lakhs
10.	Development of Solid Fuel Ramjet for a Gun Launched Projectile	ARDB	6·99 Lakhs
11.	Studies on Isothermal Mixing of Air Streams	IIT(M) and ISRO(Cell)	2·75 Lakhs
12.	Development of Jet Engine and Controller Simulator	ADA	12·486 Lakhs
13.	Development of a Low Cost Launcher	ARDB	6·9 Lakhs

LECTURES GIVEN IN THE DEPARTMENT :

S.No.	Date	Speaker	Topic
1.	23—7—86	Dr. A. Asundi Dept of Mech. Engg. Univ. of Hongkong	1) Inplane and out of plane Displacement Measurement Using, Moire Interferometry. 2) Foot-pressure Measurement Using Shadow Moire.
2.	25—11—86	Dr. B. Chandrasekaran N.A.S.A. Langley, USA	Engine/Airframe Integration and Analysis by theoretical codes
3.	28—11—86	Dr. Stranewsky D.F L.R. Gottingen Germany	Development of Adaptive wall and Cryogenic Ludwing Tube facilities at D.F.L.R.
4.	28—11 - 86	Dr. S. M. Deshpande Prof. Dept. of Aero Space Engg., I.I.Sc., Bangalore.	Basic Aspects of Computational Fluid Dynamics.
5.	22—12—86	Prof. Theodore H.H, Pian, M.I.T., Cambridge, USA	Recent Advances In Hybrid Stress Finite Element Methods.
6.	2—1—87	Prof. C. J Cremers Univ. of Kentuky Lexington	1) Heat Transfer in Lunar Surface. 2) Heat Transfer in Arc Welding.
7.	2—3—87	R. W. Doyan Head of Developing Countries Section and O. A. Shinaishin, Senior Programme Manager, N.S.F. Washington D.C.	Visitors
8.	8—3—87 9—3—87	Dr. A. Prabhu Prof. Dept. of Aero. Space. Engg. I.I.Sc., Bangalore.	1) Turbulent Flow 2) Drag Reduction 3) Flow in Curved Passages.
9.	16—3—87 17—3—87 and 18 3—87	Prof. Peter P. Wegner Yale Univ., U.S.A.	1) Water Flow made visible by schlieren Method. 2) Condensation of Vapours in the super - saturated state - Experiment and Theory. 3) Transonic Cryogenic Word Tunnels and the Condensation of Nitrogen

LECTURES GIVEN BY STAFF OUTSIDE:

S.No.	Date	Speaker	Place	Topic
1.	25—10—86	Dr. E. G. Tulapurakara	Meteorological Dept. Nungambakkam.	Use of Hot Wire Anemometer and Laser Doppler Annemometer for Turbulence Measurements.

Research Publications:

S.No.	Author/s	Title	Journal or Conference, Year and so on.
(1)	(2)	(3)	(4)
1.	G. Subramanian and T. S. Balasubramanian	Adaptation of a High Precision Triangular Element For Stepped Plate Vibration.	J. of Sound and Vibration, 108 (1), July 1986, 172—175.
2.	G. Subramanian and T. S. Balasubramanian	A higher order element for stepped rotating beam vibration.	J. of Sound and Vibration, 110(1), 1986, (167-171).
3.	G. Natarajan, G. Subramanian and T. K. Varadan	Convenient construction of Tetrahedral finite elements for the quasiharmonic eqn.	Computers and Structures, 25(2), pp 303-306, 1987.
4.	C. R. Babu, G. Subramanian and G. Prathap	Mechanics of field Consistency of Infinite element Analysis a penalty function approach.	Computers and Structures, 25(2), 1987.
5.	G. Subramanian C. V. Raghava Rao and K. Pramadavalli	Circular cylinder in a flow field with parabolic vorticity Distribution — A Numerical Study	Computers and Mathematics, 1987 (To Appear)
6.	G. Subramanian and P. N. Akella	A Selective diffraction order based lens-plane grating shearing interferometer for study of bent plates.	Strain (To Appear)
7.	A. K. Sreekanth	Monte Carlo Molecular Flow Solutions to Certain Internal Flow Problems and thin experimental verification	15th R. G. D. Symposium Grado, Italy, July 1986.
8.	A. K. Sreekanth	Aerodynamics of Wind Mills	Reg. J. Energy Heat Mass Transfer, Vol. 8, Nov. 4, 1986.

S.No.	Author/s	Title	Journal or Conference Year and so on.
(1)	(2)	(3)	(4)
9.	Ramjee. V., Tulapurkara, E G. and Balabaskaran, V.	Experimental and theoretical study of wings with blunt trailing edges.	J. of Aircraft, Vol. 23, Ap. 1986. pp 349-352
10.	Ramjee, V. and Tulapurkara E.G.	Flow behind bluff bodies.	Proceeds of 37th annual general meeting of Aero. Soc. of India, Calcutta, Dec. 20—21, 1985.
11.	G. Prathap and T. K. Varadan	Inelastic Post — Buckling of columns	Trans. of ASME, J. of App. Mech., Vol. 53, No. 3 pp 719—721, Sep. 1986.
12.	S. Krishnan and C. Periasamy	Low pressure burning of Catalyzed Composite Propellents	AIAA, Vol. 24, No. 10 Oct. 1986, 1660—1675.
13.	T. K. Bose	Thermophysical and Transport Properties of Multiple Component Gas plasmas at Multiple Temperatures	Progress in Aerospace Sciences, 1986.
14.	T. K. Bose	Thermodynamic Analysis of a Seeded Combustion Plasma.	4th Joint Conference on Thermophysics and Heat Transfer, Boston/Mass June 2—4, 1986.

APPLIED MECHANICS

The materials pertaining to this department are furnished below :

Quality Improvement programme :

	M. Tech.	M.S.	P. D
No. of Trainees so for	6	...	22
No. on rolls	1	...	1

Important Lecturers and Seminars

1. Prof. R.C. Schroter, Imperial College, London
2. Prof: L.M.F. Landsmeer, Univ. of Leiden, Leiden
3. Prof. P.C. Sethi, Jaipur

Research Publications

No. of papers published-56

Departmental Projects

1. Computer aided design of Turbine Rotors in Micro-Computer Environment (sponsored Project from BHEL, Hyderabad)
2. Aerodynamic testing of bus model (Jeeva Jet) for M/s Jeeva Transport Corporation
3. Wind anemometer Testing for M/s Lawrence & Mayo Ltd.
4. DST. Project-Flow around 3 dimensional bluff bodies relevant to building and environmental aerodynamics (on going)

Assistance to Industry:-

1. 3D Thermal Stress Analysis of Design of Horizontal flange joints of Industrial Steam Turbines (Consultancy Project from BHEL, Hyderabad)
2. Stress Analysis of Continuous Centrifugals, KCP Ltd. Madras
3. Stress Analysis of auto setting mill-Walchadnagar Industries Ltd , walchandnagar
4. Stress and Dynamic Analysis of Centrifugal Fan Impellers, Bharat Heavy Electricals Ltd., Ranipet
5. Seismic testing Busducts, CTS, VCTs
6. Analysis of Transmission Lines and Stockbridge damper testing for INDO Asiatic Corporation, Calcutta.
7. Noise level measurements for Fenner India Ltd. Madras.
8. Vibration Test on power cylinder assembly M/s Instrumentation Ltld., Palghat, Kerala
9. Design of Acoustic Enclousure for M/s Best and Crompton Engg. Ltd., Madras.
10. Failure Analysis of 800 HP BHEL Motor

New Major Equipment added

1. Micromanometer and A blower with a motor
2. Heavy Duty Double Mass exciter

Visitors to the Department

1. Prof. R C. Schroter, Imperial College, London
2. Prof. L.M. F. Landsmeer, Univ. of Leiden, Leiden
3. Prof. P.C. Sethi, Jaipur
4. Dr. Herrman, Director, DAAD, New Delhi and Dr. Schultz, Counsellor (Technical) German Embassy, New Delhi
5. Prof. Rama B Bhat, Dept, of Mech. Engg , Concorida University, Montreal, Canada
6. Prof. H. Irretier. Institute of Mechanics, University of Kassel, West Germany

Invited Lecturers delivered by the staff

Prof. T. M. Srinivasan, in Univ. of Kula Lumpur, Malayasia

Developmental Programme in the near future

Introduction of M. Tech Programme in Biomedical Engineering.

CHEMICAL ENGINEERING

Serving Teachers Program

1. Quality Improvement Programme :

Number of Trainees

Presently working — — 2

2. Important Lectures and Seminars (Guest Speakers)

1) Prof. Dr. Ing. UNBEHAUEN, West Germany
2) Prof. Dr. Ing. H. Brauer, Technical University of Berlin
3) Prof. S.V. Babu, USA
4) Prof D. Ramakrishna, Indian Institute of Science, Bangalore
5) Prof. K.V.S. Sastry University of California, Berkeley, USA
6) Dr. Kameswara R. Upadrashta University of Minnesota USA
7) Prof. Dr. R. Mutharasan, Chemical Engineering, Drexel University Philadephia, USA
8) Mr. R. Lakshminarayanan, Department of Mechanical Engineering University of Texas, Arlington, USA

3. Research :

Research Publications :

		M.S.	Ph.D.
1. Papers published	10		
2. Papers presented	18		
Completed		3	3
on Going		9	24

4. I.C.C. including Retainer Consultancy

1. Hindustan Latex Limited, Trivandrum
2. Laksmi Strach, Bombay
3. Harihar Polyfibres,Kumarapatnam
4. Seshasayee Papers
5. E.I.D. Parry, Madras
6. General & Industrial Leather Co. Ltd. Madras
7. Madras Coats, Maduai
8. Union Company
9. Bush Boake Allen India Ltd. Madras
10. Thirumalai Chemicals, Ranipet
11. Madras Fertilizers Ltd. Manali, Madras

12. Aditya Explosives Pvt. Ltd. Madras
13. Ceramic Systems, Madras
14. Dhrangadhara Chemicals, Tirunelveli
15 Madras Industrial Linings Ltd.
16. K.C.P. Limited, Madras
17. Sriram Fibres Ltd.,
18. M/s. Joy Foams Limited, Madras
19. M/s. Beardsells, Madras

5. Retainer Consultancy

a) Prof. Y.B.G. Varma,
b) Prof. C.A. Sastry

i) Hindustan Latex Ltd. Trivandrum
i) Lakshmi Starch Ltd. Bombay
ii) Harihar Polyfibres Kumarapatnam
iii) Seshasayee Papers

6. Visit to the Department

a) Prof. Dr. Ing. H. UNBEHAUEN, West Germany
b) Prof. Dr. Ing. H. BRAUER, Technical University of Berlin, West Germany

7. Invited lectures delivered by the staff

1. Prof. T. Gopichand : i) Fluidized Bed combustion Technology

2 Dr. M. Satyanarayana i) Studies on Bio-conversion in fixed bed reactor using immoblized enzymes-Delivered at Institute for Technische Chemic, Hannovar, FRG

3. Dr. Y.B.G. Varma Delivered lecture in the QIP Short-Term course conducted by Mechanical Engg. Dept. on Fluid Particle System and Multi stage Fludization.

4. Dr. N. Subramanian 3 Lectures in Polymer Rheology, sponsored short-term-Institute of Polymer Technology, Cochin University
Mixing on Polymer Processing, R R.C. Kalpakkam

5. Dr. C.A. Sastry,
1) Keynote address in an internal seminar on Env. pollution Kaula lumpur
ii) Address given in First Asian Science & Technolology conducted by ESCAP at Kaula lumpur
iii) Guest lectures in REC, Warangal
iv) Guest lectures in Annamalai University, Chidambaram
v) Lectured in courses conducted by Engg. Staff College, COSTED etc.

6. M.S. Ananth	i) Reactor Research Centre, Kalpakkam. 2) Central Leather Research Institute, Madras. iii) SAIL, RANCHI.
7. Dr. T. Venkatram	1) Summer course on Maintenance of Waste water Treatment Units, Department of Civil Engg. IIT, Madras. 2) Summer School in Chemical Engg. I.I.Sc. Bangalore.
8. Dr. D.V.S. Murthy	1) Course on Solid Waste Management - Engineering Staff College of India, Madras, Waltair.

h) Any other item of special interest:

1) All India Chemical Engineering Students Congress has been held in January 1987.

2) Proceedings on Advances in Particle Technology has been edited by Prof. M. Ramanujam and brought out by the Department of Chemical Engg.

3) 3 micro computers have been added to the department

4) Preparation of "Teachers Manuals" for Chemical Engineering Education Centre.

5) Dr. N. Subramanian was nominated Member of the National Organising Committee for the International Conference on Rubber and Rubber like materials, Jamshedpur. He also chaired one session during the Conference.

CHEMISTRY

1. New Sponsored projects :

a) IC AR sponsored project for microbial technology and microbial technology anaerobic conversion of biomass.

(Dr. T. S. Chandra).

b) 'Generation of Atomic and Molecular wave functions' DST sponsored project with funding of 2·85 Lakhs.

(Dr. M. S. Gopinathan and Dr. Deshmukh of the Dept. of Physics, IIT, Madras.)

c) 'Fundamental studies on the Development of FCC Catalysts' Funded by Madras Refineries Ltd., — to the tune of 28·00 Lakhs

(Dr. J. C. Kuriacose,
Dr. V. Srinivasan,
Dr. C. N. Pillai,
Dr. C. S. Swamy &
Dr. B. Viswanathan)

d) 'Studies on L. Leucocephala Degradation by Methonogenic Bacteria in mixed cultures' DST funded project - to the tnne of 8 9 lakhs (Dr. Mrs. K. Lalitha & Dr. V. Mahadevan).

e) 'Studies on Selenium Biochemistry and Collagen metabolism' CSIR sponsorod project (Dr. Mrs. K. Lalitha).

Visits to Foreign Universities by the Faculty :

(1) Dr. K. K. Balasubramanian visited several Universities in Europe - Sponsored by the INSA - Royal Society of U.K.

(2) Dr. S. R. Ramadas - Invited to visit Tsukuba University, Japan from July 1987.

(3) Dr. G. Aravamudan visited several Universities in Australia - Invited by C.S.I R. Australia (April - June '85).

(4) Dr. G. Aravamudan visited Novasibirsk, USSR as part of a delegation to the Symposium on Solid state Chemistry held there, August 1986.

(5) Dr. Mrs. K. Lalitha visited USA as a fulbright scholar for six months in 1986.

Papers presented & Conferences Attended :

The following staff of this department presented papers and or/chaired sessions at International Conferences.

1. Two papers at the First International Conference on Heteroatom chemistry - at kobe, Japan. (Dr. K. K. Balasubramanian).
2. 'International Union Microbiology'. (Dr. T. S. Chandra).
3. 'International Conference on Biochemistry' Hawan & 'Biotechnology symposium' Singapore. (Dr. Mrs. K. Lalitha).
4. Chairman of the session on 'Organic chemistry of sulphur' at Nijmegen University, Netherlands - Dr. S. R. Ramadas, August, 1986.
5. Tenth International Conference on Phosphorus Chemistry held at Bonn in August 31 - September 6, 1986. (Dr. M. N. Sudheendra Rao).

Invited Lectures by Faculty at Indian Universitites :

1. Dr. G. Aravamudan - National Conference on Electrocatalysis, Baroda, June 1986.
2. Dr. K. K. Balasubramanian - Invited to deliver the Prof. T. R. Govindachari Lectures at University of Madras.
3. Dr. K. K. Balasubramanian - Department of Chemistry, University of Poona (March 1987).
4. Dr. M. S. Gopinathan
   a) III Kanpur, b) Chandigarh, c) Jadavpur University,
   d) IISc, Bangalore.
5. Dr. C. Kalidas
   a) Symposium on Kinetics & Mechanism, University of Jodhpur.
   b) University of Mangalore.

Books published by the Faculty :

'Thermodynamics for students of chemistry' by Dr. J. Rajaram and Dr. J. C. Kuriacose.
Shoban Lal Nagin Chand & Co., New Delhi-7.
Besides these activities our Faculty are on the Editorial panels of Indian & International journals.

New Major equipments installed :

'Hitachi' R - 600 NMR Spectrometer.

Annual Symposium :

The XII Annual symposium in Chemistry was held on 7th and 8th March 1987 at IIT, Madras.

Faculty and Research scholars from the Chemistry Department of local colleges and from neighbouring institutions like Regional - Engineering College, Trichy, Annamalai University participated and about sixty papers were presented.

VISITORS :

1. Dr. V A. Seleznev, Soviet Scientist, USSR.
2. Dr. D. N. Bhalle, Adjunct Director, State University of Leiden, Leiden, The Netherlands.
3. Dr. Marshaknu Andrey and Dr. Oleinysk, Sergey Institute of Physical Chemistry, USSR Academy of Sciences, USSR.
4. Prof. H. Knoozinger, (Indo German Project) University of Munich, W. Germany.
5. Dr. S. S Krishnan, Toronto General Hospital, Toronto, Canada.
6. Dr. Anil K. Bhowmik, Asst. Professor, IIT Kharagpur.
7. Dr. K. K. Bhattacharya, Indian Institute of Petroleum DEHRADUN.
8. Dr. R. Pitchai, Drexel University, U.S.A.
9. PETER S. TIMMS, University of Bristol, UK.
10. Prof. Dr. H. KNAPP, Technical University, BERLIN.

CIVIL ENGINEERING

New Courses Introduced

The B. Tech. curriculam has been revised with emphasis on more elective courses The Syllabi of few B. Tech. courses was also updated.

Important Lectures and Seminars

In addition to the seminars by the post-graduate students and research scholars the following special lectures were held during the year.

	Topic of lecture	Speaker
1.	Indoor climate	Mr. Alan Young Bartlett School of Architecture
2.	Architectural and Building Acoustics	Prof. F.P. Mechel Fraunhofer Institute for Bauphysik
3.	Two dimensional Mathematical Flow Models & Policy Analysis of Water Management	Mr. G.J. Bosselar Ministry of Transport and Public Works, The Netherlands
4.	Urban Drainage Problem & Urban Storm Disposal	Dr. Chris Jefferies Dept. of Civil Engg. University of Dundee, U.K.

Short Term Courses

The following Workshop/Seminar/Short Term Courses were couducted :

1. A workshop on "WATER AND LAND MANAGEMENT IN NARAYANAPURAM REGION, SOUTH MADRAS" - on 28-2-1987.
2. A Short term course and workshop on COMPUTER AIDED DESIGN IN CIVIL ENGINEERING"- 22nd to 27th Sep. 1986.
3. A Short term Course on "FINITE ELEMENT METHOD IN ENGINEERING ANALYSIS"-28th January to 10th Febuary 1987.
4. A Workshop on "STRUCTURES FOR NUCLEAR POWER REACTOR TECHNOLOGY"-25th to 28th February 1987.
5. A Short Training Program on "VIBRATION ANALYSIS OF STRUCTURES"-3rd to 7th February 1987.
6. A Seminar on "RECENT ADVANCES IN CONCRETE CONSTRUCTION"-2nd to 5th March 1987.
7. A Short term Course on ,'DESIGN AND CONSTRUCTION OF TALL CONCRETE STRUCTURES"-23rd to 27th March 1987.

Research and Devolopment

In addition to the M. Tech.,M.S. and Ph.D. research activites, the following Indo-German projects were continued during the year.

1. Appropriate Technology for Rural Housing
2. Water Resources Evaluation and Management Model for Rural Areas with particular reference to Narayanapuram.

Assistance to Industry-ICC

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

Proposed Development Programmes :

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 Low Cost Housing
2. Functional Design of Buildings and study of Built Environment
3. Materials and Systems for Housing
4. Construction Management
5. Coastal and Estuarine Engg
6. Ground Water Modelling
7. System Analysis of Multi Reservoir Projects
8. Flood Management and Surface Water Flow Analysis
9. Foundation on Clays
10. Shell and Special Foundations
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. Pavement Design and Evaluation
18. Computer Aided Design and Civil Engineering System.

