

THIRTY THIRD ANNUAL REPORT 1991-92

**INDIAN INSTITUTE OF TECHNOLOGY
MADRAS 600 036**



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MADRAS 600 036**

CONTENTS

Chapter		
	Board of Governors	
1	Report by the Director	1
2	Administration	9
3	Academic Programmes and Award of Degrees	15
4	Departments and Centres	20
5	Central Services	165
6	Student Amenities and Activities	174
7	Financial Assistance to Students	184
8	Campus Amenities	187
9	Finance and Accounts	190
	Annexure - I	193
	List of Council Members	
	Annexure - II	195
	Senate	
	Finance Committee	
	Building and Works Committee	
	Board of Academic Research	
	Board of Academic Courses	
	Annexure - III	201
	List of Other Officers	

THE VISITOR

R. Venkataraman
President of India

THE BOARD OF GOVERNORS

Chairman
Dr.M.S. Swaminathan

Director of the Institute
Prof.N.V.C. Swamy

Members

Nominees of State Governments

Sri. P.K. Rastogi, I.A.S.
Commr. & Director of Tech. Education
Govt. of Andhra Pradesh.

Dr. R. Ravikumar
Director of Tech. Education
Govt. of Kerala.

Prof.P.V.Bhandary
Director of Technical & Mining
Education, Govt. of Karnataka.

Dr. T.R. Natesan
Director of Tech. Education
Govt. of Tamil Nadu.

Nominees of the IIT Council

Prof. M Ananda Krishnan
Vice-Chancellor,
Anna University, Madras

Sri.T.K.Srinivasan
Chairman (Retd.), Madhya Pradesh
Electricity Board.

Mrs.Mallika Srinivasan
Vice President
Tractors & Farm Equipment Ltd.,
Madras.

Sri.P.K.Kandaswamy
Chief Engineer (Retd.),
Madras Port Trust,
Madras.

Prof. V.C. Kulandaiswamy
Vice Chancellor
Indira Gandhi National Open University.
(upto 24.11.1991)

Dr. M. Santappa
Former Vice Chancellor
Madras University.
(upto 24.11.91)

Sri. Suresh Krishna
Chairman & Managing Director
Sundaram Fasteners Ltd., Padi.
(upto 24.11.1991)

Prof.(Mrs.) Leela Gulati
Centre for Dev. Studies.
(upto 24.11.1991)

Nominees of the Senate

Prof.Y.V.G.S. Murti
Prof.T.Gopichand

Prof. K.Srinivasa Raghavan
(upto 31.12.91)

Secretary

V. Shanmugam, Registrar

1 REPORT BY THE DIRECTOR

Indian Institute of Technology, Madras is one among the foremost Institutes of national importance in higher technological education in India. It has been growing from strength to strength ever since it obtained its charter from the Indian Parliament in 1961 and has established itself as a premier centre for teaching, research and industrial consultancy in the country.

The activities of the Institute encompass several departments and advanced research centres in various disciplines of Engineering Science and Humanities with nearly 100 Laboratories organised on an unique pattern of functioning.

A faculty of international repute, a brilliant student community, excellent technical and supporting staff and an effective administration have all contributed to the pre-eminent status of this Institute.

In the year 1991-92, the institute continue to maintain its tempo of activities. The salient features of those activities are given below:

1. Academic Programmes

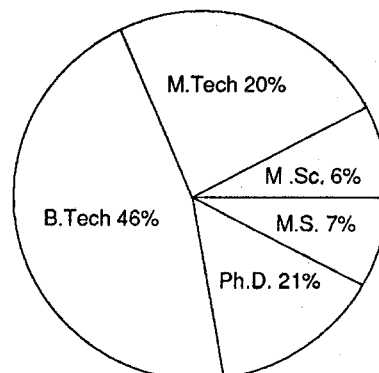
The Institute offers a wide spectrum of programmes both at the under graduate and post-graduate levels. At the under graduate level eight semester programme leading to the degree of Technology in 9 disciplines were offered. At the post-graduate level, a three semester - programme leading to the post graduate degree of technology in 37 disciplines were offered. The research programmes leading to award of MS and Ph.D degree were also offered.

Students Intake:

In the year 1991-92, 858 students were admitted. This includes, 109 Ph.D, 45 M.S., 279 M.Tech, 90 M.Sc. and 335 B.Tech students. The number of women and SC/ST students admitted were 71 and 70 for undergraduate and post graduate programmes respectively.

Enrolment:

The enrolment of students including those admitted afresh in the Academic year 1991-92 was 2460 which includes 154 SC/ST and 251 women students. This enrolment includes 515 Ph.D, 177 M.S., 488 M.Tech, 146 M.Sc., and 1134 B.Tech students/scholars.



New Courses Introduced:

The Departments are reviewing the curriculum periodically so as to make them relevant to the current needs of Engineering, Technology and Science education. During the period of report, the following 34 new courses were introduced/updated in different departments:

- Orthopaedic Mechanics
- Computational methods in Chemistry
- Introduction to Robotics
- Microprocessors & Micro Computers
- Microprocessors Lab.
- Management and Finance, Marketing and Personnel
- A critical Analysis of American fiction
- Psycholinguistics
- Transport Phenomena in Metallurgical Processes
- Special Topics in Chemical Metallurgy
- Ceramic Science & Technology
- Refractories & Ceramics
- Advanced Metallurgical Thermodynamics
- Residual Stress Analysis
- Non-linear Optical Processes and Devices
- Knowledge Structures for Planning & Understanding
- Climatology II (Modified)
- Special HVAC Applications
- Introduction to Fracture Mechanics
- Metrology, Computer Aided Inspection
- Metal Removal Processes
- Production System Design and Control
- Advanced Materials and their Processing
- Tooling for Manufacturing and Automation
- Microprocessors & Computers for Integrated Mfg. Systems
- Computer Aided Design for Manufacturing
- Flexible Manufacturing Systems
- Computer Numerical Control in Manufacturing
- Computer Networking & Standards in Computer Integrated Mfg.
- Computational Methods in Design and Manufacture
- Sensors for Intelligent Manufacturing & Condition Monitoring
- Advanced Machine Tool Design
- Expert Systems in Manufacturing
- Machine vision and its Applications

2. Faculty Development

Faculty Position:

There were 167 Professors, 53 Associate Professors, 136 Assistant Professors and 16 Lecturers totaling 372 in different departments and centres of this Institute during the period under report.