COMPUTER SCIENCE AND ENGINEERING

The Department of Computer Science and Engineering has completed three years after attaining the status of a separate department in the Institute. The second batch of B. Tech students in Computer Science will be graduating in July 1987. The M. Tech. programme in Computer Science is Continued with a normal intake of about 35. The strength of research scholars is also growing from year to year.

In addition to the academic program the department supports both sponsored and industrial research activities. This industry oriented work consists of organizing short courses on system support, data processing and computer applications.

The Department of Computer Science and Engineering is actively involved in teaching and research in several modern areas of computer science, such as Artificial Intelligence, Fifth Generation Computing, VLSI Design, Computer Networks, Speech Recognition, Algorithm for parallel and VLSI system, Simulation and Modelling, Microprocesor based system design etc. In particular, the department has major sponsored research projects in Expert Systems, VLSI Design, Computer Networks and Speech Recognition.

The Department has well equipped laboratories for work in the areas of digital circuits, microprocessors, computer systems development, information, sciences, speech and vision, CLASS project, system software etc, There are several mini and micro computer systems available to support the teaching and reseach activities of the Department.

As a central facility, the Department has also an IBM 370/155 and IPL 4443 main frame. systems to cater to the needs of the various departments/centres/sections of the Institute. A 4·5 MIPS fourth generation main frame time sharing computer system with about 100 terminals distributed all over the campus will be installed during this year.

List of Publications

1. B, Yegnanarayana and Arvind Raghunathan, "Representation of Images through group delay functions". IEEE Trans. on Acoustics, Speech and Signal Processing, Vol. ASSP - 35, pp. 237 - 240, Feb. 1987.

2. B. Yegnanarayana, "Signal processing through group delay functions", Proceedings of European Signal Processing Conference, EUSIPCO - 86, The Hague, Netherlands, Sept. 2 - 5, 1986, pp. 101 - 104.

3. B. Yegnanarayana and S. T. Fathima, "An algorithm for bandlimited signal interpolation", Proceedings of International conference on Acoustics, ICASSP - 86, Tokyo. Japan, April 7 - 11, 1986, pp. 1677 - 1680.

4. S. Raman, "Microprocessor - based peripherals for computer input - output in Indian Languages", IETE. Tech. Review, March, 1987, pp. 81 - 87.

5. Ramesh Devangam, C. Pandurangan, "A simple implementation of Warshall's algorithm on a VLSI Chip", Conference on Graphic Theoretic concepts rn Computer Science, Munich, West Germany, June 1986.

6. B. Krishna Prasad, C. Pandurangan, "Inverted spanning tree paradigm on systolic arrays". International Workshop on Systolic Arrays, Oxford, U.K., July 1986.

7. M. K. Ramanujam, 'Preserving Feasibility in LP Problems — Is it a slow or rapid convergence?", Proceedings of XXI Annual Covention of CSI, 1986.

8. M. K. Ramanujam, "New Approaches to solve LP Problems", Ph.D. Thesis, Anna University, February 1986.

9. V. Sirohi, "On the oxisymmetrical & two - dimensional jet of an in compressible pseudo - plastic fluids" International Conference on 'Numerical methods for non - linear problems', Yugoslavia, Sept. 15 - 18, 1986, p. 784.

10. Sirohi, "On forced convention, Wedge flows of Viscoelastic fluids" 31st Congress ISTAM, Gwalior, 1986.

11. S. Jayaprakash, K. B. Lakshmanan and P. K. Sinha, "A new look at the control flow complexity of computer programs", Software Engineering 1986, Southampton, U.K. September 1986.

12. S. Jayaprakash, K. B. Lakshmanan, "Evaluation of control flow complexity measures", Proc, CSI - 86, Calcutta, Jan. 1986.

Sponsored Projects :

	Project	Agency	Coordinator
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 & UNDP	H. N. Mahabala
5.	Laser Link	Indo - German Project	H. N. Mahabala
6.	Digital Design of VLSI	Ministry of Human Resource Development, Govt. of India	H. N. Mahabala
7.	Investigation into scientific super computing	ISRO	C. Pandurangan

Technical Reports .

1. Prepared 9 technical reports on the DOE project "Signal Processing in Acoustic Imaging (B. Yegnanarayana).

2. Fast VLSI algorithms for algebric path problem (Technical report for supercomputing project) (C. Pandurangan).

3. Technical report on the system design and development. (S. K. Ramesh).

4. Designed and developed a sophisticated software for the maintenance of CP directory of VM 1370 (IPL/4443) The software is named 'Directory Maintenance Software'. The software will be implemented in May 1987. (S. K. Ramesh).

5. Published a book "Computer science Vol. I" through Tata Mc Graw Hill. Another Book, Computer Science Vol. II will also be published by them. (R. Dheenadayulu).

Continuing Education Programme :

1. Two microprocessor courses for College teachers from Tamilnadu & Kerala .
   (i) 21 April-17 May 1986
   (ii) 26 May-21 June 1986

Professional Activities :

Dr. B. Yegnanarayan has been appointed as Editor, JIETE and Hon. Editor for Special issue on speech Processing. JIETE.

Dr. H. N. Mahabala has been elected as President, Computer Society of India, and as a Member. Electronics Commission.

Dr. H.N. Mahabala has been appointed as National Coordinator, Nodal Centre on Expert Systems, India Fifth Generation Project at IIT Madras.

Dr. S. Raman has been nominated as Overseas Secretary, Academy of Forensic Application of Communication Sciences (AFACS)

Dr. C. Pandurangan has been invited by CMC Hyderabad, for technical review of "Algorithms, total design and its implications on the performance of AFPP systems.

Dr. C' Pandurangan is serving on the editorial board of the national level journal, Mathematics Teacher.

Dr. C. Pandurangan has been the Convener, National Level Olympiad MO 1987.

Dr. M.K. Ramanujam has been appointed as a Member, Expert Advisory Committee for NICLAI-National Information Centre for Leather and Allied Industries, CLRI, Madras for 1986-87.

Visits Abroad :

Dr. B. Yegnanarayana visited (i) Tokyo, Japan, to present a paper at ICASSP-86 in April 1886, (ii) The Hague, Netherlands, to present a paper at EUISPCO-86, Sep. 1986 and (iii) Centre for speech Research Technology, Edinburgh, U.K. to give a seminar talk on "Singal Dependendent analysis for speech and recognition of Hindi stop constants", September 3, 1986.

Dr. H.N. Mahabala visited AI laboratories in US as part of KBCS project.

Dr. C. Pandurangan visited UK and West Germany to present papers in the Confences.

Dr. Mrs. Kamala Krithivasan is visiting University of Maryland, USA on Fellowship/Scholarship by availing Sabbatical leave for one year from 22-9-86 to 21-9-87.

Consultancy

1. Technical Feasibility study in O/E/N/ Microsystems Limited for State Bank of India, Madras, July 1986. (S. Raman)

2. Development of modules for multilingual ticket printer for Soumag Electronics, Madras-Dec. 86 to Jan. 87 (S. Raman).

3. Provided consultancy services in the modification of the Geological package-State Geological Department. (S.K. Ramesh)

4. Modification of PAT-M4 software and development of necessary interface to run the IBM 370 based software in Micro 32 for Survey of India, Bangalore. (N. Rajagopalan).

Seminars/Conferences invited talks

1. B. Yegnanarayana has given invited talks on (i) "Speech Signal Processing", at National Seminar on Acoustics, IIT Bombay, December 9, 1986, (ii) on Computer Recognition of speech in Indian languages-A proposal at the "First National Conference on Knowledge representation and inference in Samskritham", in Bangalore, Dec. 22, 1986 and (iii) on "S peech Analysis Synthesis by Machine, at XIX Annual Conference, Indian Speech and Hearing Association (ISHA), at Mysore, Feb, 5 1987.

Visitors to the Department

1. Dr. Kowalski, Imperial College, London.
2. Dr. Chris Adams, Rutherford Appleton Laboratory, U.K.
3. Dr. Leslie, University of Cambridge, Cambridge U.K.
4. Dr Brian Oakley, Director, Alvey Advanced Information Technology, U.K.
5. Dr, V M. Matrosov, Professor, Corresponding Member of USSR Academy of Sciences Director of the Irukutak Computer Centre of Siberian Branch (SB).
6. Mr. Ken Maclenzie, Editor, Press and Information Dept., British Council, U.K.
7. Dr. M. Venkatesan University of Minnesota was at the Department as Visiting Faculty from 5th September 1986 to November 1986.

CHANGES IN STAFF POSITION

1. Dr. K.B. Lakshman, Associate Professor, resigned from the Intitute.
2. Dr. M. Manohar, Assistant Professor resigned from the Institute.

ELECTRICAL ENGINEERING

Invited Lectures by Distinguished Visitors

1. Prof. LEPPAVUORI, Head Microelectronics Lab., University of Oulu, Finland.

   'Some aspects of the work in the field of Microelectronics in the view of Oulu'.

2. Mr. BRIAN OAKLEY, Director, Alvey Project. 'Fifth Generation Computing'

3. Professor R.G. RHODES, University of Warwick, Coventy, U.K. 'A survey of the III-V Semiconductor Opto-electronic devices and their application to Communication Systems'.

4. Dr. V. VISWANATHAN. At & T Bell Labs. A CAD System for Circuit Design Optimization'.

5. Prof. M. J. MILLER, South Australian Institute of Technology

   (i) Automatic repeat request systems for error control in data networks.

   (ii) Error Detection Coding systems for data Transmission.

   (iii) Review of forward error correcting codes and applications.

6. Dr. R.S. SRINIVASAN, AT & T Bell Laboratories. 'Semiconductor Devices & MBE of II, VI Compounds.

7. Professor VITTAL P PYATI, Dept. of Electrical and Computer Engineering, Airforce Institute of Technology, U.S.A.

   (i) Advanced Radar Techniques and Systems

   (ii) Electronic Warfare and Counter Measures.

8. Dr. BHASKAR RAMAMURTHY

   'The Latest Band Wagen in Source Coding'.

9. Prof. S. SRINIVASAN, Department of Engineering, Sanjose University, U.S.A. 'Recent Trends in DSP Architecture'.

10. Prof. J. HOLZ, University of Wuppertal, West Germany:

    (i) 'Load sharing control of a High Power Uninterruptible Power Supply System'.

    (ii) 'Concepts for High Power Inverter wlth Pulse with modulation control.'

11. Dr. S. RAJARAM, Bell Laboratories, USA 'Heat Transfer in Electronics Equipment and Devices

12. Dr. Ing. LUDWIG, STENGRE Rescarch Institue of the German P & T Darmstadt, West Germany' 'Coding for Video Signals for Digital Transmission'.

13. Prof. K.R. RAO, University of Texas, Arlington, USA 'Data Compression'.

2. **Invited Lectures by Staff**

(i) Prof. A. Kuppurajulu,, 'New Trends in Electric Energy Management Systems' IEEE Madras Chapter on Computers and Communication, December 1986.

(ii) Dr. S.S. Yegnanarayanan

(a) Fields and Forces In Line Traps' W.S. Insulators of India Ltd., Bangalore January, 1986.

(b) 'Charge Simulation Method and Finite Element Method of Electric Field Calculation in Electrical Power Apparatus and Systems' Central Power Research Institute, Bangalore, August 1986.

(iii) Prof. J. P. Raina

(a) 'Detectors for Optical Communication' International Workshop on Optical Communications, March 1985, IIT Madras.

(b) 'Digital Hardware Design Architecture Algorithms and Software Aids', IIT Delhi.

(iv) Prof. V.G.K. Murti, 'Modern Trends in Instrumentation' Regional Engineering College, Calicut, June 1986,

(v) Prof. P. Sankaran

(a) 'Compensating Networks for testing of Ferromagnetic meterials', ISTE Summer School on 'Modern Trends in Instrumentation', Regional Engineering College Calicut 1986.

(b) 'Miroprocessor based Measurement of Symmetrical Components in the presence of harmonics', VRCE Nagpur.

(c) 'Electronics Phase Balancing of 3 phase loads for low power loads' Power Engineer's Training Society, Nagpur.

(vi) Dr. V. Seshadri

(a) Adaptive Control and Robotic Applications

(b) Pattern Recognition and Learning Systems in Robotics, IEEE Convention, Madras.

3. Educational Activities under QIP

A Summer School on Design and Application of Large Electric motors is proposed to be held in June 1987.

4. New Equipment procured under various schemes

General :

(a) DEC VAX-11/750 32-Bit Computer with 2 Mb main memory, 456 Mb harddisk storage, Tape, Floppy drives, 300 lpm printer and 10 terminals and an interactive Graphic Display Unit.

Robotics :

(b) A robot with controller and Computer along with microprocessor based process controller has been received as a gift from Alex. von Humboldt Foundation.

Machines :

(c) 25 kVA 3 phase PWM Inverter has been receivsd as a gift from DAAD.

Communication :

(d) Tracking Scope model TR 4120.

(e) Spectrum Analyser TR 4132.

Control :

8086 and Z80 kits.

T. V.

(f) Video Cassette Recorder, multi-standard Model No. MR 7600 MS.

(g) Monitor/Receiver Model AV - 20 ME Multistandard.

(h) High Resolution Monitor 40 MHz, CONRAC.

(i) Expander System for PDP 11/23 : Mag Tape System.

Semiconductors :

(j) High Resistivity DI System.

(k) Alloying Furnaces.

(l) Ellipsometer.

(m) Junction depth measurements system.

(n) Film Thickness Monitor, Colour Graphics.

Measurements :

(o) Instrumentation Tutor.

5. Laboratory Facilities Created :

(i) Philips Oscilloscope PM 3206, 15 MHz.

(ii) Iwatsu Oscilloscope SS 5321, 250 MHz.

Machines :

(iii) Experimental Rigs for Analysis of Power Electronic Circuits.

Communications :

(iv) Digital Communications Experiments set-up.

Semiconductors :

(v) DLTS System.

(vi) New Furnace Systems.

(vii) High Pressure Oxidation System for Silicon and GaAs.

6. Seminars and Symposia Attended :

(a) IETE Annual Convention at IEEE Bangalore ...Dr. J. P. Raina.

(b) National Seminar on Dry type Epoxy Impregnated Transformers, held at Madras. 1986. ...Dr. G. Sridhara Rao.

(c) Indian Engineering Congress, January 1987. held at Calcutta ...Dr. D. K. Banerjee.

(d) International Symposium on Power conversion and Industrial Controls (IEEE Singapore), 'A pure Sinusoidal Utility supply for low power loads', Paper presented by Dr. P. Sankaran.

(e) National Symposium on High Voltage DC Transmission IIT Bombay, April 1986 and A course on EMTP, conducted by NTPC New Delhi. Jan. 1887. Dr. C. Venkataseshiah.

(f) 13th Annual Convention of IEEE (India Council) December 1986. ...Dr. V. Seshadri.

7. R & D Under Progress :

Control :

Design of Controllers for current fed inventor drive.

Semiconductors :

Studies on Native Oxide on InP and their surface characteristics: Polycrystalline. sillcon Solar Cells. MOS studies on GaAs, Microelectronics.

Communications :

Group Delay Functions and their applications to Digital signal Processing.

Machines :

(i) Homopolar Generator for pulsed Power Applications.

(ii) Reswitching Transients and their effects on H.T., motors.

(iii) Microprocessor based Controller for a doubly fed machine.

(iv) Study of Ferroresonance phenomenon using Electromagnetic Transients Program (EMTP).

(v) Design Optimization of 3 phase induction machine.

High Frequency Technology :

Fin Line Components in the Microwave region.

Power System :

(i) Integrated Real Time Controller for on line control of Power systems.

(ii) Power System Simulator for Energy Management Centres.

(iii) Automatic Generator Control and Power System Stabilizers.

High Voltage :

Pollution Performance of Insulators under high direct voltages.

T. V.

(i) Fibre Optic Communication System for Vijayanta Tank.

(ii) Impulse Response characteristics of Fibres and automatic measurement unit.

(iii) Digital F.D.C. System for Aircraft.

Control and Guidance :

Pattern recognition system for Photohoming of missiles.

T. V.

(iv) Optical couplers - development.

(v) Low bit rate colour TV Signal Codec.

Measurements :

(i) Laser Current Transformer.

(ii) Microprocessor based testing of Ferromagnetic materials.

8. Indo German Collaboration :

Control :

Induction Motor Drive Units.

High Frequency Technology

Microwave Communication Systems.

9. Assistance to Industry

Measurements :

(a) Measurement of Ferromagnetic materials.

Machines :

(b) Finite Element Analysis Programme for Electric Field Calculations.
M/S W. S. Insulators India Ltd., Madras.

(c) 450 HP, 3·3 kV 3 phase shipp ring 8 pole Induction machine redesigned for 6 pole, 600 HP rating... MRF Ltd., Madras.

(d) Failure Analysis of a 800 HP SRIM for MRF Ltd., Madras.

(e) Feasibility studies on 1·5 MJ Homopolar Generators (ARDE) Poona.

(f) Optimization of 3 phase and single phase induction motors.
M/S Southern Industrial Corporation Madras.

(g) Line loss calculation for M/S English Electric Co., Ltd, Madras.

High Frequency Technology :

(h) VHF/UHF propagation studies for (TRC) Telecommunication Research Centre.

Power Systems :

(i) Power system studies of EHV Network of Southern Region for Neyveli Lignite Corporation.

(j) Load Flow studies for TNEB system.

High Voltage :

(k) Development of impulse peak voltmeter.

(l) Trigger control unit for impulse generator.

Control & Guidance :

(m) Switched Mode closely regulated power supplies (I kw ratings).

Semiconductors :

(n) Polycrystalline solar cells - BHEL corporate.

10. Industrial Testing :

High Voltage :

(a) Impulse Testing of Transformers and Reactors.

(b) Pollution performance of Railway Insulators.

(c) RIV tests on Insulators.

Machines :

(d) Testing of valve actuator induction motor and calibration of dynamometers, M/S Beacib Rotak Ltd., Madras.

(e) Integrity of a rewound 20 HP motor - for a Textile Mill in Madras.

Measurements :

(f) Peak Losses in Bus-ducts for Best and Cromption Co , Ltd.

(g) Error Measurement of Instrument Transformers.

(h) Performance Evaluation of uninterrupted power supplies.

11. Publications :

1. An Electronic phase balancer for 3 phase 3 wire loads, P. Sankaran and V. Jagadeeshkumar Proce. IEEE, Vol. 74 No. 1 pp 233 - 34 - Jan. 1986.
2. A microprocessor based measuring instrument for rapid testing of transformer core materials, P. Sankaran, V. Jagdeesh Kumar and V. G. K. Murti - IEEE Trans. Power Del. Vol. PWRP - No. 4, pp 19-22 Oct. 1986.
3. High Sensivity MOS Varactor, P. R. S. Rao Solid State Electronics, Vol. 29, No. 11, pp 1137 - 1144, 1986.

4. A phase unwrapping algorithm, V. V. Rao, Proceedings of International Conference on Signal Processing EUSIPCO, 1986.

5. Group Delay Functions for Complex Signals, V. V. Rao Signal Processing, January 1987.

6. Contributions to the Steady state analysis of wind turbine driven self -excited induction generators' Dr. S. S. Yegnanarayanan, V. J Johnny.
Trans. IEEE Energy Conversion, Vol. EC - 1, No. 1, March, 1986, pp 169 - 176.

7. Imbalance characteristics of full and part winding excited double sided linear - induction machine - S. S. Yegnanarayanan - Suryaprasada Rao, Ibid No. 4, Dec. 1986, pp 142-148.

8. An efficient method of waveform generation using Microprocessors - G. Sridhara Rao, Paper No. 348, CEEJ, Oct. 1986 (Canada).