Short-term courses conducted:

The faculty of various departments and centres of this Institute conducted 48 Short-term courses during the period under report.

Conference/Seminars/Symposia Conducted:

A large number of conferences, seminars, symposiums are regularly organised at this Institute. During the period under report the following 4 National and International conferences/Seminars were conducted:

1. National Conference on Design Engineering - NACOMM-91, during 12-14 December, 1991 by the Department of Mechanical Engineering.
2. 11th Conference on Heat and Mass Transfer, 21-23 Dec., 1991 by the Dept. of Mechanical Engineering.
3. Physics and Technology of Semiconductor Devices and Integrated Circuits, 5-7 Feb., 92 by the Physics Department.
4. 37th All India Library Conference in collaboration with Department of Library Science, University of Madras and Madras Library Association, 4-7 Dec., 1991.

Publications:

During the period under report 674 papers were published by the faculty members of which 110 papers were in Mechanical Science, 31 papers in Electrical Science, 116 papers in Chemical Science, 73 papers in Building Science, 96 papers in Mathematical and Physical Sciences and 248 papers in other subjects.

Attending Conference/Seminar:

The faculty members are always on the move to have effective interaction with other educational institutions. During the period under report 122 faculty members participated in various conferences, seminars and symposia conducted by other organisations/Universities.

Visits Abroad:

During the period under report 53 faculty members visited foreign countries for various academic activities.

Honours conferred on Faculty:

The following are the details of faculty members who were conferred honours for various academic distinctions:

1. Dr. E.G. Tulapurakara of the Department of Aerospace Engineering was the recipient of PARAM Award 1991 given by the Centre for Development of Advanced Computing (C-DAC) for his work on Parallelisation of turbulent flow computation. This Award has been given for a demonstration of the solution of complicated problems in Fluid Dynamics through parallel processing.
2. Prof. T.K. Bose of the Department of Aerospace Engineering received the Sri Om Prakash Bhasin Award for the year 1992 in the field of Space and Aerospace.
3. Prof. A.K. Sreekanth of the Department of Aerospace Engineering received the Aerospace Education Award given by the Aeronautical Society of India for the year 1992.

4. Prof. M.S. Gopinathan of the Department of Chemistry and Prof.G.V. Subba Rao of Materials Science Research Centre were elected as Fellows of the Indian National Science Academy.
5. Prof. H. Raman and Dr.S.Mohan of the Department of Civil Engineering received the Dorr Oliver Award for the year 1991 given by the Indian Water Works Association.
6. Prof. V. Radhakrishnan of the Department of Mechanical Engineering and Prof. V.S. Raju of Ocean Engineering Centre were elected as Fellows of the National Academy of Engineering.
7. Prof. K.A. Padmanabhan of the Department of Metallurgical Engineering was elected as an Honorary Academician of the Bashkerian Academy of Sciences of the Russian Federation for his outstanding contributions in the field of Super- plasticity.
8. Prof. K.V.S. Rama Rao of the Department of Physics and Dr.K.M.M. Prabhu of the Department of Electrical Engineering were elected as Senior Members of the Institution of Electrical and Electronic Engineers, UA.
9. Dr.J.S. Mani of the Ocean Engineering Centre received the Cash Your Idea Award 1992 given by the Central Board of Irrigation and Power for his work on the Design of Y-Frame Floating Breakwater.

3. Students Facilities

Students Council:

The students council, an elected body from among the students community provides an effective channel of communication among the Director, faculty and students, through dialogue and discussion on various student matters. Student council is also responsible for certain welfare measures volunteered by the student community. The publication of Focus campus magazine of the students is one of the activities of the students council.

Adhoc Grant for Research Scholars:

To encourage the research scholars of M.S. and Ph.D programmes the Institute has been sanctioning adhoc grants for those who participate in International conference and present papers. During the period under report 8 scholars were sanctioned this grant. In the last 7 years 43 scholars were benefited under this scheme.

Thesis Preparation Grant:

The research scholars have been sanctioned a sum of Rs.2500/- for preparation of thesis. During the period under report 20 Ph.D scholars benefited in this scheme.

Award of Medals:

In the academic year 91-92 30 students obtained medals for their outstanding academic work in the respective discipline.

Scholarship:

During the period under report 87 Ph.D scholars, 59 MS scholars and 212 M.Tech students were given fellowship/scholarship. In total 294 Ph.D, 141 M.S scholars and 342 M. Tech students obtained fellowship/scholarship. Further 36 M.Sc. students got institute merit scholarship.

Facility for SC/ST Students:

During the period under report 25 B.Tech students of SC/ST community were given free messing facilities and out of pocket expenses of Rs.70/- per month, in addition to the exemption of tuition fees. With this 56 students enjoyed this facility during the period under report. Further 66 students got tuition fee exemption.

Students Aid Fund:

This is a cooperative scheme by way of subscription by every student per annum to assist needy and deserving students through loan to meet tuition fees, study tour expenses, cost of books, thesis expenses etc. During the period under report 4 students got benefited.

Placement:

The placement and training centre of the Institute contacts Medium and Large Scale Industries, National and Defence Laboratories and Universities all over the country and provides placements to the freshers, Scientists and Engineers from various disciplines. During the period under report 287 students were selected by well known organisations before they actually leave the campus after completing the course. This centre has been able to achieve this almost every year.

4. Degrees Awarded

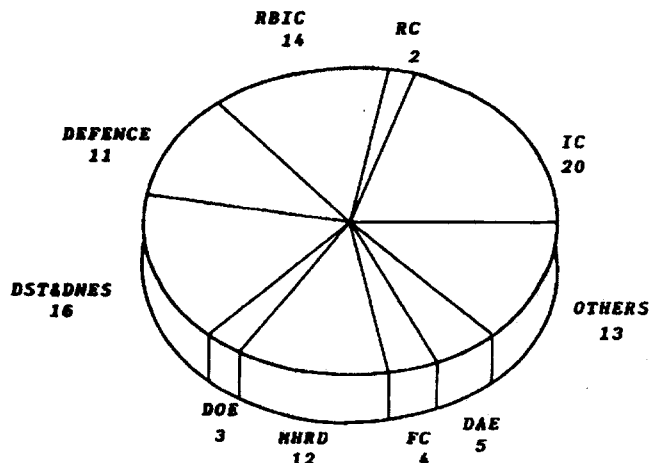
28th Convocation was held on 9th August 1991. Dr. Abdul Kalam, Director DRDL Hyderabad delivered the Convocation Address. 776-candidates were awarded various degrees. With this the total number of candidates who were awarded degrees so far by this Institute is 15,490.

5. Industrial Consultancy & Sponsored Research Programmes

The consultancy, sponsored research and interactive programmes with industries, institutions and other agencies of the Government are coordinated by the Centre for Industrial Consultancy and Sponsored Research of this Institute. These programmes give opportunities to the faculty and staff to work on live problems of immediate relevance to the user agencies. In this process, the students get an exposure and an opportunity to tackle practical problems. The percentage wise breakup of the value of sponsored research and consultancy projects, is presented below:

Value of Sponsored Research and Consultancy Projects

Figures in % of total earnings



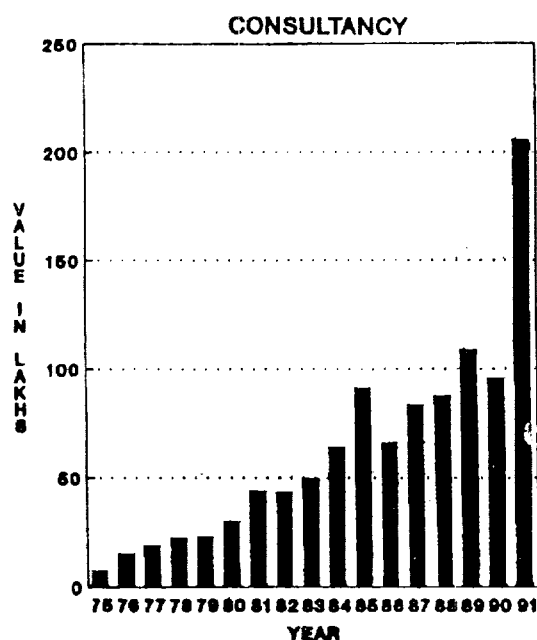
Consultancy: RC- Retainer Consultancy, IC- Institutional Consultancy, RBIC - Research Based Industrial Consultancy
Sponsored Research: Defence, DST- Dept. of Science and Technology, DNES- Dept. of Non-Conventional Energy sources, DOE-Dept. of Electronics, MHRD- Ministry of Human Resource Development, FC- Foreign Collaboration, DAE- Dept. of Atomic Energy.

Consultancy:

Industries from all sectors avail the expertise and facilities of this Institute through any one of the following avenues:

- * Institutional Consultancy
- * Retainer Consultancy
- * Research Based Industrial Consultancy

The value of the consultancy assignments for the period 1978-1992 is given below:



Institutional Consultancy:

These are specific assignments that can be executed readily utilising the professional knowledge and expertise of the faculty and facilities at the Institute.

Retainer Consultancy:

Expertise of IIT faculty is utilised by the Industries by retaining them as consultants for advice/guidance on any aspects of interest to the industries concerned for a specific duration. More than thirty industries from all over the country availed this expertise during the year 1991-92.

Research Based Industrial Consultancy - RBIC:

Assignments which require applied research fall under this category. Under RBIC an industry or a group of industries can jointly sponsor a project of interest to them in an area where they agree to share the know-how generated. The project duration will be for a period ranging from six months to three years. During 1991-92 more than fifteen companies entered into an agreement for pursuing projects under this programme.

Industrial Associateship Scheme:

The Industrial Associateship Scheme was started in 1987 to further strengthen the linkages with the industry. At present more than two hundred industries/ organisations from all over the country are members of this scheme. Institute, under this Scheme, provide access to the following facilities to their Industrial Associates:

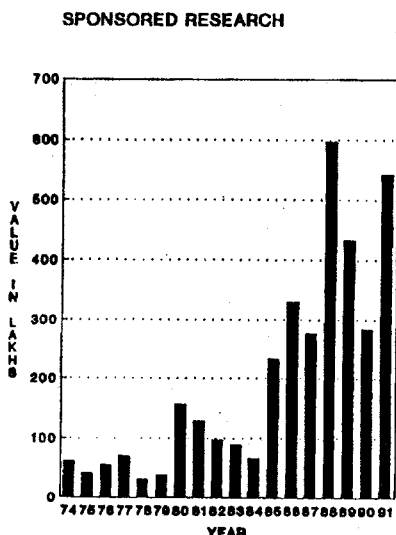
- * Technology Appreciation Programmes
- * Technology Requirement Programmes
- * Library and Information Services
- * Short term courses
- * Get-together Programmes

Collaborative Research Programmes:

International collaborative joint research programmes of common interest are undertaken through Indo-US, Indo-German, Indo-Australian and Indo-European research projects.

Sponsored Projects:

These are R & D projects sponsored by Government departments and agencies, industries or other institutions with a view to generate new knowledge to develop a new technology or to create new products in Nation building. Currently there are more than 50 on-going projects at the institute. The value of the sponsored research projects for the period 1975-1992 is depicted below:



6. Centre for Continuing Education

The centre for continuing education has initiated a wide range of activities by utilising the resources of faculty as well as certain other facilities available at the Institute. During the period under report 31 students from the colleges were admitted in the Ph.D and M.Tech programmes under Quality Improvement Programme.

7. Hostel

The strength of students in 12 hostels was 2008 which includes 1814 men and 194 women students. The administration of Hostel and Mess is being looked after by Council of Wardens. The Council of Wardens will be responsible for the day to day affairs of the hostel and mess.