9. Steady State Analysis of a doubly fed machine with a variable frequency, voltage, current source inverter in the rotor circuit - G. Sridhara Rao, International Conference on Electrical Machines 8 - 10 Sept 1986. Munchen, West Germany.

10. Optimum design of current source inverter fed induction motor drives, G. Sridhara Rao, Proceedings, (London) pp 1 - 7, Vol. 134, Part B, No. 1, Jan. 1987.

11. Steady State Analysis of current source inverter fed doubly fed drive - G. Sridhara Rao, International Conference on Power Conversion and Industrial Control IEEE Oct. 1986, (Singapore).

12. Internal Combustion Engine Simulator for Starter Motor Reliability Testing, P. Sasidhara Rao and K. R. Ananda Kumar Nair, XXI International FISITA CONGRESS, Belgrade, Yugoslavia, June '86.

13. A state space approach to the performance analysis of a separately excited d. c. motor using state transition signal flow graph, Vedam Subrahmanyam, Journal of IE (India) Vol. 67, Aug. 1986.

14. Stability Analysis of variable Frequency induction motor using D-decomposition technique, by Vedam Subrahmanyam and K. Surendran, Electric machines and Power Systems, Vol. 11, 1986.

15. Steady State Analysis of a Current Controlled Synchronous motor, Vedam Subrahmanyam and N. Gopalakrishnan Archiv, Vol. 8, July 1987.

16. On the Analysis of a Voltage source Inventer Fed Induction motor Journal IE (India) 1987. by Vedam Subrahmanyam.

17. A method for model reduction to match both time and frequency response, S. N. Iyer and Vedam Subrahmanyam Advances in Modelling and Simulation, Vol. 8, No. 4, 1987.

18. Analyses of a variable speed induction motor employing static slip energy recovery scheme, Vedam Subrahmanyam and K. Surendran ICEM '86 Munchen. pp 888 - 891, 1986.

19. Stability Analysis of an induction motor with a converter cascade in the motor using B - decomposition method K. Surendran and Vedam Subrahmanyam - Conference Record, ICEM - 86, Munchen pp 892 - 895 - 1986.

20. 'Evanescent Mode Technique, Theory and Applications, D. K Banerjee and K. Shenemann- Jour. Inst. Electronics & Telecommunication Engineers. Vol. 32, No. 2 pp-63-68, 1986.

21. Gunn Oscillators for Microwave Communication Systems, D. K. Banerjee and P. D Augustine - 1st Indian Engineering Congress, Jan. 1987, pp 12·01 - 12·18.

22. Representation and processing of Image in phase domain, J. P. Raina, CVPR Conference, San Fransico, 1985.

23. A Novel Polyphase reference sinewave Generator using multiplexing technique, K. N. Pavithran and R. Parimelalagan, IEEE Trans - On Industrial Electronics pp 342 to 344 Aug. 1986.

24. Current Gain of narrow base Transistors by K. Sukulal & K. N. Bhat - Solid State Electronics, U.K., Vol. 29, pp 311 - 316 March 1986.

25. Effects of Emitter base junction gradation on the minority carrier transport in the base region of bipolar junction transitor by K. Sukulal and K. N. Bhat Journal of Applied Physics, U.S.A., Vol. G. O. (10) Nov. 1986.

26. High Sensitivity MOS Varactor by P. R. Rao, K. N. Bhat, K. R. Rao, Solid State Electronics (U.K.) Vol. 29, Nov. 1986.

Books written :

Thyristor Control of Electric Drives by Vedam Subrahmanyam Tata McGraw Hill, 1987.

M. S. Projects

1. A Microprocessor based instrument for measurement of Frequency and other power system quantities, V A. Suresh.
   Guide : K. Ramar
2. Earth leakage Circuit Breakers, S. Ravichandran
   Guide : M. Krishnamurthi
3. Internal combustion — Engine simulator for starter motor reliability Testing, Ananda Kumar Nair,
   Guide : P. Sasidhara Rao
4. Convolutional code based Telecommand System for aerospace vehicles, T. V. Narayana, May 1986.
   Guide : V. V. Rao
5. Computer controlled Mini Lathe Radha Govardhan
   Guide : Dr. V. Seshadri.

Ph. D. Projects

1. Studies on parallel AC/DC. Power Systems K. V. Sundaresan
   Guide : C. Venkataseshiah 1987
2. Integrated Real Time closed loop control Veera Raju
   Guide : A. Kuppurajulu

3. Group delay functions in digital signal processing—G. R. Reddy — Sept. 1986

4. Microprocessor based Instrumentation Schemes for certain power system variables—E. VASU.
   Guides : V. V. Bapeswara Rao and P. Sankaran.

5. Development and applications of Electronic Circuits as compensatory Networks for Electromagnetic Devices by V. Jagadeeshkumar
   Guide : P. Sankaran.

6. Studies on Inverter fed induction motor drives by K. N. Pavithran
   Guide : R. Parimelalagan.

Future Plans :—

Measurements :

Development of Fibre Optic Sensors for current transformers.

Semiconductors :

Studies on the native oxides grown on InP and their characteristics.

Communications :

Communications Theory and Digital Signal Processing.

Machines :

(1) Application of Field Theory to the analysis and design of large and special purpose machines.

(2) Software for power Electronics.

(3) Software for Electric drives.

(4) Microprocessor Controlled drives.

High Frequency Techniques :

Direct Reception from Satellites.

Power System :

Expansion of Power Systems Lab, Data Acquisition Systems to be procured.

High Voltage :

(i) Partial Discharge testing facilities.

(ii) Development of pollution monitoring instruments for High Voltage Power Stations and Sub-stations.

Telivision :

Fibre Optics and Image Processing activities are to be expanded.

Control :

Design and fabrication of drive controllers Semiconductors :

(1) NMC activity in Micro Electronics.

(2) GaAs & InP, MIS devices & Integrated Circuits activity.

Staff Matters :

(1) Dr. M. Venugopal had taken up a foreign Assignment in June 1986.

(2) Dr. S S Yegnanarayanan worked in TVS - LUCAS Ltd., for 4 weeks under AIEI - IIT exchange Programme. This involved work relating to permanent magnet machines for automobiles.

HUMANITIES & SOCIAL SCIENCES

New Courses introduced :

HS 401 — Humanities in a Technological Age : Elective Offered to undergraduate students.

Research Publications :

a) **Research Papers Published :** 12

Invited Lectures by Faculty

1. **Sri V. S. Kumar & Sri S. Mohan**

   Lectures delivered on Report writing to trainees Industrial Engineers at National Productivity Council.

2. **Dr. Dipak Chaudhuri**

   Lecture on "Decision Making — a Scientific Process" at Quality Improvement Centre of the Export Promotion Agency, Government of India, Ministry of Industries at Madras.

3. **Dr. R. N. Anantharaman**

   Lecture on "Psychological Aspects of Safety" at Regional Labour Institute, Madras.
   Lecture on "Psychology of Discipline in Industry" Tamil Nadu Institute of Labour Studies, Madras.

4. **Dr. R. Rajagopalan**

   Lecture on "Impact of Computers on Society", Regional Engineering College, Calicut.

5. **Prof. S. Ambirajan**

   Liberalisation : 'Past, Present, How and Why?' Lecture to the Seminar on 'Liberalisation and its impact on Indian Economy', Centre for Research on New International Economic Order'.

6. **Dr. B. Subramanian**

   a) Zur anamnetischen Struktur der Dichtung Rilkes : at the University of Salzburg, of Erlangen — Nirnberg and Karlsruhe.

   b) Heinring Bo'll's Humanism — Karnatak University.

   c) Rilkes Duineser Elegien — Special Lectures.

MATHEMATICS

1. Research work :

Work is in progress in the various areas of specialization :

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

Applied Probability, Stochastic Processes, Stochastic Neural Models, Inventory Control, Operations 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, Piezo-electricity, Magneto-elasticity, Elasticity, Bio-Fluid Dynamics.

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

Bio-Mathematics, Mathematical Methods, Mathematical Modelling, Optimization Theories.

2. Distinguished Visitors

Academician Vladimirov from USSR visited the department and held discussions on possible mutual collaboration in research.

Among the visiting professors have been :

(1) Dr. Wazir Hasan Abdi (2) Dr. Remy Y. Denis
(3) Dr. R. Balasubramanian (4) Dr. K. Varadarajan and
(5) Professor V. M. Matrosov.

2. Journal of Mathematical and Physical Sciences (JMPS)

The Journal continues to cublish quality research papers. It is now in the 20th year of publication and has crossed 16600 pages of published matter.

4. Symposia/Conferences/Schools attended by Faculty/Scholars

In June 1986, Prof V. B Johri visited Copernicus Centre, Polish Academy of Sciences, Warsaw and delivered two lectures. He participated in GR II International Conference at Stockholm. In October 1986, Dr. Johri participated in the college of Neurophysics at ICTP, Trieste. During December 1986, Dr Johri delivered a course of lectures on Relativistic Cosmology at the Advanced Level UGC Workshop for college teachers at Gorakhpur.

Dr. Y. Nagendra took part in the Indian Science Congress held at Bangalore in January, 1987 and delivered an invited talk in the Statistics Section.

Dr. P. R. Parthasarathy attended the Second Autumn course on Mathematical Ecology in ICTP, Trieste during November—December, 1986 and presented a paper.

Prof. P. Achuthan participated in the II International Conference of Mathematicians held at Berkeley, California and The Statphys 16 Conference at Boston, MASS., USA during August, 1986. He also visited a number of Universities and Centres of Research.

5. Invitation

Dr. P. Achuthan spent the period Sept-November, 1986 at the Kaiserlautern University, West Germany on a DAAD invitation.

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.

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

Dr. C. V. Ragava Rao has, on leave from the Institute, taken up an assignment in Baghdad (Iraq).

An International Conference on Mathematical Modelling in Science and Technology is scheduled for Aug., 1988.

MECHANICAL ENGINEERING

Faculty :

Professors	Associate Professors	Asst. Professors	Lecturers
16	4	23	8
Design Engineers	S. S. O. IIs		
2	3		

Deputation/Assignments Abroad/Resignations/Retirement

The following faculty member has retired from the Department .
Prof. M. C. Gupta

The following faculty member has resigned from the Department :
Prof. M. V. Krishnamurthy

Mechanical Engineering Association :

The following special lectures were arranged :

1. Combustor Modelling and Diagnostics —Dr. P. Sampath, Chief Combustion Technology, Pratt and Whitney, Canada.
2. Developments in Armament Technology —Col. H. S. N. Sastry, Institute of Armament Technology, Pune.
3. Sonntlan Project on Solar Thermal Energy Conversion —Dr. Werner Tanner, Dornier Systems GmbH, West Germany.
4. Introduction to Robotics —Dr. T. Radhakrishnan, Villanova University, Pennsylvania, U.S A.

Other Activities :

1. Inter Production Students Meet.
2. Mechanical Engineering Sports.
3. Mechanical Engineering Quiz.
4. Screening of Technical Films.

Educational Tour :

Pre-final year B. Tech students accompanied by Dr. K. Narayanasamy and Dr. Y. G. Srinivasa went on Industrial Educational Study tour lasting for about 20 days in Nov. December, 1986.

HEAT TRANSFER AND THERMAL POWER LABORATORY

a) Sponsored Projects :

(1) BHEL Projects

(a) Design and Model testing of Horizontal Feed Water Heaters.

(b) Heat Transfer in the casing of Steam Turbines.

(2) **SAIL** Ranchi

Simulation of continuous casting of steel using FEM.

b) Research and Development :

1. Direct Contact Heat Transfer Between immiscible liquids.
2. Subcooled Boiling.
3. Simulation of Casting processes using FEM.
4. Measurement of Thermal diffusivity of metals and liquids.
5. Asympototic solution to radiating fin problem.
6. Development of a thermal infrared dectector.
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 exchange.
15. Analysis of fouling on finned surface.

16 Thermal performance of Dearators.

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) Invited Lectures delivered by the staff :

1. Prof. V. M. Krishna Sastri and Dr. Ajit Kumar Kolar delivered a Keynote lecture on the Bubble Dynamics and Heat Transfer in Fluidized Beds at the 8-th Int. Heat Transfer Conference held at Sanfrancisco, U S.A. during August 1986.

2. Prof. K. N. Seetharamu delivered a Keynote lecture on 'Modelling of Heat Exchangers using Finite Elements' at the Int. Conf. on Computational Mechanics held at Tokyo, Japan during May 1986.

3. Prof. V. M. Krishna Sastri and Dr. Ajit Kumar Kolar delivered a Lecture on Fluidized Bed Heat Exchangers at advanced Study Institute on Heat Exchangers held at Poona during June 1986.

4. Dr. S. P. Venkateshan Visited the Jet Propulsion Laboratory U.S.A. during the summer of 1986 and conducted experiments leading to the development of Acoustic Temperature Profile Measurement system (ATPMS) which has been reported as New Technology by the NASA. During this period he gave two seminars at JPL on (1) ATPMS (2) Use of Hybrid Profiles in the solution of diffusion problems.

5. Prof. V. M. Krishna Sastri and Dr. Ajit Kumar Kolar delivered a lecture on 'Bubble Dynamics and Heat Transfer on Fluidised beds at the Int. Symposium on Boiling Condensation and Two phase flows held at Waltair during January 1987.

6. Prof. K. N. Seetharamu delivered a lecture on 'Effect of Non uniform boundary conditions on Film boiling' at the Int. Symposium on Boiling' Condensation and Two Phase flows held at Waltair during January 1987.

7. Prof. K. N. Seetharamu delivered a series of lectures on the Application of Finite Elements Methods to Heat Transfer Problems to the Engineers of Brakes India Ltd. Padi, Madras, as well at the Anna University, Guindy, Madras.

Visit of Foreign Scientists

1. Prof. J. N. Reddy of Virginia Polytechnic Institute and State University, visited the department and delivered 3 lectures on applications FEM in Stress Analysis and Heat Transfer during June 1986.

Winter School

Prof. K. N. Seetharamu and Dr. N. Siva Prasad conrdinated a Winter School 'On the Applications of Finite Element Methods in Mechanical Engineering to the Engineers from Industry under the auspsices of Continuing education Programme.

HYDROTURBOMACHINES LABORATORY

a) **Sponsored Projects :**

i) **ARDB Project :**

The project entitled 'LPR Turbopump Cavitation Prediction is in progress

ii) **CBIP Projects :** (in Progress)

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.
3. Detailed studies on the cavitation behaviour of radial flow pump with special reference to the inlet flow variations.
4. Evaluation of various methods of design of radial flow pump impeller based on the performance and cavitation behaviour.

iii) **D. S. T. Project :** (Started)

1. Cavitation and unsteady flow studies in tubular/bulb turbine suitable for mini-micro hydro power plants.

b) **Research and Development :**

1. Studies on the influence of number of blades on the performance of the Bulb Turbine is completed.
2. Application of surface vorticity method for the analysis of 'S' blade profiles has been completed.
3. Visual studies of unsteady cavitation in a radial flow pump has been completed.
4. Return flow studies in a centrifugal pump is in progress.
5. Studies on blade profiles for wave energy air turbines are in progress.
6. Studies on the application of surface vorticity distribution method for separated flows has been started.
7. Further studies on cavitation, noise and vibration on centrifugal pumps has been started.

c) **Research Publications :**

1) V. Balabaskaran, R. I. Lewis and H. C. Radha Krishna 'Application of Surface Vorticity Distribution Theory for the Analysis of flow through Axial Flow Hydroturbomachines'. accepted for publication in Irrigation and Power Journal.

2) S. Kumaraswamy and H. C. Radha Krishna, 'Computer Aided Design of Radial Flow Pumps', accepted for publication in Irrigation and Power Journal.

3) S. Kumaraswamy and H. C. Radha Krishna, 'Cavitation Studies of Centrifugal Pumps', accepted for publication in CBIP Journal.

4) H. C. Radha Krishna, M. Ravindran and S. Nilavalagan, 'Optimisation of Mixing Tube Length of a Jet Pumps', accepted for publication in Irrigation and Power Journal.

5) H. C. Radha Krishna, P. A. Aswathanarayana and Rm. Ramachandran, 'Characteristics of 'S' Profile runner for fully Reversible Pump Turbine', accepted for publication in Irrigation and Power Journal.

6) M. Ravindran and H. C. Radha Krishna, 'Design and performance of a Pump Turbine for Tidal Power', Special issue of Irrigation and Power Journal brought out of the time of Diamond Jubilee Celebration in January 1987.

d) **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.

e) **Ph.D. Thesis completed :**

Dr. S. Kumaraswamy,

'Cavitation Studies of Centrifugal Pumps'.

INTERNAL COMBUSTION ENGINES LABORATORY

a) Sponsored Projects :

1. Indo - German Project	:	"Development of Alternative fuels for I.C. Engines"
2. DNES Project	:	"Use of Non - Edible Oils as an Alternative Fuels to Diesel for use in I.C. Engines.
3. NSF Project	:	"Combustion of Alcohol & Biogas"
4. Sundram Clayton Project	:	"Mathematical Modelling of two stroke S.I. Engine"

b) Research Publications : International 5

National 9

MACHINE ELEMENTS LABORATORY

a) Research & Development :

1. Friction & Wear studies on sintered brake materials.
2. Frictional Studies on wet clutches.
3. Superplastic forming of Ti and Al alloys.
4. Surface integrity studies on sursulf treated gears.
5. Performance studies on surface treated bearing materials.
6. Analysis of wheels.
7. Kinematics of Robot Manipulators.
8. Design possibilities of Cam - Gear Type Indexing Devices.
9. Design possibilities of large oscillation angle five - bar crank - rocker mechanisms.
10. Dynamic analysis of elastic structures in fluid environments.
11. Surface durability studies on Thermal sprayed coatings.
12. Finite Element Analysis and Ammonia converter using FEM.
13. Stress Analysis of LCV Chasis using FEM.

b) Assistance to Industry ICC :

1. Wear Failure analysis of Girth gears in UPSCC cement mill at Chunnar for KCP Ltd.,
2. Stress analysis of Wheel rims for wheels India Ltd.,
3. Advice to BHEL on 4 - axis manipulator analysis.
4. Lectures delivered at NSTL Vizag in CAD.
5. Stress Analysis of Ammonia Convertor for BHPV.

c) Research Publication :

1. "Performance studies on liquid nitrided gears" S. Krishnamurthy and Dr. A. Ramamohana Rao. Proc. II World Congress on gearing, Paris 1986, paper G3.
2. "Performance characteristics of Sursulf treated gears" S. Krishnamurthy & Dr. A. Ramamohana Rao, Proc. of the 12th AIMTDR Conf. Delhi 1986. pp. 38 - 41.
3. Studies on Iron - Copper - lead bearing materials Rajan Verghese & K. Gopinath, National Conf. on Powder Metallurgy 1987. at Bhopal,
4. Frictional studies on sintered bronze disc clutches. K. Radhakrishnan and K. Gopinath, National Conf. on powder Metallurgy 1987, at Bhopal.

5. Investigations on the pressure thermo forming of superplastic alloys, KSK Chockalingam, D. Viswanathan, S. Venkataswamy, K. Gopinath and K. A. Padmanabhan
Intl. Conf. on Advances in Metal Forming Techniques (ICMF 1987) Bombay.

6. Investigations on Sintered Aluminium Bronze Friction Material. V. Sridhara & K. Gopinath 13th National Conf. of P/M 1987 at Bhopal

7. K. Lakshminarayana and B N, Kumar: A Note on Dwell - Cam Follower - Motion Synthesis: Mechanism and Machine Theory, Vol. 22, No. 1, pp. 65 - 70, 1987.

8. K. Lakshminarayana and K. Ch. Butchi Raju, Function Cognates of the RSRC Mechanism: Mechanism and Machine Theory, Vol. 22, No. 2, 1987.

9. M. M. Mayuram & R. Krishnamurthi, Evaluation of Cohesion strength of sprayed metal surfaces through a simple modification in the shear bond test. 11th Int Thermal spraying conf. Montriel Canada, Sept. 86, pp. 829 - 836.

10. Arun, Koshy Abraham, N. Sivaprasad, Automatic Mesh Generation for 3D Surfaces 1st National Conference Science & Technology CS Group July 1986, Bangalore.

d) Important Lectures/Seminars (by outside experts)

1. Prof. Shyam Bahadur.
   4 Lectures on Wear of Materials.

e) Visitors to the Department :

1. Prof. Shyam Bahadur, Iowa State Unit Ames, Iowa U.S.A.
2. Prof. Bechtloff, Armed Forces University Hamburg, West Germany.

f) Brief indication of developmental programmes :

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

g) Any other information :

Digitor and electronic typewriter compatible aurolec computer have been added.

MECHANICAL HANDLING LABORATORY

Sponsored Projects :

Project on development of an equipment to produce continuous helicoids sponsored by IC & SR was carried out.. Aluminium strips were successfully rolled into a close helicoidal form.

Research and Development :

Developments of computer aided design packages for Pneumatic conveyor and belt conveyors were carried out.

Patent :

A device for lifting and tilting of rolls has been developed for which a patent is applied for.

Assistance to Industry :

Design advice was given to M/s Southern Structurals Ltd., Machine build industries; Machanical assembly system; Marshal and Sons Pvt., Ltd. Technical Assessment of the requirement in M/s. Indian Granite Ltd., was carried out.

Research Publications : 3

Important Lectures & Seminars :

Delivered a series of lectures on Material handling at Regional Engineering College. Trichy.

Invited lectures delivered by staff :

Lecture on Pneumatic conveying at MECON, Ranchi, Key note address at National Materials Handling Council, Bhilai.

PRECISION ENGINEERING AND INSTRUMENTATION LABORATORY

a) **Sponsored Projects** :

1. Investigations on Wear and Noise in Sintered Bearings''—CSIR Rs. 1,23,200/-
2. ''Dynamic Modelling of Gyroscopes'' Proj. No 10/43/ARDB/82/DVRL—Rs. 5,99,720/-

b) **Research and Development :**

1. Pole assignment in multivariable Control System.
2. High Speed Servo Actuators.
3. Force/Torque Sensors in Robots.
4. Wheeled and legged locomotion.
5. Finite Element methods in Robot application.
6. Platform Structures for fine manipulation.
7. Precision Plastic gearing transmission behaviour.
8 Microprocessor Based System Design.
9. Parameter Estimation in turning.
10. Dynamic Modelling of Cutting forces in turning operations.
11. Dynamic analysis of hydraulic circuits using power flow modelling.
12. Error Analysis in the measurement of important parameters in Space engine testing.

c) **Assistant to Industry—ICC :**

Projects : ITC limited packaging division, Investigation on the behaviour of a rotary cutter in a High Speed Web printing machine.

d) **Research Publications** : Papers Published : 8

1. ''Frictional characteristics of flanged sintered bearings'', National Conference on Industrial Tribology, Dec. 1986, Bombay—R. Raman and P. Iyamperumal.
2. ''Mechanical Design aspects of a dual magnification optical system'', Inst. of Engrs. Sem. annual paper meeting, April 12, 1987, A. M. J. Basha, M. Singaperumal and Narayanasami.
3. ''Computer Aided Design of port plate for Micro-Hydraulic Axial Piston Machine and Performance tests on it'', Proc. ASME Fall Design Engs. Conf. Sept 1986, New York, M. Singaperumal and M. A. Veluswamy.
4. ''Condition Monitoring iu Fluid Power'', Presented at the First Regional Seminar of FPSI, Madras, Aug. 1986, Dr. B. V. A. Rao and M. Singaperumal.

5. "A Robot for Quality Control of Turned Components", T. Nagarajan, A. V. S. Bhaskar. Samuel, 12th AMTDR Conf. New Delhi, Dec. '86.

6. "A Mobile 4-legged robot for unmanned material handling in an industrial environment", T. Nagarajan, A. V. S. Bhaskar, 12th AMTDR Conf. New Delhi, Dec. '86.

7. "Force torque sensors for cognitive manipulation", T. Nagarajan, and Vinayak Hegde, 12th AMTDR Conf., New Delhi. Dec. '86

8. "Vission Seam Tracking", Rm. Thirupthi and V. Swarna Radha, presented in Southern Regional Symposium on 'Recent Trends in Manufacturing Processes'. at C.I.T., Coimbatore-awarded First Prize.

e) **Ph.D. Completed :**

1) "Investigation on the optimum configuration for the port plate of a micro - hydraulic axial piston machine", in June 1986, by M. Singaperumal.

2) "An experimental investigation of impact phenomenon in spur geared torsional systems", by Mr. Penchalayya in Dec. '86·

3) "Investigation on the Effects of some Parameters on Sintered Bearings", by P. Iyamperumal, Feb. '87.

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

A research project for Integrated System Adaptive Control of CNC machines is envisaged.

Development of Mobile Robots with sensors to identify and overcome obstacles is envisaged.

g) **Summer School/Invited Lectures :**

i) Industrial Robotics - in June '87.

ii) Industrial Pneumatics - Short Term course under Continuing Edn. Programme for M/S. Sundaram Clayton, Madras.

iii) Invited lectures on Measurements, Industrial Pneumatics and Microprocessors for M/S. Sundaram Clayton, Brakes Division, Madras.

iv) Invited lectures on Measurement, Electronics and Microprocessors for M/S. Hindustan Motors, Tiruvallore.

PRODUCTION ENGINEERING AND MACHINE TOOL SECTION

a. Sponsored Project :

1. DAE Project on Study of Wear of Engineering Surfaces by Radio Active Techniques.
2. DST Project on Electro - chemical Machining, Electro - chemical studies and surface production.

b. Research and Development :

Ph.D.	—	3
M.S.	—	4
M.Tech.	—	17 + 10 under Users Oriented Programme.

c. Assistance to Industry :

1 M. Tech under SANDVIK Asia Fellowship.

1 M. Tech under WIDIA (INDIA) Fellowship.

ICC work to Cut - fast Abrasives in machining.

ICC work to Guindy Machine Tools in measurements and gauging.

ICC work to Amalgamations Repco Ltd., in surface finish.

ICC work to Shri Ram Fibres Ltd , In surface finish.

d. Research Publications : 35

e. QIP/UGC Fellowsihp Programme :

Ph.D.	—	8
M.Tech.	—	2

f. Visitors to the Laboratory :

The Consul General of the Union of Soviet Socialist Republic at Madras.
Representatives from DAAD.
The Head, Max Muller Bhavan, Madras.

g. Brief indication and development programme :

Research and development on Metal Cutting, Surface characterisation, Surface Integrity, Gear Tribolgy, Unconventional Machining, Group Technology, EDM, ECM, CAD/CAM, etc.

h. Invited lectures delivered by the staff :

1. College of Engineering, Guindy.
2. A.T.I. Guindy.
3. Madras Productivity Council.

i. **Patents:** 5

j. **Educational Programme/Continuing Education Programme:**

1. HAL Management Trainee Programme.

k. **Major Equipment added:**

1. CNC Trainer Lathes.
2. Machining Center —Fanuc System 6 M.

l. **Any other information:**

One Day seminar on 'Computer Aided Manufacturing' has been conducted on 6—12—86 by the CAD - CAM Centre of Production Engineering Section.

Three Months Training Programme has been arranged for 2 Philippines.

REFRIGERATION AND AIRCONDITIONING LABORATORY

A. Sponsored Projects :

1. Study of thermal problems in ground based navigational equipment - Department of Electronics (Completed).
2. Utilisation 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— Indo - Australian Project - Department of Non-conventional Energy Sources (concluded).
5. Heat pumps and energy conservation - Tata Energy Research Institute.

B. Research/Development :

1. Comparison of working fluids for vapour compression heat pumps.
2. Transport properties of refrigerant - absorbant mixtures
3. Thermodynamic analysis of vapour absorption heat pumps and heat transformers.
4. Bulk 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 aircondioning systems.
9. Computerised cooling load calculations.
10. Heat Pumps operating with refrigerant mixtures.
11. Heat pumps for drying applications.

C. Accepted Ph.D Dissertation :

1. Mr. C. V. S. Murthy : 'Mathematical Modelling of Fired Heaters' (Ph.D)
2. Mr. R. Balasubramanian : 'Investigations on a Vapour Jet Refrigeration System and its Cascade with a Vapour Compression Heat Pump' (Ph.D)
3. Mrs. P. S. Asha Iyer : 'Thermodynamic Analysis of Vapour Absorption Refrigeration Cycles'. (M.S.)

D. Visitors :

1. Prof. Dr. Helmut Knapp of Technical University of Berlin visited the laboratory under DAAD Guest Professor scheme and delivered a series of lectures on liquid mixture.
2. Dr. G. Lacoste of Institut Du Genie Chimique, visited the laboratory.

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 Resources Development, New Delhi to establish a Turbo machinery Lab at REC, Trichy. This scheme is in progress from 1983, February onwards.

2. Ph.D — 1 completed
   — 3 Under progress (external)
   M.S. — 2 Under progress (external)
   M.Tech. — 4 completed

C. Assistance to Industries :

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

1. 'Design, development and calibration of 5 hole pneumatic probes' for BHEL, R & D, Hyderabad.
2. 'Design of an axial flow impeller' for Bharat Bijlee Ltd, Bombay.
3. 'Design and development of wedge probes' for BHEL, R & D Hyderabad.
4. 'Calibration of three dimensional probe for BHEL, R & D, Hyderabad.
5. Design of two dimensional pneumatic probes for Bharat Bijlee Ltd, Bombay.
6. Design and development of pneumatic probes for BHEL, R & D, Trichy.
7. Technical Report on Fire Accident to the Synthesis Gas Turbine of compressor for Coromandel Fertilizers Ltd., Visakhapatnam.
8. Design of Axial ventilating fan for Bharat Bijlee Ltd., Bombay.

D. Research and Publications :

1. M. Govardhan, N. Venkatrayulu 'Effect of Aspect Ratio on Losses in an Annular Impulse Turbine Cascade' Paper presented at the 3rd Asian Congress of Fluid Mechanics, held in Tokyo, Japan Sept. 1986.
2. M. Govardhan and N. Venkatrayulu and D. Prithvi Raj, 'Secondary Losses in a Large Deflection Annular Turbine Cascade'. 'Effect of Entry boundary layer thickness' ASME Paper No. 86 - GT - 292, Presented at the 31st ASME International Gas Turbine Conference and exhibit held in Dusseldorf West Germany in June '86.

3. N. Venkatrayulu and D. Prithvi Raj, 'Effect of Boundary Layer Fences and Casing Treatment in a Centrifugal Impeller' ASME Paper No. 86 - GT - 171 Presented at the 31st ASME International Gas Turbine Conference and exhibit held in Dusseldorf, West Germany in June '86.

4. M. Govardhan and N. Venkatrayulu, 'Blade passage Flow survey through Annular Nozzle cascade-Effect of the entry boundary layer thickness' Paper to be presented in the journal of Aero. Soc. of India Vol. 38 No. 4, November 1986, pp 257 - 265.

5. N. Sitaram, 'Performance studies on an Axial Flow Compressor Stage' Paper to be presented at the Journal of Aero. Soc. of India, Vol. 38 No. 4, November 1986 pp 267 - 275.

6. N. Sitaram and M. Govardhan, 'Effect of Incidence Angle on Wake Charecteristics of a High Deflection Linear Turbine Rotor Cascade', 9th Australasian Fluid Mechanics Conference, Auckland, New Zealand, 8 - 12 December 1986.

7. M. Govardhan and D. Muthuvel Murugan, 'Effect of Space - Chord Ratio on Secondary Losses in a Large Deflection linear Turbine Rotor Cascade' Paper to be presented at the 15th National Conference of Fluid Mechanics and Fluid Power, REC, Srinagar, July 1987.

8. M. Govardhan and N. Venkatrayulu, 'Secondary Losses in an Annular Turbine Nozzle Cascade' with varying Aspect Ratio', Paper to be presented at the 15th National Conference of Fluid Mechanics and Fluid Power, REC, Srinagar, July 1987.

9. N. Sitaram, 'Effect of Blade Loading on Endwall Flows in an Axial Flow Compressor Rotor' Presented at the 15th National Conference on Fluid Mechanics and Fluid Power, REC, Srinagar, July 22 - 24, 1987.

E. Vistors to The Laboratory From Abroad:

1. Prof R. E. Peacock, Director, Turbo Electric (Consultant) Ltd., London, U.K. visited the laboratory for three days from 28 - 30 September '86 and delivered lecture on 'Destabilisation phenomena in Turbomachinery'.

2. Dr. J. D. Denton, Director, Whittle Laboratory, Cambridge University Engineering Department, England visited the laboratory for 3 days from 4 - 6 Jan. 1987 and delivered lecture on 'Computational Methods for three dimensional flow calculation in Turbomachinery.

F. Short - Term Courses/Continuning Education Programmes:

The Laboratory has organised a Summer School in 'Gas Turbine Engineering' for the Teachers of Engineering Colleges under ISTE during May 1986.

THERMODYNAMICS AND COMBUSTION ENGINEERING LABORATORY

1. Publications :

(a) Papers Published in Journals : 12

(b) Papers presented at National Conferences : 15

(c) Papers presented at International Conferences: 3

2. Invited Lectures/Deputation :

Dr. K.A. Bhaskaran was deputed by the Institute to attend and present a paper titled "Acetylene Oxidation : The Reaction $C_2H_2 + O$ at High Temperature, at the 21st (International) Symposium on Combustion held at Munich, West Germany, August 1986.

3. Visiting Faculty to the Laboratory :

Dr. P. Sampath, Head, Combustion Division, Pratt and Whitney Ltd., Canada, visited the Laboratory during July-August, 1986 under TOKTEN Programme. He delivered a series of three lectures in the area of Gas Turbine Combustors.

4. Ph.D. Theses Completed : : 3

5. Sponsored Projects :

ARDB (20-11-1985) Combustion Phenomena in Integral Rocket Ramjet Engines.

6. Research and Development :

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

Combustion Kinetics.

Rocket Technology.

Turbulent Combustion

Spray Combustion.

Combustion in Swirling Flows.

Thermal Applications of Solar Energy.

Solar Refrigeration.

Solar Pumps.

7. Assistance to Industry :

Calibration of Thermocouples, Calibration of Gas Flowmeters, Calibration of Pressure Gauges

METALLURGICAL ENGINEERING

1. No. of research papers published in journals and in press	40
No. of students awarded Ph.D. degree in the Convocation held in 1986.	4
No. of students awarded M.S. degree in the Convocation held in 1986.	2
No. of students completing their requirements for Ph.D.	6
No. of students completing their requirements for M.S.	6

No. of Students Registered :

For Ph.D,	:	Regular	:	25
		External	:	22
M.S.	:	Regular	:	4
		External	:	27

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. Fluidine (P) Ltd.
7) Failure Analysis for N.L.C.

Sponsored Projects :

1. Studies on creep, fatigue and hot corrosion behaviour of Ni_3 Al and similar intermetallics.
   Sponsored by DST of value Rs. 2.91 lakhs.
   Coordinators : Dr. KJL Iyer and Prof. VM Radhakrishnan.

2. Creep and fracture characteristics of austenitic stainless steel with and without weldments. Sponsored by DAE of value of Rs. 4.2 lakhs.

Coordinators: Prof. VM Radhakrishnan, Dr. KJL Iyer and Dr. K. Prasad Rao.

Awards:

Dr. D. G. R. Sharma Lecturer, Met. Engg. IIT Madras	Binani Gold Medal for the best paper in the area of Non Ferrous Metals published in the "Transaction's of IIM during 1985.
Dr. O. Prabhakar Professor Met. Engg.	Binani Gold Medal for the best paper in the area of Non Ferrous Metals published in the Transactions' of IIM during 1985.
Dr. D. R. G. Achar Associate Professor Met. Engg.	H. D Govindaraj Memorial Award for the best paper presented at the National Welding Seminar 1985.

Other Staff Matters:

— Prof. R. Vasudevan was the Coordinator under the International Network Scheme for setting up Mechanical Testing Laboratory at Regional Engg. College, Warangal.

— Dr. D. R. G. 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, Export Committee of Foreman Training Institute Bangalore.

Lectures Delivered by Distinguished Visitors:—

1. Dr. C. Ravindran. Vice-President, R & D Galtaco Inc. Redlaw Industries, Canada (Under IIM-ASM Collaboration)—'Austempering of Ductile Iron'—29-5-86.

2. Dr. T. S. Srivatsav, Materials Modification Inc. Falls church Virginia U.S.A. 'Microstructural on the Fatigue Behaviour of Aluminium— Litium Alloys' on 30-5-86.

3. Dr. S. Nazare, Karlsruhe, West Germany on 23-9-86.

   i) Ceramic Materials—An overview.

   ii) Basic Principles, Processes of Fabrication and properties of ceramics for structural Effects applications.

   iii) Some Example—Non oxide ceramics.

   iv) Some Example—Oxide ceramics.

   v) Inter mettalics—New approach for materials for the gap between superalloys/ ceramics.

4. Dr. Ing. Peter Bogen, West Germany—'Some aspects of Cold Extrusion o! Titanium'.

5. Dr. R. P. Wahi, Berlin—The High Temperature Deformation behaviour of Nimonic PE 16—27th Nov. 86.

6. Prof. Dr. Ing. B. H. Kolster, Twente, University of Technology, Enschede, The Netherlands—Residual Stresses—on 21-1-87.

7. Dr. S. A. David, Tennessee, Prof. R. G. Thompson, University of Alabama, Birmingham., Prof. D. L. Olson, Colorado., Prof. G. R Edwards, Colorado—Welding Exports from U.S.A. on 22-1-1987.

8. Dr. Ravi Menon, University of Tennessee, U.S.A. Welding Metallurgy on 29-1-1987.

9. Dr. E. A. Little, Principal Scientific Officer, AERE, Harwell, U.K.—Radiation Embrittlement of Pressure Vessel Steels on 16-2-1987.

10. Prof. Dr. Ing. H. W. Wagener, University of Kassel, West Germany—Energy Flow, Energy Loses and Efficiency of Eccentric Press System 27—2—1987.

PHYSICS

I. New Projects Approved During The Year :

The following sponsored research projects have been taken on hand in the department:

1. DST Project 'Atomic and Molecular Photoelectron Processes and Related Phenomena' Value Rs. 2·85 lakhs coo dinated by Dr. P. C. Deshmukh and Dr. M. S. Gopinathan.
2. CSIR Project 'Metal Oxide and metal halide graphite intercalation compounds for potential applications of industry value Rs. 82,080/- Coordinated by Dr. V. Ramakrishna Murty.
3. CSIR project 'preparation and characterisation of Indium Tin Oxide (ITO) Heterostructures' value Rs. 1 lakh, coordinated by Dr. A. Subrahmanyam
4. CSIR project 'Transport studies on copper ion conducting glasses' value Rs. 1,02,700/- coordinated by Dr. K. Hariharan.
5. Ministry of Human Resource Development project 'Training in maintenance of cryogenic equipment and study of cryogenic materials' Rs. 16 lakhs during 1986—87 coordinated by Dr. R. Srinivasan, Dr. G. Rangarajan and Dr. V. Sankaranarayanan.

II. Short Term Courses and Conferences Held During The Year :

1. Laser Application in Spectroscopy and Optics (LASO) 5—1—'87 to 10—1—'87.
2. Short - term course on Physics of Materials conducted by the APSO 5—12—'86 to 19—12—'86.
3. Short - term course on 'Fundamentals of Photovoltaic Materials' Two weeks June 1986.