8. Endowment Lectures

During the period under report the following Endowment lectures were conducted:

Sl.No.	Name of Endowment	Topic	Delivered by	Date
1.	Employees Federation of Southern Indian Lecture	Global competitiveness of Indian Industry - Employer - Employee Partnership	Sri V. Krishnamurthy, Chairman, Board of Governors, IIT Delhi and formerly Chairman, Maruti Udyog Ltd.	03.08.1991

2.	Philips India VII Endowment Lecture	Swot Analysis of Indian Electronics	Dr.P.S. Deodhar, President, Applied Electronics Ltd., Bombay	08.10.1991
3.	Second National Conference on Dock Harbour Engineering Lecture	World Dredging Scenario with special reference to conditions in India	Brig.O.P. Narula, Chairman & Managing Director, Howe (I) P.Ltd., New Delhi	23.01.1992

9. Finance

The non-plan revised estimate 1991-92 and budget estimate for 1992-93 were Rs.2,101.69 lakhs and Rs.2,320.11 lakhs respectively. The actual non-plan and plan expenditure during the year 1990-91 were Rs.1885.58 lakhs and Rs.304.90 lakhs respectively.

10. Library

The Central Library as on 31.3.1992 had a total accession of 2,04,792 volumes of books, journals and periodicals.

11. Building Programmes

The following buildings/works were completed and thrown open for occupation/put into use during the period under report:

S.No	Name of work	Rs. in lakhs
1.	Construction of MSRC Building	39.00
2.	Construction of Lecture Hall Complex	33.00
3.	Construction of First Floor over FRP Centre	8.00
4.	Extension of SBI Building	8.60
5.	Construction of Eastern Wing in FF for Chemical Kinetics Lab. (Chemistry Dept.)	6.60
6.	Extension of 3rd Floor over Structural Engg. Lab.	6.40
7.	Construction of a Building for Regional Centre for Energy Heat & Mass Transfer at IIT (RCEHMT)	10.00
8.	Laying Telephone cables in campus	23.60

2. ADMINISTRATION

2.1 General

I.I.T. Madras is an autonomous statutory organisation functioning within the "Institutes of Technology Act, 1961", as amended by "The Institute of Technology (Amendment) Act, 1963". The five Institutes of Technology (others being at Bombay, Kanpur, Kharagpur and Delhi) are administered centrally by the Council of IITs, an apex body established by the Government of India to co-ordinate activities of these Institutes. The Human Resource Development Minister of the Government of India is the Chairman of the Council. The list of the members of the Council is given in Annexure I. Each Institute of Technology has a Board of Governors responsible for its over-all administration and control. The composition of the Board of Governors of this Institute is given in page i.

The Senate decides the academic policy of the Institute. It controls and approves curriculum, courses and examination results. It appoints committees to look into specific academic matters arising from time to time. The teaching, training and research activities of various departments at the Institute are constantly under review to improve both facilities and standards. The Director of the Institute is the Chairman of the Senate. Members of the Senate are listed in Annexure II.

Financial advice to the Institute is given by the Finance Committee, whose constitution is given in Appendix II. Similarly, there is a Buildings and Works Committee which advises the Institute on matters relating to buildings and works activity. The constitution of this committee is also given in Annexure II.

In addition, there are two Boards viz., the Board of Academic Research and Board of Academic Courses appointed by the Senate to help in the efficient administration of academic activities of the Institute. The constitutions of these Boards are also listed in Annexure II.

The details of Academic staff are given in the respective departments and the list of Administrative officers of the Institute is given in Annexure III.

2.2 Staff Position

During the year 360 Faculty, 53 Scientists, 60 Officers and 170 supporting staff were in position. 46 new appointments/ selections for higher positions were made. 19 retired from services and 2 expired the details of which are given below:

Faculty/Officers appointed during the year:

Sl.No.	Name	Designation	Date of appointment/ Selection
1.	Dr. S. Sunderasan	Professor	07-06-91
2.	Dr. M.Chidambaram	Asso. Professor	12-08-91
3.	Dr. Pramod S. Mehta	Asso. Professor	04-09-91
4.	Dr. A. Meher Prasad	Asst. Professor	17-06-91

Sl.No.	Name	Designation	Date of appointment/ Selection
5.	Dr. S. Sankararaman	Asst. Professor	28-06-91
6.	Dr. Mrs S.Lakshmi Bala	Asst. Professor	22-07-91
7.	Dr. M. Ramakrishna	Asst. Professor	16-07-91
8.	Dr. Enakshi Bhattacharya	Asst. Professor	01-08-91
9.	Dr. K. Srinivasan	Asst. Professor	29-11-91
10.	Dr. S. Swarnamani	Asst. Professor	07-02-92
11.	Dr. M.S. Subramanian	Asst. Professor	07-02-92
12.	Dr. T. Subramanyan	Asst. Professor	07-02-92
13.	Dr. A. Ramachandriah	Asst. Professor	07-02-92
14.	Dr. S. Karmalkar	Asst. Professor	07-02-92
15.	Dr. D. Veeraraghavan	Asst. Professor	07-02-92
16.	Dr. C. Rajendran	Asst. Professor	07-02-92
17.	Dr. K. Swaminathan	Asst. Professor	07-02-92
18.	Dr. J.S. Mani	Asst. Professor	07-02-92
19.	Dr. S.K. Bhattacharya	Asst. Professor	07-02-92
20.	Dr. T.J. Kamalanabhan	Asst. Professor	18-03-92
21.	Dr. Sujatha Chandramohan	Lecturer	07-02-92
22.	Dr. K. Ramamurthy	Lecturer	16-03-92
23.	Dr. Paul Mario Kola	Lecturer	23-03-92
24.	Dr. R. Sundaram	STEO	28-10-91
25.	Sri K. Panchalan	Deputy Registrar	22-08-91
26.	Sri M Koteswara Rao	Deputy Librarian	17-05-91
27.	Sri I.R. Naganagoudar	Deputy Librarian	31-07-91
28.	Sri John D. Britto	Asst. Engineer	10-07-91
29.	Sri R. Easakkimuthu	AFAO	07-08-91
30.	Sri P. Ravikumar	Asst.Systems Engr.	21-08-91
31.	Sri K. Narayana Rao	Asst.Systems Engr.	17-05-91
32.	Ms. Dorothy Samuel	Asst.Systems Engr.	12-06-91
33.	Sri V. Ravikumar	Asst.Systems Engr.	07-06-91
34.	Sri A.M.Thrivikraman Nair	Asst.Systems Engr.	26-06-91
35.	Sri K. Paranjothi	Asst.Systems Engr.	01-07-91
36.	Sri P. Radhakrishnan	Asst.Systems Engr.	15-07-91
37.	Sri S. Saomianaraynan	Asst.Systems Engr.	01-08-91
38.	Sri R. Muthuswamy	Asst.Systems Engr.	19-08-91
39.	Sri M. Kasiraju	Asst.Systems Engr.	07-10-91
40.	Sri M. Sugumaran	Asst.Systems Engr.	11-11-91
41.	Sri Z. Aslam Basha	Asst.Systems Engr.	23-12-91
42.	Sri V. Perumal	Accountant	17-06-91
43.	Sri T. Karunakaran	Accountant	17-06-91
44.	Sri D. Ravi	Accountant	14-08-91
45.	Sri S.D.Sundaravinayagam	Accountant	30-08-91
46.	Sri C.C. Tom	Asst. Librarian	01-10-91