III. Visiting Professors :

1) Prof. Ted B. Flanagan, Department of Chemistry, The University of Vermont, USA an internationally known expert in Metal Hydrides was in the department as visiting professor under the Indo - American Fellowship Programme during January - February 1987, and delivered a series of lecturers and interacted with the magnetics group.

2) Professor KVLN Sastry Department of Physics University of Brunswick, Canada' delivered a series of lectures as visiting professor in the department during Febuary - March 1987 and interacted with the microwave physics group.

3) Prof. E. Gmelin, Max plank Institute Stuttgart FRG - Low Temperature Laboratory - 6 week - delivered 15 lectures.

IV New Facilities Set up in the Laboratories :

1. Design and fabrication of a specific heat Calorimeter and a metallic liquid helium cryostat. Specific heat measurements from 100k down to 4 - 2k can be carried out using a sample holder made of $A\,1_2\,0$.

2. Set up to measure the change in low frequency dielectric constants of crystals on application of Uniaxial stress was designed and fabricated.

3. A microprocessor based measuring cum recording unit has been assembled for recording measuring TL emission spectra of sample at different temperatures.

4. Splat cooling apparatus for the preparation of amorphous samples.

5 Spray Pyrolysis set up.

6. Design and fabrication of set up to measure internal friction in the temperature range 80k - 300k.

7. A modular laser system with inter changeable rod and optics for Ruby, Nd: YAG and Nd: glass.

8. Set up for estimation of hydrogen absorption in metals.

9. Solid state power supply for 2k 25 Klystron was designed and developed.

10. An automatic scanning system with 50 micons at every 5 minutes interval was designed and fabricated.

OTHER REPORTS

Indo German Programme
Central Library
Central Workshop
Institute Hospital
Placement Office
Alumni Association
Weaker Section Students & Foreign Students
Institute Gymkhana
National Cadet Corps
National Service Scheme
Hostel Management
Central Supplies Unit
Construction of Buildings
Administration
Names of Faculty Members
Budget Proposals
Statement of Accounts 1985-86

INDO - GERMAN PROGRAMME

No. of Staff Members Permitted to Visit Federal Republic of Germany :

Faculty	Short term	...	12
	Long term	...	4
Scientific Staff	Short term	...	2
	Long term	...	—

CENTRAL LIBRARY

The following are the significant activities of the Central Library during the period April 1986 to March 1987.

Administration, Reprography and Bindery Division (ARB) :

The Handbook of Library Administration along with its Supplimentary Volume containing patterns for Forms and Registers used in the Central Library is revised by the Librarian in the light of the experience gained by the Staff and published for reference and use by the Library Staff. The Handbook has also been acquired by I.I.Ts. and other organisations in the country for reference and use in their respective Libraries.

The Reprographic Section of the Library is augmented with two more plain paper Copying Machines with enlargement and reduction facilities, one of which is proposed to be kept in the Stacks for on the spot Copying Service to Readers.

While power operated wire-stitching machine has been added to the Bindery for limited quick bindery service, the External binders are retained to clear the ever increasing work in the Bindery.

Acquisition & Processing Division (A & P) :

The Library has acquired and processed books worth nearly Rs. 13 lakhs including Rs. 6½ lakhs for various projects in the Institute.

The Library continues to receive Indian Patents for its depository collection. While the Division has compiled 2 volumes of Abstracts of Theses submitted during the Convocations held from 1980 to 1986, the ARB had seen to its expeditious publication from within the resources of the Central Library.

Circulation, Reference & Maintenance Division (CRM) :

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

A reference desk has been opened to maximise utilisation of Periodicals and other Literature by alerting researchers to publication of articles particularly from non-core journals in their areas of interest. Other assistance to readers was also offered by the Batch Leaders during all the time the Library is kept open.

Professional Assistants are also posted in all the three stacks not only to supervise maintenance of Book stacks but also provide the necessary assistance to readers in retrieving publications in time Registers are also placed in each of the three Stacks and Reading Halls for readers to record for any publication not found in its proper place to be traced and informed.

The Stack Assistants have also in the process of rectifying the shelves and maintaining the stacks traced 1241 out of 2407 publications which were reported as lost during the previous stock verification and thus brought down the number of missing publications by over 50%.

As part of User Education programme the video and other Audio - Visual programmes were conducted periodically. A stock of 30 Video Cassettes and 37 Tape-slide programmes on different subjects has been built up in the Media Resources Section of the Library to conduct Audio-Visual Programmes in the afternoons regularly. These facilities are also extended to groups of Library Science Students who visit our Library on Educational Tour from various Universities of India.

The Book Bank (General) and Book Bank (Weaker Section) continued to be actively used by the students, particularly the later with financical assistance from the State Government.

Periodicals and Serials Division (P&S):

The subscription to periodicals and serials exceeded the budgetary allocation due to escalation of cost and the excess was met by diversion of funds from other sources. An exercise to streamline allocation of funds based on actual requirement of Core Journals for each Department/Centre along with what could be shared with other Departments has been undertaken and this is proposed to be made effective from 1988 onwards/after/due consideration by all the Departments/Centres concerned Renewals of Subscriptions and/follow-up action for expeditious processing of/bills were taken up and completed payment in most of the cases.

The back issues of periodicals were systematically collected and sent to binders and journals as late as early half of 1986 have been bound and made available to Readers.

General:

The staff members mentioned below attended Seminars/Conferences/Workshop noted against their names respectively.

Sri V. S. Nazir Ahmed, Librarian, attended the Sixth Convention and Conference of the Society for Information Science (SIS) held at the Central Electronic Engineering Research Institute (CSIR), Pilani, Rajasthan in December 1986. Theme: "On-Line Information Processing thro, Mini & Micro Computers". He also attended the XXXII All India Library Conference held at Sri Krishnadevaraya University Library, Anantapur, A.P. in January 1987. Thems: "Quality in Libraries".

Sri C Deenadayalu, Deputy Librarian, attended IFLA Pre-session Seminar on "Industrial Scientific and Technological Information for Development: The Role of Special Libraries for National Development" held in Library Center, Kanazawa Institute of Technology, Kanazawa, Japan, Aug. 18—23, 1986. He also attended the 52nd General Conference of the International Federation of Library Associations in Tokyo, Japan, Aug. 24—29, 1986. He published 3 articles and submitted technical paper to the Seminar.

Sri P. Venkatesan, Assistant Librarian (SG) and Sri P. N. Swamy, S.T.A attended and presented papers separately on Regional Seminar on Management and Applications for Micrographics held at CLRI. Madras in December 1986.

Smt. J. Durairaj, Assistant Librarian (SG), Sri K. Sankaran, S.T.A. (SG) and Sri R. K. Sankaran, Professional Assistant attended the Seminar on Library Automation held at MALA premises, Madras in June 1986.

Sri N. Satyamurthi, Assistant Librarian (SG) attended the Regional Seminar on national Policy on University Library held at Hyderabad in September 1986.

Sri C. C. Tom, Sri C. R Sekhar, Professional Assistants and Sri K. Kamaraj, Library Assistant attended Seminar-cum-Workshop on Computerised Information Retrieval held at M.I.T. Madras in March 1987.

Following are basic statistics of Library performance :

1985—86		1986—87
	Library Membership :	
4880	Institute Members (Staff & Students)	**3525**
54	Outside Members — Individual	**68**
52	Outside Members — Corporate	**2**
—	Outside Members — Industrial Associateship	**95**
275	Consultation Permits	**293**
	Circulation :	
1,05,498	Number of Readers Visited	**1,05,475**
1,13,557	Number of Volumes Issued:	**1,30,517**
	To Individuals :- Subjectwise :	**1,21,855**
	Science : 43,095 Technology : 53,908 Humanities : 15,906 Text Book Reference : 3,937 Periodicals : 9,009	
	To Departments :	**8,662**
	Department Loan . 7,012 Permanent Loan : 1,650	

Book Banks :

	General	Weaker Section	
Collection	4,268	1,229	**5497**
Issued	1,600	800	**2,400**

Circulation: (Contd.)

	Number of Reservation for Books:	
6,554	Registered	**8,710**
3,621	Fulfilled	**4,591**
	Amount of Overdue Charges and other Charges Realised	
1,59,169		**1,33,715**
	Inter - Library Loans:	
97	Borrowed for Institute Members	**112**
172	Lent out from the Institute Library	**245**
	Audio - Visual:	
22	Number of Audio - Visual Software available	**37**
—	Number of Video Cassettes available	**13**
22	Number of Audio - Visual Programs conducted	**57**
325	Number of Persons attended	**376**
	Acquisition:	
3,578	Books	**3,706**
4,108	Bound Volumes of Periodicals	**2,096**
337	Pamphlets and Reports	**265**
5	Microfilms and Microfiche	**—**
82	Institute Ph.D. Theses	**43**
8,110	Total Intake during the year	**6,110**
2,21,386	Total Accessions as at the end of March	**2,27,496**
	Current Periodicals:	
1,243	By Subscription	**1,243**
195	By Exchange/Gift	**195**
3	Translations Arranged	**4**

	Reprographic Services:	
1,56,141	Xerox Copies made	**1,49,217**
345	Korestat Copies made	**150**
451	Gestafax (Electronic Stencils)	**350**
639	Rotamasters Prepared and Printed	**1,090**
	Binding :	
1,214	Number of Books and Journals Bound from the Library Bindery	**995**
600	Number of other Publications (Reports, Lecture Notes etc.) Bound in Library	**1,200**
4,074	Number of Back Volumes of Journals and Books bound through External Binders	**3,169**

CENTRAL WORKSHOP

During the period 1986—87, Workshop has completed 964 work orders, received from Departments in conection with project, research and maintenance work, in addition to the regular training programme for students of B.Tech.

Advanced Workshop Course was conducted during the Summer (May—June) to the B.Tech. students and 44 students were trained.

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

Some of the IC & SR work undertaken during 1986—87.

1. Stainless steel machine and parts for Shri AMM. Murugappa Chettiar Research Centre, Photosynthesis and Energy Division, Madras-113.

2. Precision gears for 'The Hindu', Kasturi Buildings Madras-2.

INSTITUTE HOSPITAL

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

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

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

1.	Dr. N. A. Jayavelan, M.B.B.S.	Medical Officer/Resident Medical Officer-assisting the Physician
2.	Dr. Sumati Khangaonkar, M.B.B.S., D.A.	Anaesthetist
3.	Dr. Lalithakumari, M.B.B.S., D.G.O.	Gynaecologist
4.	Dr. P. Subramaniyan, M.B.B.S.	Medical Officer
5.	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)
6.	Dr S. Devaji Rao, M.S., M.N.A.M.S.	Consultant Surgeon (Part-time)
7.	Dr. R. Sathyanathan, M.D., D.P.M.	Consultant Psychiatrists (Part-time)
8.	Dr. R. Thara, M.D., D.P.M.	
9.	Dr. S. Rathnamala	Eye Specialist

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

From April 1986 to March 1987, 1080 doses (comprising of 5 doses to each child getting primary doses) against Polio, and 340 doses of Triple Antigen (against Diphteria, Pertusis and Tetanus) as 3 primary doses a month apart and a single booster doses at appropriate intervals were given.

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

Statistics :

April 1986 to March 1987

1.	Total numbe of out-patients	2,47,661
2.	Total number of in-patients	555
3.	Emergencies attended	2,340
4.	Dressing	13,718
5.	Injections	32,896
6.	Delivery	12
7.	Pathology	
	a) Urine	2,460
	b) Motion	734
	c) Blood.	3,692
8.	Bio-Chemistry :	
	a) Blood Sugar.	486
	b) Urea.	41

PLACEMENT OFFICE

The Placement Office, designated with the responsibility to procure placement and arrange inplant training in various industrial establishments for students of this Institute, was very active during the academic year 1986-87. Towards this end, this office maintained a very close interaction with industrial establishments in private as well as public sectors. It liaised with as many as over 150 companies during the year. As a result, about 80 companies visited this office to hold campus interviews. The Placement Office was able to get jobs in the Indian industries for almost all the students who were serious about making their career immediately on completion of their academic programmes at the Institute.

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

1. Each of the student was provided with complete details relating to career opportunities available in the country in different disciplines much before the placement session began so that they could plan their future programme of action with knowledge and fore-thought

2. All the final year students were given complete brief about the modus operandi adopted by various companies in recruiting their personnel.

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

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

In so far as training was concerned, this office continued to make energetic efforts to get training facilities for our students who made a request to this effect. The Office also wrote letters to as many as over 100 companies and the response from them was as good as was in previous years.

ALUMNI ASSOCIATION

The Alumni Association is functioning with Prof. L. N. Ramamurthy as President.

The Association formed in July 1984 now has a membership of about 8700. The membership is open to all students receiving degrees or diplomas conferred by the Institute as well as to the Academic staff of the Institute. It is obligatory for every student to become the life member of the Association by payment of Rs. 50/- during his admission to the Institute. The Association is trying to establish a number of chapters in different cities in India and at a few places abroad. One main chapter has already been established in Houston, Texas, U.S.A. with a local chapter at Philadelphia.

The Aims and objectives of the Association are:

1. To provide an organisation through which its members can keep in touch with the Institute and its students and staff as well as with one another.
2. To enable its members to take part in such activities of the Institute as may contribute to the general improvement of the students of the Institute.
3. To help its members to get advice from the Institute on various technical problems which they may come across in their work.
4. To bring out from time to time publications which highlight the professional activities of its members.
5. To further such other aims as the General Body may decide from time to time.
6. To bring out a News-Letter every month.

Some of the activities carried out in this academic year are detailed below:

a) The list of addresses are being computerised.
b) The Alumni week was celebrated from 7th to 9th January, 1987 This included an Alumni Reunion Day.
c) The Alma Mater has been very active and 4 issues were published.
d) Efforts are being made to obtain PCs for the use of students from our alumnus in U.S.A.

WEAKER SECTION STUDENTS AND FOREIGN STUDENTS

B. Tech.

22½% of the seats are reserved fo· 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 admision 32 SC/ST students Joined the B. Tech degree course during the academic year 1986-87. 2 students have discontinued' 30 SC/ST students are present continuing the course· Students admitted against the SC/ST reservation quota are given:

1. Free messing (Basic menu) and pocket alowance of Rs. 70/-per mensem to all SC/ST students irrespect of their parent's/Guardian's income.
2. Free Lodging.
3. Free tuition.
4. Exclusive use of Weaker Section (SC/ST) Book Bank.
5. Drawing instrument (Mini-Drafter) free of cost.
6. Help in getting placements.
7. Financial help for needy students through part-time jobs through Guidance and Counselliug Unit.

M. Tech.

22½% of the seats are reserved for the students of SC/ST community. At present these studets are admitted through GATE examination. 37 SC/ST students joined M. Tech degree course during the academic year 1986-87. 6 students discontinued. 31 SC/ST students are at present continuing the course. Students admitted against SC/ST reservation quota are given:

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

Preparatory Course

The Preparatory course of one academic year duration for SC/ST students who did not get admission through Joint Entrance Examination 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 academic year 1985-86 and 1986-87, the Prepartory course could not be conducted in this IIT because of the lack of response

from the SC/ST students. (During the accademic year 1986-87, offer of admission to Preparatory course was sent to 15 SC/ST students). However, for the current academic year, the Preparatory course is being conducted at some other IIT for SC/ST students

Foreign Students

At present 28 Foriegn students are studying in this Institute.

(B. Tech. =20, M. Tech=4, Phd.=4). 5 Foreign students joined the Institute during the academic year 1986-87.

Adviser

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

INSTITUTE GYMKHANA

Sports Events :

1. The Inter IIT Sports Meet :

The Inter I.I.T. Sports meet was organised and conducted by the Indian Institute of Technology, Kharagpur in December 1986. Both Men and Women teams practised hard and underwent a rigorous coaching camp. We got a record SIX golds Basketball Cricket, Kabaddi, Table Tennis, Tennis and Volley ball and came second overall. This was a very significant improvement over the previous three years' performance and gives us quite a good deal of the hope for the future.

2. Sportfest 1986

The Sportfest - Inter Collegiate level Tournaments in various games was conducted in August 1986. Our Institute Team participated in all the Tournaments and gave good performance.

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

The above Tournaments for Men and Women attracted 17 and 12 teams respectively. The Loyola College, Madras won the Trophy and the A M. Jain College, Madras were 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 '87 and it was a feast for the sports-loving community of our Campus.

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

We had the pleasure of conducting the above Volleyball tournaments for Men and Women in the Students' Activities Centre during the Second week of February '87. The Philips Trophy was instituted by Peico Electronics and Electrical Limited and the Trinity Shield was donated by Prof; J. C. Kuriacose family. The auditiorium gave the spectators a panoramic view of the game. 15 Men teams and 7 Women teams comprising both outstation and local teams were invited to participate. St. Joseph's College, Trichy won the Men's event and the Gandhigram Rural Institute, Gandhigram were the runner - up. S.D.N.B. Vaishnav College for Women from Madras were the champions and the Ethiraj College, Madras claimed to be 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 Activites 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 Rajaiah Bssketball Tournaments.

(b) All India Philips and Trinity Inter Collegiate Flood-lit Volleyball Tournaments.

(c) Inter Collegiate Table Tennis and Chess tournaments.

(d) Three - a - side Basketball Tournament.

(e) Institute Volleyball and Basketball Teams practice.

(f) 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

6. Open Bridge Tournament :

In the above Bridge Tournament organised by us in March '87, 25 teams from the various parts of the city participated. This Tournament has found a permanent place in our Sports Programme.

7. 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 '87. Prof. E. G. Ramachandran's Shield was instituted for the staff section while Mr. Nikolaus Merten's Cup was donated for the Students Section. In the Staff Section Thirteen (13) teams participated and in the students category Four (4) outstanding teams entered.

The Winning teams in the Staff section was Madras Medical College of Madras and the Runner - up team was our IIT Staff team. In the Students Section Anna University of Madras won the Trophy while Madras Medical College, Madras were the runner - up in the Tournament.

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

a) Annual Road Race.

b) Open Cycle Race.

c) 3-a-side Basketball.

d) 3-a-side Volley ball.

e) 4-a-side Hockey.

f) 6-a-side Football.

g) Skating Hockey.

h) Institute Chess Meet.

i) Institute Open Bridge.

10. Our Institute Football and Hockey teams had the honour of becoming the runner-up in the Sports Festival.

11. The Inter Hostel Competitions is one of the important programme of the Gymkhana to ensure larger participation of the student body in Sports and Games. It aims at 'a game for each end each for a game'. Competitions were held in 21 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 the Sports Officers of the Gymkhana.

Cultural Events

Traditionally there has been two groups into which all the Institute Cultural Activities have been divided-Literary and Arts and there are two Cultural affairs Secretaries elected every year by the Students' Affairs Council (SAC) to manage the activities in these two areas

This year, however, we decided to make no such distinctions and instead handle all the areas of Culturals as a team with an additional member to the Cultural Secretaries-the Co-ordinator-General for the year. This year we had G. Harinarayan taking care of the running of the Cultural events in the Institute. A very important fourth member to this team was the Public Relations Co-Ordinator, Karthick A.

With this four member group at the helm of affairs regarding Culturals for the 1986-87, we set about to divide our activities into two major areas-one, the Institute events which included the the Lit-Soc Rally, the Institute Open Events, the Inter Hostel Competitions and the Inter-Collegiate competition introduced this year with a new structured format-the intercol. In addition to these events were the special events such as the Staff-Student Debate, the Staff Student Quiz, the Spic-Macay Concerts and lecture demonstrations, and the newly introduced odd-sem professional show.