Faculty/Officers who have retired/resigned during the year:

Sl.No.	Name	Designation	Date of retirement/- resignation	Remarks
1.	Dr.J. Rajaram	Professor	31-05-91	Re-employed upto 30-06-91 AN
2.	Sri D. Hariharan	C.T.E.O	30-06-91	---
3.	Dr.C.A. Sastry	Professor	31-12-91	Re-employed upto 30-06- 92 AN
4.	Dr.D.K. Banerjee	Professor	29-02-92	-do-
5.	Dr.A.K.Srekanth	Professor	30-11-91	-do-
6.	Dr.K. Remananda Rao	Associate Professor	30-09-91	Retired
7.	Dr.KV Chalapathi Rao	Associate Professor	01-07-91	Voluntary Retirement
8.	Sri V. Subramanian	Supdt. (SG)	31-05-91	Voluntary Retirement
9.	Kum. G. Saroja	Asst. Regr.	30-09-91	Retired
10.	Sri Abraham Varghese	A.E. (SG)	31-08-91	Voluntary Retirement
11.	Sri N. Satyamurthi	Assistant Librarian (SG)	30-09-91	Retired
12.	Sri G.Govardhanagiri Rao	Lecturer	29-11-91	Voluntary Retirement
13.	Sri T. Subramanian	Asst. Prof.	28-02-92	Retired
14.	Sri V.S. Ramakrishna Iyer	Supdt.	31-03-92	Retired
15.	Sri R. Srinivasan	IAO	30-11-91	Retired
16.	Sri H. Shaukat Ali	Sr. PTI	29-02-92	Retired
17.	Sri R. Balasubramanian	TO (SG)	29-02-92	Retired
18.	Sri S. Shanmugam	TO	29-02-92	Retired
19.	Mrs. S.K.Kanthimathi	Tech. Asst.	01-08-91	Resigned

Expired:

1.	Dr. G.V.N. Rayudu	Professor	17-03-92	Expired
2.	Sri N. Rajagopalan	Asst. Systems Officer	01-11-91	Expired

Faculty/Officers who were on long leave:

Sl. No.	Name	Designation	Duration	Nature of Leave
1.	Dr V M Radhakrishnan	Professor	02-01.91 to 30-04-92	Sab. Leave/Leave at Credit
2.	Dr M S Gopinathan	Professor	08-01-91 to 30-06-92	AVH Foundation Fellowship
3.	Dr H N Mahabala	Professor	01-01-91 to 31-12-91	Sabbatical Leave
4.	Dr P T Manoharan	Professor	22-01-91 to 21-01-92	-do-
5.	Dr. H. Achyutha	Professor	18-02-91 to 28-02-92	-do-
6.	Dr. T K K Srinivasan	Professor	30-09-91 to 20-11-92	-do-
7.	Dr. V. Ramamurti	Professor	18-09-91 to 31-07-93	-do-

Sl. No.	Name	Designation	Duration	Nature of Leave
8.	Dr. N. Parameswaran	Asst. Prof.	13-05-91 to 12-05-92	EOL
9.	Dr. V. N. Shukla	SDE	15-05-90 to 14-05-92	EOL
10.	Dr. P.C. Deshmukh	Asso. Prof.	01-02-91 to 13-03-92	Sab. Leave/ Leave @ credit
11.	Dr.S.M. Kulkarni	Asst. Prof.	24-01-91 to 23-07-91	Inter IIT Faculty Exchange Prog. to visit IIT Bombay
12.	Dr. A. Subrahmanyam	Asst. Prof.	23-08-91 to 22-08-92	Sab. Leave
13.	Dr. M.N. Sudheendra Rao	Asst. Prof.	04-06-90 to 03-06-91	Sab. Leave
14.	Dr. B. Subramanian	Asst. Prof.	03-06-91 to 02-06-92	Sab. Leave
15.	Dr. V. Sundar	Asso. Prof.	02-01-91 to 12-07-91	EL & Summer Vacation
16.	Sri G. Palanisamy	SSO II	11-09-90 to 10-09-92	EOL
17.	Sri S. Karmalkar	SSO II	04-11-91 to 03-11-92	EOL
18.	Sri G. Jothinathan	SSO II	06-02-92 to 04-06-92	EOL

2.3 Meetings of the Bodies

Board of Governors:

Five meetings of the Board of Governors were held on 17.6.91, 8.8.91, 29.11.91, 16.12.91 and 7.2.92.

Finance Committee:

Three meetings of the Finance Committee were held on 10.4.91, 28.10.91 and 17.3.92.

Senate:

Six meetings of the Senate were held on 7.6.91, 5.8.91, 13.9.91, 4.11.91, 13.12.91 and 5.2.92.

Board of Academic Research:

Five meetings of the Board of Academic Research were held on 16.4.91, 15.10.91, 29.1.92, 10.3.92 and 23.3.92.

Board of Academic Courses:

Three meetings of the Board of Academic Courses were held on 19.4.91, 24.7.91 and 21.10.91

Building and Works Committee:

Three meetings of the Building and Works Committee were held on 1.2.91, 27.9.91 and 24.3.92.