Institute Events

LIT-SOC Rally (LSR)

The year began with a bang without introduction of a new concept after a lapse of two years-the Lit-Soc Rally. This Rally, held within the first three weeks of the reopening of Institute was intend-ted to concentrate on the first years joining the Institute and expose freshie talent. The events we had as a part of this rally were Skits, JAM. Tintoretto, Password, Quiz, Fine Arts and Elocution. The response was not what we had expected it to be and the talent intended to be discovered was not forth-coming. We believe this rally can be a try once again but with a new format to really send the Institute alive in the first few weeks when the academic pressure is not there.

This year only cash prizes were given to the winners of the various LSR events and this can be continued since the emphasis of the rally is on mass participation and fun of taking part.

Freshies Nite

This traditional event which marks the end of the near non-existent ragging in IIT, turned out to be the biggest fiasco we have faced. The LSR events had been completed but as mentioned earlier had failed to unearth freshie talent. Thus the Secretaries and the Co-ordinators were hard-pressed to formulate a good programme which would make the freshies nite entertaining and serve the purpose for which it has been instituted.

institute open Events :

The Institute Open Events carried cash prizes and along with Intra-mural certificates and we scheduled throughout the odd semester, in the month of August, September, and October. The events scheduled in this string of competitions were JAM, Elocution, Debate, Indian Light Music, Western Music, Tintoretto, Quiz, Dumb Charades, Indian Classical Music, Prolix, Creative Writing and Fine Arts.

Festival of Plays :

This annual feature was a success from all points of views this year due to the overwhelming response we got from the Institute and Campus residents and the outside Campus—Madras Colleges

There was a Telugu play, two Kannada, One Tamil and Five English plays in this festival which continued for three days in the last week of October. The Madras Colleges that took part were Ethiraj College, Women's Christian College and three troupes in English from Stagecoach, IITs theatre group.

It is our observation that on account of the disappointing response to dramatics during MARDIGRAS : and the need to have a strong dramatics group in IIT, an All India Festival of plays must be organised in the Odd Semester on a large scale and outside the scope of MARDIGRAS.

Spic-Macay Concerts and Lecture Demonstrations:

The Lec-Dem series in September featured, in IIT, Ustad Asad Ali Khan (Rudra Veena) at CLT and Pandit Birju Maharaj and his troupe in a Katha Lec-dem at SAC, both of which were well organised by the IIT Unit of SPIC-MACAY, and attracted large crowd. The concert series in February 1987 had Sri. K. V. Narayanaswamy singing Carnatic and was well received. We also supported the Vana Vani School SPIC-MACAY unit this year by lending out services and the use of CLT for a Parveen Sultana Vocal Hindustani recital which was a major crowd puller and a total success.

We are grateful to SPIC-MACAY for having arranged these super performances by artistes of the highest calibre.

Intercol '86

Intercol '86 is the first Inter Collegiate festival of competitions held by the IIT under the structured format. The winners were awarded cash prizes and certificates and these included participants from all the major colleges of the city. The events held were JAM, Elocution, Quiz and Fine Arts and Creative Writing. The festival on the whole attracted a reasonable crowd of participants except for the JAM which was pathetic with five of the six finalists being from IIT and the event itself attracting only three non-IIT Participants.

Madras Open Debate:

The newly formed Debating Society of the Institute conducted this debate which is the first of its kind in Madras. The debate was an open one - open to all residents of Madras and was sponsored in part by Murugappa Electronic Limited. The debate was organised on the 24th October 1986 to coincide with the United Nations Day and had as its central theme - PEACE. The debate was not a major success in the sense of quality and participation since only one non - Collegian took part and the standard of debating was not very high. But it was undoubtedly a good start for the debating society and the Institute and will become a major debate in Madras in the next few years to come.

Invited Inter - Collegiate Events:

In continuation of the new events introduced last year we had the Indian Light Music and Western Music invited events where Presidency College, Loyola College and IIT took part in the programme held at SAC on consecutive days. This year unlike last year the Indian Classical Music was held on a competitive basis and we recommend that this continue to be so since the talent unearthed is very good and more over provides the young musicians of the city a chance to prove their worth, an occassion they do not get very often.

ODD—SEM Carnatic Professional Concert:

On November 5 we had a professional concert by Master Ravi Kiran on the Gottuvadyam, accompanied by Kumari Anuradha Brahmanandan on the Violin and Shri V. Nagarajan on the Kanjira. The Mridangist Shri Vellore Ramabhadran could not arrive on time since his flight from Trivandrum was delayed and hence the concert had only Kanjira for percussion.

Inter-Hostel Events :

While the odd semester contained all the above mentioned events the even semester with its great MARDI GRAS hangover was left by us deliberately with only Inter Hostel Competitions which included JAM, Debate, Elocution, Quiz, Dumb Charades. Tintoretto and Indian Light Music with Godavari winning the overalls.

Mardigras '87

The festival, has over the years, gained a reputation of being a trend - setter. The Mardigras this year was conducted from 21st to 24th January 1987. Efforts were made to focus Indian Classical Culture in the Festival this year also.

There was a record number of participants from outstation students this year. Competitions were held for the following events: Western Music, JAM, Creative writing, painting and Carving, Elocution, Tintoretto, Classical Music, Debate, Password, Paper Collage and Pot painting, Light Music, Flower Carpet, Dumb Charades, Skits, Quiz, Dramatics, Classical Dance, Clay modelling and Cartooning, Music Quiz, Treasure Hunt, Sketching, Logo Designing, Rangoli, Prolix, Antakshari, Extempore and Choreography.

The following Professional Shows were arranged during MARDIGRAS '87 :

1. Mr. Visweswaran ... SANTOOR
   (accompanied by Shafaat Ahmed Khan on the TABALA)
2. Smt. Seetha Duraiswamy ... JALTARANG
   (accompanied by N. V. Moorthy on the TABALA)
3. Kalakshetra Dance drama on 'SEETHA SWAYAMVARAM'
4. The East West Fusion Ensemble was the main attraction of Mardigras '87. Mr. L. Subramanyam one of the famous Violinists of the East and Mr. Volker Biesenbender, the great Violinists of the West gave a glittering performance on 24—1—1987 accompanied by Mr. Alla Rakha on the Tabla, Mr. Palghat Raghu on the Mridangam and Mr. Harishankar on the Kanjira. Mr. Handel Manuel gave a wonderful performance on the Piano.

NATIONAL CADETS CORPS : 4 (TN) AIR SQN (TECH) NCC

The aim of NCC training are three-fold.

(a) Development of leadership, comradeship, spirit of sportsmanship and the ideal of service.

(b) To create a force of disciplined manpower which in a national emergency could be of assistance to the country.

(c) To provide training for students with a view to developing in them officer-like qualities, thus also enabling them to obtain commission in the Armed Forces.

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

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

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

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

NATIONAL SERVICE SCHEME

The National Service Scheme (N.S.S.) strengthened its activities and expanded the scope of student participation during 1986—87. More than a hundred students took part in various activities.

The main activity has been running a Tailoring and stitching Unit for the women of neighbouring village, Velachery. About 40 women are trained this year under the N.S.S. scheme for gainful employment. Further, 10 students took part in a camp whereby they travelled to Anandpur and met Sri Baba Amte, the renowned social worker. The message and inspiration of Sri Amte was conveyed to all students in this campus. A 5 day workshop and training program in Psychosomatic Relaxation Techniques was conducted during October 1986.

Three blood donation camps were held during the year under review. Apart from this regular feature, the blood donors are always at the service of emergency calls from local hospitals. N.S.S. Week was celebrated between 12th to 17 January, 1987. It started with Talk on Teachings of National Leaders, Physical Fitness and ended on 17th January with a debate on 'Youth for Peace" wherein four college students who won the debate were recommended for final selection at Delhi.

The students also took active part in literacy programs teaching weaker section students at local village schools. All in all, N.S.S. has provided a forum for student activities and for awakening their desire for social service for self betterment and for betterment of society.

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' hostel. In addition there is a Central Supplies Uuit (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.

The facility of the Co-operative and Thrift Society of IIT., Madras has been extended to the employees of the Hostel Management. 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, Cocoanut, Potato, Onion etc., at the wholesale rate and distributes them to the individual hostels.

CONSTRUCTION OF BUILDINGS

List. I. During the period April 86 to March 87 the following works have been taken up and completed.

1.	Godown for Indane gas	— Rs.	75, 000/-
2.	Building for Maintenance Office.	— Rs.	1.6 lakhs.
3.	Additional rooms for I.C. Engines Lab.	— Rs.	2.20 ,,
4.	Extension to Metallurgical Engineering Department.	— Rs.	1.60 ,,
5.	Providing partitions in stacks of Library.	— Rs.	87, 000/-
6.	Warden's room and Celler at Brahmaputra Hostel.	— Rs.	1.13 Lakhs
7.	Extension of first floor over NCC Building for J.E.E. office.	— Rs.	1.70 ,,
8.	Modification in the Ground floor of ESB for T.V. Lab	— ,,	86, 000/-

List II. Besides the above the following works are in progress.

1.	Digging of 10 M O well near Ocean Enginneering Centre.	,,	3.00 lakhs.
2.	Mechanical Testing Lab for Metallurgical Engineering Department.	— ,,	6.00 ,,
3.	Extension of stack rooms for Library.	— ,,	13.25 ,,
4.	New Annexe for Sarayu Hostel (Ladies Hostel).	— ,,	33.00 ,,
5.	Solvent Room for Chemistry Department.	,,	1. 48 ,,
6.	New Extension to Materials Science and Reasearch Centre.	,,	1. 09 ,,
7.	Rest Hall for Off duty security personnel.	— ,,	1. 49 ,,
8.	Renovation and deepening of two wells (one rear of Saraswathi Hostel & other at the playground rear of N.C.C. Building)	— ,,	2. 94 ,,
9.	Laying A C. pressure pipe line (third main) for water supply.	— "	3. 40 ,,
10.	Digging of 10 M O well at N.C.C. ground.	— ,,	2. 32 ,,
11.	Relaying road along Bonn Avenue.	— ,,	5. 22 ,,

Listi III. The following works are nearing Completion.

1.	Construction of New Computer Centre Building.	— ,,	90. 00 ,,
2.	Building for Chemical Kinetics Lab.	— ,,	7. 50 ,,
3.	New ,D' type quarters for faculty (12 flats).	— ,,	15. 00 ,,

ADMINISTRATION

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 (from 1-2-1986).

Prof. R. Natarajan, Dean, Students

Prof. N. V. C. Swamy, Dean, Administration.

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

Heads of Departments

Prof. K. A. Damodaran	...	Aeronautical Engineering
Prof. P. S. Srinivasan	...	Applied Mechanics
Prof. N. Subramanian	...	Chemical Engineering
Prof. C. Kalidas	...	Chemistry
Prof. H. Raman	...	Civil Engineering
Prof. Y. Yegnanarayana	...	Computer Science & Engineering
Prof. Y. Narayana Rao	...	Electrical Engineering
Prof. S. Ambirajan	...	Humanities & Soc. Sciences
Prof. R Subramanian	...	Mathematics
Prof. V. M. Krishna Sastry	...	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 (SG)

Sri W. Hanumesi Rao	...	General Administration
Sri M. Gopalan	...	Academic
Sri V. Shanmugam	...	Administration

Finance & Accounts Officer (SG)

Sri A. V. Karunakaran Nambiar

Stores & Purchase Officer

Sri A. Thirunavukarasu

Internal Audit Officer

vacant

Chief Security Officer

Sri P. S. A. Pathy

Assistant Registrars (SG)

Sri D. Thiagarajan	...	Administration
Sri G. R. Raghunatha Rao	...	Academic

Assistant Registrars

Kum. G. Saroja	...	Academic
Sri K. Sekar	...	Administration

Assistant Finance & Accounts Officer (SG)

Sri R. Kannan

Assistant Stores and Purchase Officer (SG)

Sri M. C. James

Assistant Stores And Purchase Officer

Sri M. Manickam

Secretary (SG) to Director

Sri V. V. Natarajan

Secretary to Director

Sri G. Natarajan

Engineering Unit

Executive Engineer

Sri N. Malayalam

Estate Officer

Sri V. N. Murthy

Assistant Engineers (SG)

Sri D. Ramanathan

Sri Abraham Varghese

Sri M. Doorvasulu Reddy

Assistant Engineers

Sri S. Swaminathan

Sri D. R. Patel

Sri S. K. Pathi

Sri J. C. Jinadoss

Sri A. Angamuthu

Sri C. Ganesan

Sri A. Sardar Jhan

Sri T. Seshan

Sri K. Ramkrishnan

Horticultural Superintendent (SG)

Sri P. Manickavasagam

NAMES OF FACULITY MEMBERS, DEPARTMENT-WISE

Aeronautical Engineering

Prfessors

1. Dr. K.A.V. Pandalai
2. Dr. A.K. Sreekanth
3. Dr. T.K. Bose
4. Sri. K. Balaraman
5. Dr. K. A. Damodaran (Head)
6. Dr. G. Subramanian
7. Dr. T.K. Varadan

Associate Professor

Dr. S. Krishnan

Assistant Professors

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

Lecturer

Sri. S.C. Rajan

Senior Scientific Officer Grade I

Sri Job Kurian

Applied Mechanics

Professors

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

Associate Professor

Dr. V. Ramjee

Assistant Professors

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

Lecturer

Sri J. Lakshminarasimhan

Senior Scientific Officer Grade II

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

CHEMICAL ENGINEERING

Professors

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

Associate Professors

1. Dr. T. Venkatram
2. Dr. G. S. Davies
3. Dr. A. Baradarajan

Assistant Professors

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

Lecturer

Dr. V. Sriramachandra Rao

Technical Officer (SG)

Sri. B.V. Sreeramulu

Technical Officers

1. Sri. S. Shahmugam
2. Sri. V. Raman

Chemistry

Professros

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

Assistant Professors

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

Lecturers

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

Senior Scientific Officer Grade II

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

CIVIL ENGINEERING

Professors

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

Associate Professors

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

Assistant Professors

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

Senior Scientific Officer Grade II

1. Sri M. Subbi Reddy
2. Sri R. Ambalavanan
3. Sri A. Ramachandriah
4. Sri K. Ananthanarayanan
5. Sri V. Tamizharasan
6. Dr. K. Srinivasan
7. Sri 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. Dr. V. G. K. Murti
3. Dr. M. K. Achuthan
4. Dr. D. K. Banerjee
5. Dr. B. Ramaswamy
6. Dr. V. Seshadri
7. Dr. A. Kuppurajalu
8. Dr. Y. Narayana Rao (Head)
9. Dr. J. P. Raina
10. Dr. V. V. Sastry
11. Dr. K. Radhakrishna Rao
12. Dr. P. Sankaran
13. Dr. P. Subbarami Reddy
14. Dr. V. Venkata Rao
15. Dr. M. Mukunda Rao

Associate Professors

1. Dr. S. S. Yegnananarayanan
2. Dr. K. N. Bhat
3. Dr C. Dattatreyan
4. Dr. G. Sridhara Rao
5. Dr. Vedam Subrahmanyam

Assistant Professors

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

Lecturerers

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

Senior Design Engineer

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

Senior Scientific Officers Grade II

1. Sri S. Karmalkar
2. Dr. V. Jagadeesh Kumar

Technical Officer (SG)

Sri A. S. Satheesan

Technical Officer

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

HUMANITIES & SOCIAL SCIENCES

Professors

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

Assistant Professors

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

Lecturers

1. (Smt) Elizabeth Nainan Kurian
2. Sri M. Durgaprasada Rao
3. Sri Raj Gopal
4. Dr. (Kumari) Evangeline 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. Dr. L V K V. Sarma
3. Dr. H S. Paul
4. Dr. K R. Parthasarathi
5. Dr. R. Subramanian (Head)
6. Dr. V B. Johri
7. Dr U.N Srivastava
8. Dr. P. Achuthan

Associate Professors

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

Assistant Professors

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

Lecturer

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

Senior Scientific Officer Grade I

Dr K Swaminathan

Mechanical Engineering

Professors

1. Dr. H.C. Radhakrishna
2. Dr Prithviraj
3. Dr M A. Parameswaran
4. Dr G V N Rao udu
5. Dr. V M. Krishna Sastry (Head)
6. Dr V. Radhakrishnan
7. Dr. R Natarajan
8. Dr K. Lakshminarayana
9. Dr. K.A. Bhaskaran
10. Dr. K,V Gapalakrishnan
11. Dr. K. N. Seetharamu
12. Dr V. Sriramulu
13. Dr. A. Rammohan Rao
14. Dr N. Venkatrayulu
15. Dr. P.K Philip
16. Dr. M.A. Veluswami

Associate Professors

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

Assistant Professors

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

Lecturers

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

Senior Design Engineer

Sri. M. Singaperumal

Senior Maintenance Engineer

Sri A. Arun

Senior Sclentific Officers Grade II

1. Sri. B. Ramamoorthy
2. Dr. L. Vijayaragavan
3. Sri M. Govardhan

Technical Officer (SG)

Sri U.P. Das

Technical Officers

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

Metallurgical Engineering

Professors

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

Associate Professors

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

Asst. Professor

Sri R. K. Srikanta Kumaraswamy

Lecturers

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

Senior Scientific Officers Grade II

1 Sri S. Annamalai
2 Sri S. Kumaran

Technical Officers (SG)

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

PHYSICS

Professors

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

Associate Professor

Dr. C. K. Narayanaswamy

Assistant Professors

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

Lecturers

1 Sri V. Ramabhadran
2 Dr. G. Sreenivasamurthy
3 Dr. V. Subrahmanya Murthy
4 Dr. K. Hariharan
5 Dr. A. Subrahmanyam
6 Dr. 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 Officer (SG)

Sri U. D. Venkatarangaiah

Technical Officer

Sri A. P. Venugopal

COMPUTER SCIENCE AND ENGINEERING

Professors

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

Assistant Professors

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

Lecturer

Dr. C. Pandurangan

Assistant Manager (Operation)

Sri P. Seshasayi

Senior Systems Programmer

Sri M. Kothanda Ramanujam

Systems Engineer (Operations)

Sri R. Deenadayalu

Shift Engineer

Sri K. G. Sundararajan

Programmers Grade I

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

Senior Scientific Officers Grade II

1 Sri M. Kumaravelu
2 Smt. Leela Mohan

OCEAN ENGINEERING 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
2 Dr. K. Ganesh Babu
3 Dr. S. P Subramanian
4 Sri R. L. Roy Chaudhury
5 Sri P. Sambandam
6 Dr. R. Mahadevan

Senior Scientific Officers Grade I

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

Senior Scientific Officers Grade II

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

REGIONAL SOPHISTICATED INSTRUMENTATION CENTRE

Professors

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

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

MATERIALS SCIENCE RESEARCH CENTRE

Professors

Dr. K V. S Rama Rao
Dr. G. V. Subba Rao

Senior Scientific Officer - Grade II

Dr. V. V. Varada Raju

ENGINEERING DESIGN CENTRE

Professors

Dr. M. A. Veluswami

Dr. R. S. Sirohi

Assistant Professor

Dr M. P. Kothiyal

Lecturer

Sri V. Venkateswara Rao

Chief Design Engineers

1 Sri T. S Chennabasavan 2 Dr. D. K. Sarma

Senior Design Engineer

Sri S. D. Kalandar Sahib

FIBRE - RE-INFORCED PLASTIC RESEARCH CENTRE

Chief Design Engineer

Dr. N. Gopalakrishna Nair

Assistant Professor

Dr. R. Palaninathan

Senior Design Engineer

Sri S K. Malhotra

Sri B. Jagadish Chandra Babu

Technical Officer

Sri G. R. Santhana Krishnan

CENTRE FOR INDUSTRIAL CONSULTANCY AND SPONSORED RESEARCH

Chief Techno Economic Officer

Dr. D. Balakrishnan

Senior Techno Economic Officer

1 Sri C. Sivaprasada Rao 2 Sri Y. G. Narasimha

CENTRAL WORKSHOP

Senior Workshop Superintendent

Sri S. Jambunathan

Assistant Workshop Superintendent (SG)

Sri N. V. L. N. Kumar

Technical Officer

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

CENTRAL GLASS BLOWING SECTION

Technical Officer

Sri N. T. Kumaraswamy

CENTRE FOR CONTINUING EDUCATION

Dr. K. A. Padmanabhan

Senior Scientific Officers Grade I

1 Dr. G. Kuppuswamy
2 Dr. J. Rammohan Rao
2 Sri K. D. Chandrasekharan

GYMKHANA

Senior Physical Training Instructor

1 Sri H. Shaukatali
2 Sri S. Joga Rao

LIBRARY

1	Librarian	Sri V. S. Nazir Ahmed
2	Deputy Librarian	Sri C. Deenadayalu
3	Assistant Librarians (SG)	Sri P. Venkatesan
		Smt. J. Durairaj
		Sri N. Satyamurti
4	Senior Technical Assistant (SG)	Sri K. Sankaran

BUDGET PROPOSALS

(1986—87 & 1987—88)

(Figures lakhs of Rupees)

Description	Budget Estimates for 1986—87 (as proposed)	Budget Estimates for 1986—87 as allocated by Board of Governors	Revised Estimates 1986—87 as per Finance Committee	Budget Estimates 1987—88 (as proposed)
(1)	(2)	(3)	(4)	(5)
RECURRING	1,117·87	965 31	1,174·16	1,234·09
NON—RECURRING	150·00	40 00	100·00	100·00
TOTAL NON—PLAN	1,267 87	1,005·31	1,274 16	1,334·09
RECURRING	27·98	6·00	17·20	23·50
NON—RECURRING	494·75	175·47	330·14	330·96
		(—) 41·47*		
TOTAL PLAN	522·73	181·47	347 34	354·46
		(—) 41·47*		
INCOME	114·07	114·07	141·02	144·26

*Relates to 1985—86.

Statement of Accounts
1985-86

INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE

	Rs.	Rs.
Educational Expenses :		
Pay of Teaching Staff :		
Department of		
Chemistry	17,01,587	
Physics	18,00,412	
Mathematics	10,68,150	
Humanities & Social Sciences	7,02,414	
Civil Engineering	16,40,182	
Mechanical Engineering	27,84,672	
Electrical Engineering	26,20,776	
Chemical Engineering	11,38,441	
Metallurgical Engineering	11,05,360	
Applied Mechanics	11,94 840	
Aeronautical Engineering	7,78,110	
Computer Science and Engineering	9,16,738	
		1,74,51,682
C/o		1,74,51,682

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1986

INCOME

		Rs.	Rs.
Grant from Govt. of India			
(On Revenue Account)		7,88,73,000	
Less : 1984—85 transfer		44,50,000	
		7,44,23,000	
Add : 1985—86 Outstanding adjustment		36,40,000	
			7,80,63,000
General Income :			
Tuition Fees		4,55,547	
Hostel Seat Rent		2,44,783	
Gymkhana fees	44,360		
Medical Fees	15,531		
		59,891	
Students Amenities Fund		35,178	
Fine		6,689	
Examination Fees		60,500	
Degree in Absentia		410	
Application Fees from Students		24,42,956	
Application Fees for Appointments		6,806	
Admission Fees		51,972	
Grade Card		5,690	
			33,70,422
C/o			8,14,33,422

INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE

	Rs.	Rs.
B/F		1,74,51,682
Pay of Non-Teaching Staff :		
Department of Chemistry	5,16,727	
Physics	9,27,879	
Mathematics	1,09,620	
Humanities & Social Sciences	1,81,675	
Civil Engineering	9,73,928	
Mechanical Engineering	14,91,400	
Electrical Engineering	13,48,444	
Chemical Engineering	6,50,295	
Metallurgical Engineering	6,98,519	
Applied Mechanics	5,35,141	
Aeronautical Engineering	4,25,780	
Computer Science & Engineering	4,30,110	
		82,89,518
Pay and Allowancess :		
Centres-Officers	9,38,169	
Centres-Others	8 76,461	
		18,14,630
Pay and Allowance :		
Indo-German Projects		2,30,590
C/o		2,77,86,420

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1986

INCOME

	Rs.	Rs.
B/F		8,14,33,422
Miscellaneous Receipts :		
Institute Bus Collections	5,19,786	
Hire Charges on Institute Vehicles	17,873	
Licence Fee	13,51,085	
Electricity Water & Service Charges	6,61,789	
Lawns & Gardens (Auction sales of trees Usufructs)	46,214	
Income from Computer Centre	17,91,618	
Other Receipts	75,23,207	
		1,19,11,572
C/o		9,33,44 994

INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE

	Rs.	Rs.
B/f		2,77,86,420
Departmental Expenses :		
Chemistry	5,01,775	
Physics	4,56,746	
Mathematics	36,290	
Humanities & Social Sciences	30,866	
Civil Engineering	4,90,250	
Mechanical Engineering	10,14,358	
Electrical Engineering	6,24,401	
Chemical Engineering	1,62,933	
Metallurgical Engineering	4,62,378	
Applied Mechanics	2,78,693	
Aeronautical Engineering	3,40,017	
Computer Science & Engineering	24,77,983	
		68,76,690
Library :		
Pay & Allowances :		
Officers	2,44,523	
Establishment	12,04,093	
Contingencies-Operating Cost & Binding Charges	33,161	
Journals of General Interest	3,467	
		14,85,244
C/o		3,61,48,354

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1986.

INCOME

	Rs.
	9,33,44,994
C/o	9,33,44,994

INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE

	Rs.	Rs.
B/F		3,61,48,354
Workshops :		
Pay and Allowances of Workshop Superintendents	3,22,408	
Pay and Allowances of other Staff	22,58,726	
Working expenses (Instruments, Tools and other consumables)	2,55,870	
		28,37.004
Stipend to apprentices		1,75,904
Sub-Centre in Cryogenic Engineering		41,949
Ocean Engineering Centre :		
Pay and Allowances : Officers	8,60,695	
Pay and Allowances : Others	3,51,508	
Working expenses (Instruments and other consumables)	4,11,035	
		16,23,238
C/o		4,08,26,449

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1986.

INCOME

	Rs.
	9,33,44,994
C/o	9,33,44,994

INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE

		Rs.
B/F		4,08,26,449
Central Electronic Centre - Pay & Allowances		2,27,928
Air - Conditioning Unit - Pay & Allowances		2,01,873
Regional Sophisticated Instrumentation Centre		1,92,516
Electronic Instruments Servicing and Development Centre (C.E.C.)		1,50,302
Central Photographic Section		39,633
Central Glass Blowing Section		39,113
Air - Conditioning Unit		2,55,691
X-Ray Diffraction Laboratory		78,779
Energy Research Centre		11,330
Centre for Rural Development		
Pay & Allowances	23,456	
Others	8,38,817	
		8,62,273
Fibre Reinforced Plastic Research Centre		2,83,309
Television Engineering Lab.		1,76,856
Engineering Design Centre		1,29,868
Material Science Research Centre		3,43,199
Indo - German Project		1,52,389
Naval Architecture		1,26,222
Central Gas Supply Unit		4,371
Bio - Science and Bio - Technology		67,774
C/o		4,41,69,875

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1986.

INCOME

	Rs.
	9,33,44,994
	9,33,44,994

INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE

	Rs.	Rs.
B/F		4,41,69,875
Institute Scholarships :		
Post Graduate & Research	62,94,741	
Under Graduate	3,10,057	
		66,04,798
N. C. C. / N. S. S. :		
Pay and Allowances	57,719	
Other Expenditure	47,368	
		1,05,087
Contribution to Gymkhana Management (Atheletic & Gymkhana)		4,71,058
Part Time Lecturers		4,050
Visiting Professors		13,018
Technical Bulletin & Journals		1,05,100
Symposia and Seminars		28,892
Inplant Training Courses/Visits		70,097
Continuing Education Programme organised by the Institute		1,527
Guidance and Counselling Unit		21,741
J.E.E. Special Coaching Programme for SC/ST students		47,528
C/o		5,16,42,771

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1986.

INCOME

	Rs.
B/F	9,33,44,994
C/o	9,33,44,994

INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE

	Rs.
B/F	5,16,42,771
Quality Improvement Programme initiated by the Ministry of Education	3,553
Director's Discretionary Fund for Research	10,140
Membership Fees to outside bodies	25,217
Remuneration to External Examiners	80,910
Joint Entrance Examination	7,28,090
Convocation	1,29,111
Prizes for Academic Distinction	9,092
Common Examination for P.G. Admission	
Graduate Aptitude Test in Engineering	5,76,589
Graduate Aptitude Test in Engineering/CERA	2,52,244
Contribution towards Institute participation in Programme of National Conference	25,000
H. A. L. Trainees	1,00,000
Hostels :	
Allowances to Wardens	27,523
Subsidy to Hostels	24,39,166
Security to Hostels	81,585
Central Administration :	
Pay and Allowances-Officers	16,33,681
Pay and Allowances-Establishment	55,23,743
C/o	6,32,88,415

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1986.

INCOME

	Rs.
B/F	9,33,44,994
C/o	9,33,44,994

INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE

		Rs.	Rs.
	B/F		6,32,88,415
Contingencies :			
Postage		2,87,725	
Entertainment		36,712	
Telephone		5,88,507	
Liveries		2,26,633	
Stationery		6,33,015	
Printing		2,48,857	
Advertisement		4,29,474	
Sundries (Misc. Expenses)		1,89,922	
G.H. Provision		62,232	
			27,03,077
Other Items :			
Director's Discretionary Payment			6,769
Stores :			
General Stores		20,904	
Pay & Allowances - Officers		1,33,954	
Pay & Allowances - Estt.		4,40,502	
			5,95,360
Security :			
Other charges			3,34,015
Lawns and Gardens :			
Pay & Allowances of Horticultural Superintendent		39,260	
Pay & Allowances - Others		1,55,369	
			1,94,629
	C/o		6,71,22,265

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1986.

INCOME

	Rs.
	9,33,44,994
C/o	9,33,44,994

INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE

	Rs.	Rs.
B/F		6,71,22,265
Power		32,57,430
Mosquito Control		1,244
Water		4,93,748
Oil and Petrol		4,40,798
Repairs and Maintenance:		
a) Furniture	2,69,698	
b) Typewriters & Duplicators	68,092	
c) Motor Vehicles	2,27,072	
		5,64,862
Fire Fighting Operating Cost		18,114
Duty Insurance and Road Taxes		99,238
Works and Maintenance:		
Pay and Allowances-Officers	1,70,935	
Pay and Allowances-Esst.	49,33,132	
Other Charges	32,61,210	
		83,65,277
Property Tax		1,99,793
Hospital:		
Pay and Allowances-Medical Officers	2,67,628	
Pay and Allowances-Estt.	4,83,990	
Purchase of Medicines	6,62,896	
		14.14,514
C/o		8,19.77,283

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1986.

INCOME

		Rs.
	B/F	9,33,44,994
		9,33,44,994

INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE

	Rs.	Rs.
B/F		8,19,77,283
Subsidy to Vana Vani School		1,66,035
Audit Charges		70,340
Legal Expenses		41,986
Reimbursement of Stamp Duty		20,155
Travelling Allowances :		
Board of Governors	13,382	
Staff Selection Committee and other Committees	42,221	
Candidates called for interview for appointments	43,767	
Joint Entrance Examination		
External Examiners	1.70,239	
		2,69,609
C/o		8,25,45,408

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1986.

INCOME

	Rs.
	9,33,44,994
C/o	9,33,44,994

INDIAN INSTITUTE OF

INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE

		Rs.
	B/F	8,25,45,408
Leave Salary and Pension Contribution on account of personnel on Foreign Services		42,187
Employees Welfare Scheme		988
Campus Amenities		19,218
G.P.F., Contribution, etc.		66,69,800
Chairman, Council of Wardens		1,148
Excess of Income over Expenditure		40,66,245
	Total	9,33,44,994

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

TECHNOLOGY, MADRAS-600 036.

FOR THE YEAR ENDED 31st MARCH 1986.

INCOME	
	Rs.
B/F	9,33,44,994
Total	9,33,44,994

Registrar
Indian Insttitue of Technology
Madras-600 036.

Director
Indian Institute of Technology
Madras-600 036.

BALANCE SHEET

CAPITAL FUND AND LIABILITIES

	Rs.	Rs.
CAPITAL :		
Value of Land per contra		1,12,17,262
Block value of German aid per contra equipment	10,09,36,849	
Technical books and journals per contra	15,56,230	
		10,24,93,079
Value of aid alexander van Humboldt Foundn.	10,83,000	
Value of aid from German Volks Wagon Foundation	2,99,860	
		13,82,860
COMPUTER SYSTEMS		
PER CONTRA :		
As per last Balance Sheet		1,54,50,458
Capital Grants and balance of Income and Expenditure a/c as on 31—3—1985	28,33,53,995	
Add : Capital Grant during 1985—86	2,49,60,000	
	30,83,13,995	
Add : Excess of Income over Expenditure during 85—86	40,66,245	
	31,23,80,240	
Less : Value of equp. written off	1,06,241	31,22,73,999
		44,28,17,658

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TECHNOLOGY, MADRAS-600 036.

AS ON 31-3-1986

PROPERTY AND ASSETS

	Rs.	Rs.	Rs.
Land :			
Value of Land gifted by the Tamil Nadu Govt.			1,12,17,262
BUILDINGS :			
Cost of completed buildings as on 31—3—85	12,04,66,345		
Add : Buildings completed during the year	71,41,141		
		12,76,07,486	
Building under construction as on 31—3—85	55,41,491		
Add : Adjustment relating to 84—85 per contra			
Add : Expenditure for the year	63,96,519		
	1,19,38,010		
Less : Transferred to completed building account	71,41,141	47,96,869	13,24,04,355
Diesel Genarator equipment			2,14,232
			14,38,35,849

C/o

BALANCE SHEET

CAPITAL FUND AND LIABILITIES

	Rs.	Rs.	Rs.
			44,28,17,658
Cost of Projector etc. (Gymkhana) per contra			49,811
Endowment Fund (Governors Prize Etc)			3,45,350
Deposits :—			
EMD/ICC and other Deposits	2,96,38,638		
Refund of Customs Duty (Projects)	1,89,847		
		2,98,28,485	
New Plan Schemes Emerging Technology approved by **Govt. of India**			
Opening Balance	33,90,419		
Add : Receipts 1985-86	44,00,000		
	77,90,419		
Less : Payment for the year	24,08,665		
	53,81,754		
Less : Adjustment	10		
		53,81,744	3,52,10,229
Sundry Creditors :			
On Works Accounts		11,05,103	
For the Supplies made for service rendered Departments/Sections		13,90,739	
			24,95,842
C/o			48,09,18,890

TECHNOLOGY, MADRAS-600 036.

AS ON 31-3-1986

PROPERTY AND ASSETS

	Rs.	Rs.
		14,38,35,849
Equipment Furniture and Fittings at cost as per B/S. as at 31-3-1985	8,68,71,033	
Add : Additions during the year	1,14,87,146	
	9,83,58,179	
Less : Cost of Equipment written off during the year	23,301	
		9,83,34,878
Computer acquired thro' German Food Aid Funds under the Indo-German **Agreement :**		
At cost as per B/S as on 31-3-1985		1,54,50,458
Block value of Equipment from Alexander Von Humboldt foundations as on 31-3-1985	10,83,000	
Block value of Refrigerator and components from German Volks Wagon Foundation	2,99,860	
		13,82,860
Block value of Equipment from W.G. as on 31-3-85	9,91,78,771	
Add : Additions during the year	17,58,078	
		10,09,36,849
C/o		35,99,40,894

BALANCE SHEET

CAPITAL FUND AND LIABILITIES

		Rs.	Rs.
	B/f		48,09,18,890
Outstanding Expenses : payable			
a)	Pay and Allowances	33,67,157	
b)	Scholarships	3,17,919	
c)	Other Allowances Medical	99,982	
d)	Wages to labourers NMR/Departments Sec.	1,373	
e)	Audit Fees	48,000	
f)	Stipend to Apprentices.	15,328	
g)	Computer Center remuneration to staff.	—	
			38,49,759
P,F. Contribution and Interest payable			1,00,007
Computer Receipts received in advance			9,551
Grant-in-Aid from American Chemical			
Society (per Contra)			
Balance as per last year balance sheet.			1,10,934
	C/o		48,49,89,141

TECHNOLOGY, MADRAS-600 036.

AS ON 31-3-1986

PROPERTY AND ASSETS

	Rs.	Rs.
B/f		35,99,40,894
Customs Duty and Clearance charges on Equipment from W. Germany as per B/S as on 31—3—1985	2,76,55,633	
Add : Customs Duty paid during the year	21,22,997	
	2,97,78,630	
Less : Refund of Customs duty	—	
		2,97,78,630
Motor Vehicles at cost as per balance as at 31—3—85	17,60,977	
ADD : Additions during the year	3,02,108	
		20,63,085
Library books and scientific journals at cost as on 31—3—85	2,16,47,007	
Add : Additions during the year	34,69,994	
	2,51,17,001	
Less : Value of Books written off	82,394	
		2,50,34,607
Block value of Technical books journals from West Germany as per balance sheet as at 31—3—85	15,55,480	
Add : Additions during the year	750	
		15,56,230
Typewriters and Duplicators at cost as per B/S at 31—3—85	10,36,719	
Add : Additions during the year	93,331	
	11,30,050	
Less : Cost of Typewriter during the year	—	
		11,30,050
C/o		41,95,03,496

BALANCE SHEET

CAPITAL FUND AND LIABILITIES

	Rs.
B/f	48,49,89,141
Unpaid items as on 31—3—86 as per Undisbursed pay register	38,758
New Plan Schemes - Engineering Technology approved by Govt., of India (per contra)	21,97,986
C/o	48,72,25,885

TECHNOLOGY, MADRAS-600 036.

AS ON 31-3-1986

PROPERTY AND ASSETS

	Rs.	Rs.
B/f		41,95,03,496
Tools and Plants as at 31—3—85	4,89,873	
Add: Additions during the year	19,459	
	5,09,332	
Less: Written - off during the year	—	
		5.09,332
Cycles at cost as per balance sheet as at 31—3—85	69,051	
Less: Cost of Cycles written off during the year	546	
	68,505	
Less: Recovery	80	
	68,425	
Add: Additions during the year	—	
		68,425
Investment A/c. Endownment Fund Governor's prize etc. as on 31—3—1986.		3.45,350
Stock as on 31—3—1986. Consumable stores with depts.		60,03,506
Construction materials with Engg. Unit work account		33,66,284
Guest House Provisions		390
Stationery Articles		5,63,773
Consumable store with central stores Tyres and Tubes spare part liveries etc.		85,236
UNESCO Coupons		50,138
C/o		43,04,95,930

BALANCE SHEET

CAPITAL FUND AND LIABILITIES

	Rs.	Rs.
B/F		48,72,25,885
Industrial Research and		
Development Fund Account :		
Balance as on 1-4-1985 (as per separate statement of account)	55,86,235	
Add : Receipt for the year	28,03,838	
	83,90,073	
Less : Payment during the year	5,68,707	
		78,21,366
Gymkhana Management :		
Opening Balance 1-4-85 as per the separate statement of account	35.191	
Add : Receipts of the year	8,63,684	
	8,98,875	
Less : Payment during the year	7,91,095	
		1,07,780
C/o		49,51,55,031

TECHNOLOGY, MADRAS-600 036.