2.4 List of Administrative Officers

Director

Prof. N.V.C. Swamy

Deans

Prof. G. Aravamudan
Prof. V.M. Krishna Sastri
Prof. A. Kuppurajulu
Prof. V.S. Raju
Prof. N. Venkatrayulu

Administration
Academic Research
Academic Courses
Industrial Consultancy & Sponsored Research
Students

Heads of Departments

Prof.S. Krishnan
Prof.K.M. Patil
Prof.M.S. Ananth
Prof.V. Ramakrishnan
Prof.C.S. Krishnamoorthy
Prof.R. Nagarajan
Prof.K. Radhakrishna Rao
Prof.Dipak Choudhury
Prof.U.N. Srivatsava
Prof.V. Radhakrishnan
Prof.K.J.L. Iyer
Prof.S. Narasimha Rao
Prof.K.V.S. Rama Rao

Aerospace Engineering
Applied Mechanics
Chemical Engineering
Chemistry
Civil Engineering
Computer Science & Engg.
Electrical Engineering
Humanities & Social Sciences
Mathematics
Mechanical Engineering
Metallurgical Engineering
Ocean Engineering Centre
Physics

Central Administration

Registrar
Deputy Registrar
Finance and Accounts Officer
Stores and Purchase Officer
Internal Audit Officer
Asst. Registrars

Sri V. Shanmugam
Sri K. Panchalan
Sri R. Kannan
Sri A. Thirunavukkarasu
Sri R. Srinivasan (upto Sept.1991)
Sri G.R. Raghunatha Rao (SG)
Sri B. Nagaraja Rao
Sri K.R. Raghavan
Sri K. Ramaswamy
Sri K. Rangarajan
Sri R.N. Sankaran
Ms. G. Saroja
Sri K. Sekar
Sri V. Ramamurthy
Sri S. Ramakrishnan
Sri G. Sreenivasulu

Asst. Finance & Accounts Officers

Asst. Stores & Purchase Officers

Sri M.C. James (SG)

Secretaries to Director

Sri M. Manickam
Sri V.V. Natarajan (SG)
Sri G. Natarajan

Training & Placement-cum-Public
Relations Officer
Chief Security Officer
Security Officer

Sri A.K. Pattabiraman
Sri V.C. Alexander
Sri G. Selvamani

Engineering Unit

Chairman, Estate & Works
Institute Engineer
Executive Engineers

Dr. N. Rajagopalan
Sri N. Malayalam
Sri C. Ganesan
Sri D. Ramanathan

Assistant Engineers

Sri Abraham Varghese (SG)
Sri M. Doorvasalu Reddy (SG)
Sri S. Swaminathan
Sri S.K. Pati
Sri J.C. Jinadass
Sri A. Angamuthu
Sri A. Sardar Jhan
Sri K.Ramakrishnan
Sri P. Manickavasagam (SG)

Horticultural Superintendent

3. ACADEMIC PROGRAMMES AND AWARD OF DEGREES

3.1 Introduction

Institute offered Ph.D. Programme in 13 departments, M.S. Programmes in 10 departments, M.Tech Programme in 35 disciplines, M.Sc., programme in 3 disciplines and B.Tech programme in 9 disciplines during the year under report.

3.2 Admissions 1991-92

Students for B.Tech and M.Tech programmes were selected through JEE and GATE respectively. Selection for Ph.D/M.S. programmes was done through interview/test. For M.Sc., programme selection was done by written test and/or interview.

The number of students and scholars admitted to various courses during 1991-92 are given in Table 1.

TABLE - 1

Sl.No.	Department	B.Tech	M.Tech	M.Sc.	M.S.	Ph.D	Total
1.	Aerospace Engg.	24	10	-	3	4	41
2.	Applied Mechanics	-	18	-	3	8	29
3.	Chemical Engg.	43	21	-	1	11	76
4.	Chemistry	-	-	28	-	18	46
5.	Civil Engg.	42	38	-	8	10	98
6.	Computer Sci. Engg.	27	39	-	7	3	76
7.	Electrical Engg.	76	46	-	6	6	134
8.	Humanities & Soc. Sciences	-	20	-	1	5	26
9.	Mathematics	-	-	36	-	6	42
10.	Mechanical Engg.	76	62	-	8	20	166
11.	Metallurgical Engg.	30	13	-	3	6	52
12.	Naval Architecture	17	-	-	-	-	17
13.	Ocean Engg. Centre	-	7	-	5	5	17
14.	Physics	-	5	26	-	7	38
	Total	335	279	90	45	109	858

The total 858 includes the following:

Foreign Nationals	.. 10	QIP Scholars	.. 31
Scheduled Castes	.. 59	Sponsored Candidates	.. 30
Scheduled Tribes	.. 11	External Registration	.. 10
Women	.. 71	Project Staff	.. 21

3.3 Students/Scholars Enrolment

The total number of students on roll in various programmes of the Institute in the academic year 1991-92 are given in Table 2.

TABLE - 2

S.No.	Department	B.Tech	M.Tech	M.Sc.	M.S.	Ph.D	Total
1.	Aerospace Engg.	69	14	-	6	14	103
2.	Applied Mechanics	-	30	-	18	29	77
3.	Chemical Engg.	137	26	-	8	41	212
4.	Chemistry	-	-	45	-	87	132
5.	Civil Engg.	120	65	-	27	51	263
6.	Computer Sci Engg	113	69	-	28	22	232
7.	Electrical Engg	270	79	-	23	29	401
8.	Humanities & Soc. Sciences	-	44	-	10	20	74
9.	Mathematics	-	-	55	-	29	84
10.	Mechanical Engg.	273	118	-	34	78	503
11.	Metallurgical Engg.	99	18	-	7	28	152
12.	Naval Architecture	53	-	-	-	-	53
13.	Ocean Engg. Centre	-	18	-	12	25	55
14.	Physics	-	7*	46	-	62	115
15.	IC & SR	-	-	-	4	-	4
Total		1134	488	146	177	515	2460

* Solid State Tech.

The total 2460 includes the following:

Foreign Nationals	40	External Registration	19
Scheduled Castes	139	Project Staff	85
Scheduled Tribes	15	Defence	26
Women	251	CSIR	42
QIP Scholars	87	Handicapped	3
Sponsored Candidates	52	Institute staff	45

3.4 Convocation

28th Convocation was held on 9.8.91. Dr. A.P.J Abdul Kalam, Director, DRDL, Hyderabad delivered the Convocation Address. 776 candidates were awarded various degrees. 696 candidates received degrees in person. The details of programme/department wise degree awarded are given in the following Table-3.

TABLE - 3

S.No.	Department	B.Tech	M.Tech	M.Sc.	M.S.	Ph.D	Total
1.	Aerospace Engg.	12	8	-	2	2	24
2.	Applied Mechanics	-	7	-	6	6	19
3.	Chemical Engg.	29	12	-	3	7	51
4.	Chemistry	-	-	14	-	19	33
5.	Civil Engg.	24	40	-	6	7	77
6.	Computer Sci. Engg.	30	22	-	11	1	64
7.	Electrical Engg.	66	35	-	11	8	120
8.	Humanities & Soc. Sciences	-	17	-	2	8	27
9.	Mathematics	-	-	22	-	5	27
10.	Mechanical Engg.	67	117	-	16	17	217
11.	Metallurgical Engg.	22	16	-	3	9	50
12.	Naval Architecture	11	-	-	-	-	11
13.	Ocean Engg. Centre	-	13	-	5	7	25
14.	Physics	-	6	16	-	9	31
	Total	261	293	52	65	105	776

With this Convocation the number of degrees awarded so far by the Institute is 15,490, the details of which are as follows:

Ph.D	1386	B.Tech	6977
M.S.	791	DIIT	245
M.Tech	5043	B.Sc.(TA)	20
M.Sc.	1048		

3.5 Award of Prizes

The following are the details of award of President of India Prize, Governor's Prize and Institute Merit Prize for the students with the Best Academic Record in each course:

President of India Prize

B.Tech - Computer Science, Ravi Sundaram

Governor's Prize

B.Tech - Computer Science, Vinod Anantharaman

Institute Merit Prize

B.Tech - Civil Engineering, Rajesh G Shenoi,

M.Tech - Civil Engineering, S. Venkata Narasimha Rao,

Solid State Technology, Kamal Nitin Ramakant,

M.Sc. - Mathematics, Harishree Achuthan,

3.6 Endowment Prizes

The following are the details of endowment prizes awarded to the students in 1991-92.

Ph.D

Sudharshan Bhat Memorial Prize to the full time Research scholar in Metallurgical Engg. with the best published research paper V. Surianarayanan

M.Tech

Air India Prize for the best student in M.Tech Aerospace Engineering P. Ramachandran
Siemens Prize for the best student in M.Tech Electrical Engineering Srinivasa Venkataraman
Mico Bosch Prize for the best project in Environmental Pollution Control M.Tech Chemical Engg. P. Jayanthi
Dr. S. Vaidyanathan Memorial Prize for the best student in M.Tech Mechanical Engg. (Production Engg. and Machine Tools) Bangalore Ramanna Omprakash
Dr. Subbaraju Memorial Prize for the best student in M.Tech Chemical Engg. P. Jayanthi
K.V. Arunkumar Memorial Prize for the best student in M.Tech Industrial Management K. Sudhir
Prof. B. Sengupto Prize for the best student in M.Tech Mechanical Engg. M. Herald
CMC Prize for the outgoing M.Tech student in Computer Science with the best academic record N. Sethuraman
Alumni Association Prize for the best student in M.Tech Industrial Metallurgy S. Ravi Sankar
Coka Parthasarathy Memorial Prize for the best student in M.Tech Industrial Management K. Sudhir
Sudharshan Bhat Memorial Prize for the best student in M.Tech Industrial Metallurgy S. Ravi Sankar
Giri Bros (P) Ltd. Prize for the best student in M.Tech Mech. Engg. with project in Metrology Prashant Prabhakar Fulay
S. Anantharamkrishnan Memorial Prize for the best student in M.Tech Metallurgical Engg. (Metal Casting) Inturi Venkateswara Rao
American Bureau of Shipping Prize for the best student in M.Tech Ocean Engineering Sasank Sekhar Sarma
K. Devarajan Memorial Prize for the student with highest CGPA in M.Tech Civil Engg. (Transportation Engg.) B Subba Raju
S. Anantharamkrishnan Merit prize for the student with the Best individual project for M.Tech Mechanical Engg. Udayagiri Chandrasekhar

M.Sc.

Dr. S.R. Ramadoss 60th Birthday Commemoration Award for the best student in M.Sc. Chemistry V. Sujatha
Prof. C. Ramasastry Memorial Prize for the student with the best academic record in M.Sc Physics S. Jayalakshmi

B.Tech.

Siemens Prize for the best student in B.Tech Electrical Electronics Engg. K. Ramakrishna
Philips India Prize for the best student in B.Tech Electrical Engg. (Electronics) S. Venkatesan
Banco Foundation Prize for the best student in B.Tech Mechanical Engg. S. Badrinarayanan
Reliance Heat Transfer (P) Limited Prize for the best student in B.Tech Chemical Engg. Lachmi Niwas Sadani
HAL Prize for the student with the best academic record passing the B.Tech Degree Course in Aerospace Engg. C.R. Satyanarayanan

V. Ratna Rao Memorial Prize to the outgoing M.Sc. (Chemistry) student with the best academic record	V. Sujatha
American Bureau of Shipping Prize for the best student in B.Tech Naval Architecture	S. Prabhukumar
Valli Anantharamakrishnan Merit Prize for the Girl student with the best Academic Record in B.Tech	K. Kavitha Krishna
B. Ravichandran Memorial Prize for the best student in B.Tech Chemical Engg.	Lachmi Nivas Salani
B. Ravichandran Memorial Prize for the best student in B.Tech Computer Science	Ravi Sundaram
Sivasailam Merit Prize for the student in B.Tech Mech. Engg. for the best individual project	B. Arvindh
Dr. Dhandapani Prize for the student with the best academic record in B.Tech Metallurgical Engg.	Hemant Kumar Sabat

4. DEPARTMENTS AND CENTRES

The Institute is having the following Departments and Centres:

Departments

Aerospace Engineering
Applied Mechanics
Chemical Engineering
Chemistry
Civil Engineering
Computer Science and Engineering
Electrical Engineering
Humanities and Social Sciences
Mathematics
Mechanical Engineering
Metallurgical Engineering
Ocean Engineering
Physics

Centres

Centre for Bio-Science & Bio-Technology
Regional Sophisticated Instrumentation Centre
Centre for Systems and Devices
Material Science Research Centre
Fibre Reinforced Plastics Research Centre
Central Electronic Centre
Centre for Industrial Consultancy & Sponsored Research

The activities of these Departments and Centres during the year 1991-92 are as follows:

4.1. Aerospace Engineering Department

4.1.1 Introduction

The Department of Aerospace Engineering was established in 1969. Now Ph.D., M.S., M.Tech., and B.Tech. programmes are being offered. The major areas of teaching and research of the Department are:

Aerodynamics, Propulsion and Structures.