AS ON 31-3-1996

PROPERTY AND ASSETS

	Rs.
B/F	43,04,95,930
Projector and Tape recorders (Gymkhana Assets) at cost as per last year	49,811
Balance Sheet	36,40,000
Grant receivable from Govt.	1,01,285
Licence Fees etc. recoverable	53,002
Fees recoverable	59,975
Leave salary recoverable from parent Departments	7,13,980
Income receivable for the Computer Centre	5,318
Hire charges of Institute Vehicles etc. recoverable	25,573
Pre-Paid taxes	32,378
Stamps on hand	
Equipments procured from Grant-in-aid received from the American Chemical Society :	
Balance carried over from last year	1,10,934
Equipments procured from Grant-in-aid received from New Plan Schemes	21,97,986
Emerging Technology approved by Govt. of India	10,800
Deposits with Telephones	24,666
Deposits with Firms	
C/o	43,75,21,638

INDIAN INSTITUTE OF

BALANCE SHEET

CAPITAL FUND AND LIABILITIES

		Rs.
	B/f	49,51,55,031
	C/o	49,51,55,031

TECHNOLOGY, MADRAS-600 036.

AS ON 31-3-1986

PROPERTY AND ASSETS

	Rs.	Rs.	Rs.
B/f			43,75,21,638
Work Advance			15,99,630
Central Supplies Unit Advance Recoverable			5,00,000
Other (General)			1,02,76,236
Deposit with Tamil Nadu Electricity Board			4,96,300
Collector of Customs Air cargo complex... O/B	13,09,331		
Advance paid	85,00,000		
	98,09,331		
Less : Transferred to Customs Duty (Projects)	90,44,400		
		7,64,931	
Collector of Customs A/c No. II		2,02,828	
			9,67,759
Customs Duty on Projects		90,44,400	
Less : Recoveries		62,50,427	
			27,93,973
Unpaid Balance per contra with State Bank of India Cash on hand UPD.	38,758		
Imprest	500		
		39,258	
Cash on hand (other than 'C' account)	3,89,309		
With SB of India (otherthan IRD Fund A/c.)	3,23,25,089		
With IIT P.O. Savings A/c.	3,16,693		
		3,30,31,091	
With S.B.I. IRD Fund		78,21,366	
With SBI Gymkhana Management A/c.		1,07,780	
			4,09,99,495
C/o			49,51,55,031

INDIAN INSTITUTE OF

BALANCE SHEET

CAPITAL FUND AND LIABILITIES		
		Rs.
B/c		49,51,55,031
Total	Rs.	49,51,55,031

TECHNOLOGY, MADRAS-600 036.

AS ON 31-3-1986

PROPERTY AND AND ASSETS

		Rs.	Rs.
B/f			49,51,55,031
Earnest Money, Caution and other Deposits		2,98,28,485	
New Plan Schemes		53,81,744	
		3,52,10,229	
Less : Drawn from refundable deposits		21,79,138	
		3,30,31,091	
	Total	Rs.	**49,51,55,031**

RECEIPTS	
	Rs.
Opening Balance	2,57,67,678
Receipts on Capital Account	
Grant from Government of India on Capital Account	2,49,60,000
C/o	5,07,27,678

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1985-86

PAYMENTS

		Rs.	Rs.
On Capital Account :			
i)	Building and Works		76,49,617
ii)	(a) **Furniture Equipments and Fittings :**		
Departments :			
1	Chemistry	82,331	
2	Physics	1,74,284	
3	Mathematics	9,335	
4	Humanities & Social Sciences	15,538	
5	Civil Engineering	2,05,213	
6	Mechanical Engineering	5,24,052	
7	Electrical Engineering	4,19,924	
8	Chemical Engineering	83,239	
9	Metallurgical Engineering	1,41,876	
10	Applied Mechanics	1,07,722	
11	Aeronautical Science & Engineering	63,793	
12	Computer Science & Engineering	2,22,217	
			20,49,524
	(b) **Central Service Units :**		
1	Central Glass Blowing Section	694	
2	Central Photographic Section	9568	
3	Central Electronic Centre	1,22,300	
4	Air Conditioning Unit	46,746	
5	Central X-ray Diffraction Lab	6,517	
			1,85,825
	C/o		98,84,966

RECEIPTS

	Rs.	Rs.
B/f		5,07,27,678
Grant from Government of India :-		
On revenue account		7,88,73,000
Receipts from Academic Section :		
Tuition Fees	4,55,060	
Hostel Seat Rent	2,44,362	
Gymkhana Fee	59,810	
Students Amenities Fund	35,133	
Medical Fees	—	
Fines	6,689	
Examination Fees	18,200	
Degree in Absentia	410	
Thesis Fees	42,300	
		8,61,964
Other Receipts :		
Application fees from Students	24,42,957	
Application Fees for Posts in Institute	6,806	
Admission Fees	51,972	
Grade Card	5,690	
Institute Bus Collections	5,21,072	
Hire Charges on Institute Vehicles	18,961	
Library over due collection	1,25,571	
Institute Day and Association Fees	3,154	
Migration Certificate	774	
		31,76,957
C/o		13,36,39,599

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1985-86

PAYMENTS

		Rs.	Rs.
	B/f		98,84,966
d)	**Research Centres :-**		
1	Engineering Design Centre	42,576	
2	Regional Sophisticated Instrumentation Centre	74,625	
3	Composite structure FRP Research Centre	57,771	
4	Energy Research Centre	29,992	
5	Material Science Research Centre	82,156	
6	Inter University Partnership Projects	1,08,958	
7	T.V. Engineering Lab,	69,086	
8	Indo-French Collaboration Programme	1,458	
			4,66,622
e)	Central Workshops		38,293
f)	Ocean Engineering Centre		2,73,890
g)	Centre for Rural Development		58,027
h)	Replacement of Obsolete Equipment		77,41,757
i)	Sub-Centre in Cryogenic Engg.		39,233
h)	Naval Architecture		6,587
k)	Bio-Science & Bio-Technology		1,08,278
	Customs Duty on W. Germany Equp. :		
	Customs Duty	19,81,152	
	Clearance Charges	1,44,073	
			21,25,225
	Furniture and Fittings :-		
	Office, Library etc.	3,95,760	
	Utensils of Hostels	76,240	
			4,72,000
	C/o		2,12,14,878

RECEIPTS

	Rs.
B/F	13,36,39,599
Short Term and other Courses	3,365
Miscellaneous Receipts	16,38,861
Hire charges for Gowns	2,034
Guest House Boarding Charges	5,932
Subscription to Journal of Mathematical & Physical Sciences & Sale proceeds of Institute Publications	1,66,159
Hostel Establishment charges Receipts from Students	26,816
Interest on Conveyance Advance	38,757
Interest on Deposit with TNEB	4,452
Interest on Call Deposits with SBI	4,06,175
Interest on P. F. Investments	46,76,876
Interest on House Building Advance	18,564
Furniture Hire Charges	6,546
Central Photographic Section	9,889
C/o	14,06,44,025

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1985-86

PAYMENTS

	Rs.	Rs.
B/F		2,12,14,878
Library :		
a) Books	6,66,663	
b) Journals and Back Volumes	27,58,263	
c) Equipment	36,908	
d) Film Media Resources	—	
		34,61,834
Others :		
a) Motor Vehicles	24,873	
b) Cycles	9,430	
c) Typewriters and Duplicators	1,74,531	
d) Hospital Equipment	37,241	
e) Telephones	34,657	
		2,80,732
C/o		2,49,57,444

RECEIPTS

	Rs.	Rs.
B/F		14,06,44,025
Receipts from Buildings :		
Licence Fees	14,28,980	
Electricity, Water and Service Charges	6,61,827	
		20,90,807
Lawns and Gardens :		
Usufructs & Receipts from Sewage farms	46,214	
Receipts from Computer Centre	16,74,230	
Over-head charges from Consultancy Services	3,89,282	
		21,09,726
Recovery of Advances :		
Motor Car and other Conveyances	3,00,676	
Festival Advance	2,89,520	
Customs Duty	62,50,427	
Miscellaneous Advances	5,66,530	
Flood Advance/Drought Advance	4,59,166	
House Building Advance	4,79,953	
		83,46,272
C/o		15,31,90,830

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1985-86

PAYMENTS

		Rs.	Rs.
	B/F		2,49,57,444
Revenue Account :			
i)	**Academic**		
Pay and Allowances of Teaching Staff :			
1	Chemistry	16,84,249	
2	Physics	17,80,213	
3	Mathematics	10,56,125	
4	Humanities and Social Sciences	6,98,063	
5	Civil Engineering	16,26,200	
6	Mechanical Engineering	27,60,599	
7	Electrical Engineering	25,78,152	
8	Chemical Engineering	11,25,783	
9	Metallurgical Engineering	10,97,936	
10	Applied Mechanics	11,78,816	
11	Aeronautical Engineering	7,71,678	
12	Computer Science and Engineering	9,13,573	
			1,72,71,387
ii)	**Pay and Allowances of Non-Teaching Sfaff :**		
1	Chemistry	5,16,025	
2	Physics	9,19,905	
3	Mathematics	1,11,105	
4	Humanities and Social Sciences	1,80,226	
5	Civil Engineering	9,68,555	
6	Mechanical Engineering	14,80,322	
			41,76,138
	C/o		4,64,04,969

RECEIPTS

	Rs.	Rs.
B/F		15,31,90,830
Deposits:		
Contractors Deposits (Works)	7,86,715	
Suppliers Deposits (Institute)	1,75,759	
External Scholarship	5,88,077	
C S I R.	8,41,585	
Students Caution Deposits	33,868	
New Plan Schemes, etc. 'H' a/c.	75,55,356	
Miscellaneous Deposits	37,31,123	
QIP & CSD Schemes	14,35,805	
ICSR Projects	1,94,73,774	
RSIC Receipts	59,883	
Library Deposits	98,750	
Students aid & Welfare Fund Receipts from students	22,630	
Alumni Association	45,330	
Interest on Endowments	33,218	
		3,48,81,873
C/o		18,80,72,703

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1985-86

PAYMENTS

		Rs.	Rs.
	B/F		4,64,04,969
7	Chemical Engineering	6,46,751	
8	Electrical Engineering	13,45,982	
9	Metallurgical Engineering	6,99,119	
10	Applied Mechanics	5,31,276	
11	Aeronautical Engineering	4,22,527	
12	Computer Science & Engg.	4,29,925	
			40,75,580
Departmental Expenses :-			
1	Chemistry	4,80,079	
2	Physics	5,70,090	
3	Mathematics	35,959	
4	Humanities & Social Sciences	38,266	
5	Civil Engineering	4,17,841	
6	Mechanical Engineering	8,92,890	
7	Electrical Engineering	5,68,221	
8	Chemical Engineering	3,03,428	
9	Metallurgical Engineering	4,69,194	
10	Applied Mechanics	3,11,208	
11	Aeronautical Engineering	2,75,608	
12	Computer Science & Engg.	22,41,858	
			66,04,642
	Indo German Projects (P & A)		2,38,304
	C/o		5,73,23,495

RECEIPTS	
	Rs.
B/F	18,80,72,703
C/o	18,80.72,703

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1985-86

PAYMENTS

	Rs.	Rs.
B/F		5,73,23,495
Library :		
Pay and Allowances-Officers	2,45,184	
Pay and Allowances-Estt.	11,98,265	
Journal of General Interest	3,466	
Contingencies Operating Cost	25,554	
Binding Charges	43,037	
Library NMR Charges	12,893	
		15,28,399
Ocean Engineering :		
Pay and Allowances-Officers	8,52,840	
Pay and Allowances-Estt.	3,50,208	
Other Charges	3,11,481	
		15,14,529
Research Centres :		
Pay and Allowances-Officers	9,22,184	
Pay and Allowances-Estt.	8,72,412	
		17,94,596
Central Services :		
Central Workshops :		
Pay and Allowances-Officers	3,11,946	
Pay and Allowances-Estt.	22,45,803	
Working Expenses: Tools and Other Consumables	2,00,845	
		27,58,594
Central Electronic Centre :		
Pay and Allowances		2,26,139
Centre for Rural Development :		
Pay and Allowances		23,456
C/o		6,51,69,208

RECEIPTS	
	Rs.
B/F	18,80,72,703
C/o	18,80,72,703

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1985-86

PAYMENTS

	Rs.
B/F	6,51,69,208
Air Conditioning Unit :	
Pay and Allowances	2,00,291
Stipend for Apprentices	1,67,699
Regional Sophisticated Instrumentation Centre	1,78,921
Instruments Servicing & Development Centre	1,07,418
Central Photographic Section	39,787
Cental Glass Blowing Section	39,113
Air Conditioning Unit	2,11,369
X-Ray Diffraction Laboratory	63,616
Energy Research Centre	6,442
Centre for Rural Development	8,48,277
Fibre Reinforced Plastic Research Centre	1,67,632
Bio-Science and Bio-Technology	70,443
Naval Architecture	1,13,377
Sub-Centre in Cryogenic Engineering	77,761
Television Engineering Lab.	1,55,455
Engineering Design Centre	1,18,486
Material Science Research Centre	3,47,069
Indo-German Project	1,52,389
Guest House Provision	59,641
C/o	6,82,94,394

RECEPTS		
		Rs.
	B/F	18,80,72,703
	C/o	18,80,72,703

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1985-86

PAYMENTS

	Rs.	Rs.
B/F		6,82,94,394
Institute Scholarships:		
Post Graduate and Research	64,41,425	
Under Graduate	3,51,132	
		67,92,557
N. C. C. and N. S. S.:		
Pay and Allowances	56,235	
Other Expenditure	22,760	
N. S. S. and N. S. O.	25,110	
		1,04,105
Athletic and Gymkhana:		
Transfer of Funds to Gymkhana Management & Other Gymkhana Items		4,71,057
Other Items:		
Part-time Lecturers		4,050
Visiting Professors		13,018
Technical Bulletines & Journals		86,057
Guidance & Counselling Unit		21,741
Symposia and Seminars		28,893
Inplant Training / Courses / Visits		70,096
Continuing Education Programme Organised by the Institute		1,527
Quality Improvement Programme		3,553
H. A. L. Trainees		1,00,000
Director's Discretionary Fund for Research		10,140
Membership to outside bodies		25,218
Remuneration to external examiners		80,910
C/o		7,61,07,316

RECEIPTS

		Rs.
	B/f	18,80,72,703
	C/o	18,80,72,703

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1985-86

PAYMENTS

	Rs.	Rs.
B/f		7,61,07,316
Convocation		131,851
Prizes for Academic Distinction		9,092
Joint Entrance Examination		7,29,462
Common Examination for Post Graduate Admission (CERA)		2,52,244
Graduate Aptitude Test in Engg. (GATE)		5,77,874
Contribution towards Institute Participation of Programme of National Conference		25,000
JEE Special coaching Programme for SC/ST Students (1985-86)		47,528
Hostels :		
Security (Hostels)	81,585	
Allowances to Wardens	27,523	
Subsidy to Hostels	24,39,167	
		25,48,275
Other Sections :		
a) **Central Administration :**		
Pay and Allowances-Officers	16,49,062	
Pay and Allowances-Others	54,84,850	
		71,33,912
b) **Contingencies :**		
Postage	3,11,176	
Entertainment	37,017	
Telephones	5,88,507	
Liveries	4,40,378	
Stationery	5,79,066	
Printing	2,32,219	
Advertisement	4,13,942	
Miscellaneous Expenses	1,99,114	
		28,01,419
C/o		9,03,63,973

RECEIPTS		
		Rs.
	B/F	18,80,72,703
	C/o	18,80,72,703

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1985-86

PAYMENTS

	Rs.	Rs.
B/f		9,03,63,973
c) **Other Items :-**		
Director's Discretionary Payments		6,769
d) **Stores :-**		
Pay and allowances - Officers	1,31,324	
Pay and Allowances - Others	4,41,383	
		5,72,707
General Stores :-		
Purchases		23,389
Security - Other Charges		3,07,377
Lawns and Gardens :-		
Pay and Allowances of Horticulture Superintendent	38,986	
Pay and Allowances - Others	1,55,369	
		1,94,355
Power		32,57,430
Mosquito Control		1,244
Water		4,93,748
Oil and Petrol		2,91,953
C/o		9,55,12,945

RECEIPTS		
		Rs
	B/F	18,80,72,703
	C/o	18,80,72,703

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1985-86

PAYMENTS

		Rs.
B/F		9,55,12,945
Repairs and Maintenance :-		
Vehicles	1,67,625	
Furniture	2,69,698	
Typewriters/Duplicators	64,403	
Duty, Insurance and Road Taxes	97,343	
Fire Fighting Operating Cost	18,114	
		6,17,183
Works and Maintenance :-		
Pay and Allowances (Officers)	1,64,278	
Pay and Allowances (Others)	49,28,550	
Other Expenditure on Maintenance	35,31,607	
		86,24,435
Property Tax		1,99,792
Hospital :-		
Pay and Allowances - Medical Officers	2,65,223	
Pay and Allowances - Others	4,84,901	
Purchase of Medicines etc.	6,81,632	
		14,31,756
Subsidy to Vanavani School		1,66,035
Audit Charges		72,340
Legal Expenses		41,986
Reimbursement of Stamp Duty		20,155
C/o		10,66,86,627

RECEIPTS

		Rs.
	B/F	18,80,72,703
	C/o	18,80,72,703

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1985-86

PAYMENTS

		Rs.
B/F		10,66,86,627
Travelling Expenses :		
Board of Governors	13,382	
Staff Committee, Selection Committee etc.	42,221	
Candidates Called for Interview	43,767	
External Examiners	1,70,239	2,69,609
Leave Salary and Pension Contribution on account of Personnel on foreign Services		42,187
Contribution to Employees Welfare Scheme		988
Chairman, Council of Wardens		1,418
Central Gas Supply Unit		4,461
C/o		10,70,05,290

RECEIPTS		
		Rs.
	B/f	18,80,72,703
	C/o	18,80,72,703

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1985-86

PAYMENTS

	Rs.	Rs.
B/f		10,70,05,290
Campus Amenities :		19,458
Provident Fund/Gratuity/Pension :		
Pension/Commutation of Pension	5,73,232	
Family Pension	1,00,405	
Institute Share of Contribution	57,85,624	
Gratuity	3,51,893	
		68,11,154
Advances :		
Motor Car and Other Conveyance	4,52,925	
Customs Duty—Non-Plan	85,00,000	
Customs Duty (on Personal Effects of West German Experts)	2,00,000	
Festival Advance	3,18,200	
Other Miscellaneous Advance	4,72,311	
Flood Advance	1,89,125	
House Building Advance	9,40,060	
		1,10,72,621
C/o		12,49,08,523

INDIAN INSTITUTE OF

RECEIPTS AND PAYMENTS

RECEIPTS		
		Rs.
B/F		18,80,72,703
Total	Rs.	18,80,72,703

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

TECHNOLOGY, MADRAS-600 036.

ACCOUNTS FOR THE YEAR 1985-86

PAYMENTS

			Rs.
	B/F		12,49.08,523
Refund of Deposits :-			
Suppliers Deposits (Institute)		1,08,158	
Contractors Deposits (Works)		9,06,346	
External Scholarship		6,15,250	
C.S.I.R.		5,16,008	
Miscellaneous Deposit		13,53,682	
Students Caution Deposit		15,850	
Library Deposit		35,350	
Microprocessor Lab. Centres, Etc.		98,05,118	
QIP Programme organised by GOI CSD (Defence)		12,80,304	
Industrial Consultancy Work and Projects		1,54,24,361	
Interest on Endowments		12,525	
Alumni Association		31,363	
N.C.E.R.T.		1,429	
Students Welfare Fund		27,345	
			3,01,33,089
Closing Balance :-			
Cash in Hand		3,89,309	
With State Bank of India		3,23,25,089	
Savings Bank Account		3,16,693	
			3,30,31,091
	Total	Rs.	18,80,72,703

Registrar
Indian Institue of Technology
Madras-600 036.

Director
Indian Institute of Technology
Madras-600 036.