4.1.2. Details of Faculty:

Name and Qualification	Major area of Specialisation
Professors	
S.Krishnan, Ph.D(IIT Madras)[Head] T.K.Bose, Dr.Ing. (Stuttgart)	Aircraft, Missiles Propulsion Plasma Physics, Gasdynamics, Heat Transfer and Propulsion
K.A.Damodaran, Ph.D(IIT Madras) A.K.Sreekanth, Ph.D (Toronto) G.Subramanian, Ph.D(IIT Madras)	Design Gasdynamics and Propulsion Aerodynamics, Gasdynamics, Fluid Mechanics Structural Analysis, Finite Element and Finite Difference Techniques Moire Techniques
T.K.Varadan, Ph.D (IIT Madras)	Composites, Non-linear Structural Mechanics
Associate Professors	
S.S.Gokhale, Ph.D(Illionis)	Propulsion, Simulation,, Computational fluid dynamics
A.Krishnan, Ph.D(IIT Madras) S.Santhakumar, Ph.D(IIT Madras) E.G.Tulapurkara, Ph.D(IIT Madras)	Aircraft Structural Analysis and Design Composites Aerodynamics Aerodynamics, Aircraft Design,, Performance and Stability, Turbulence
Assistant Professors	
R.M.S.Gowda, Ph.D(IIT Madras) Job Kurian, Ph.D(IIT Madras) M.Ramakrishna, Ph.D(Arlington)	Structural Mechanics, Thermal Stress Analysis Exp. Gasdynamics & Systems Computational Fluid dynamics
Lecturer	
S.C.Rajan, M.Tech(IIT Madras)	Aerodynamics

4.1.3 Students on Roll

Programme	I Year		II Year		III Year		IV Year		V Year		Total
	M	W	M	W	M	W	M	W	M	W	
Ph.D	8	-	8	-	6	-	4	-	9	-	35
M.S.	3	-	1	-	3	-	-	-	-	-	7
M.Tech	10	-	-	-	-	-	-	-	-	-	10
B.Tech	23	-	15	-	14	-	15	-	-	-	67
Total	44	-	24	-	23	-	19	-	9	-	119

4.1.4 Number of Scholarships holders

Programme	Number Institute	CSIR	Others	Total
Ph.D	6	1	2	9
M.S.	5	-	-	5
M.Tech	6	-	-	6
Total	17	1	2	20

4.1.5 Number of Degrees Awarded

Programme	Number
Ph.D	2
M.S.	2
M.Tech	8
B.Tech	13
Total	25

4.1.6 New Facilities added and Major Equipment procured

3 Nos. of PC 486 added

4.1.7 Short-term courses/workshops/seminars/symposia/conferences/training attended by the Faculty in recognised Academic Institutions and Public Sectors:

Sl.No.	Name of Faculty	Title	Period
1.	Dr.E.G.Tulapurkara	National Seminar on Flight Testing, ASTE, Bangalore	26 & 27th April 1991
	-do-	Workshop on Computational Fluid Dynamics, IIT Delhi	29 & 30th Nov. 1991
	-do-	Dynamics of unstable Vehicles Instrumentation of Engineer, Bangalore	22 & 23rd Nov. 1991
2	Dr.S.S.Gokhale	National Heat and Transfer Conference, IIT Madras	Dec. 1991

4.1.8 Invited Lectures Delivered by the Faculty in Academic Institutions/Public Bodies

Name of Faculty	Topic of the Lecture	Delivered at	Date
Dr.E.G.Tulapurkara	Wakes Series of 14 lectures on "Turbulent Flows & their Prediction"	MIT, Madras VSSC Trivandrum	Nov. 91 23 & 27 Dec. 91

4.1.9 Visits Abroad

Name of Faculty	Country visited	Date	Purpose of visit
Dr.E.T.Tulapurkara	Ruhr Universitat Bochum, Germany Stanford Univ. USA	24-6-91 to 14-7-91 14-7-91 to 19-7-91	Colloborative Research International Conference on Turbulent Flows

4.1.10 Distinguished visitors to the Department

Name of the Visitor and Occupation	Date of visit	Purpose of visit
Prof.J.Zierep of Institute of Fluid Mechanics and Fluid Power, Technical University Karlsruhe, Germany.	26.9.91	Guest Lecture

4.1.11. Sponsored Projects

Title	Period	Funding Agency	Amount Rs. in Lakhs.	Co-ordinators
Erosive Burning Studies of Solid Propellents under transonic and supersonic cross flow Mach numbers	Three years	ARDB*	5.986	Prof.S.Krishnan
Composite Solid Propellents Combustion Research and New Courses Development	15 Months	MHRD*	15.000	Prof.S.Krishnan, Prof.T.K.Bose, Dr.S.S.Gokhale
Computer Aided Design Aerodynamically Heated Structure	Three years	ARDB	11.850	Prof.T.K.Bose, Prof.R.Palanimathan
Nozzle Flow with Secondary Injection	Two years	ISRO*	4.880	Prof.T.K.Bose
Studies on Isothermal mixing of two Axisymmetric Airstreams	Four years	ISRO	2.400	Prof.K.A.Damodaran
Escape from military Aircraft at Very high Mach numbers (2.0M)	Four years	ARDB	5.850	Prof.K.A.Damodaran
Studies on Advanced Propulsion for Aerospace Vehicles	Four years	DRDL*	19.980	Prof.K.A.Damodaran
Studies on Supersonic Combustion	Four years	ISRO	7.490	Prof.K.A.Damodaran
Moire studies using image processing techniques	Three years	ARDB	6.785	Prof.G.Subramanian, Dr.R.M.S.Gowda
A Higher order theory of laminated composite shells under transfer loads	Four years	ARDB	3.219	Prof.T.K.Varadan

Review of Turbulence Models Applicable to Aircraft Configurations	Nine months	ADA*	0.920	Dr.E.G.Tulapurkara
Flow Studies on S-blade Profiles Reversible Flow pump Turbine	One year	IRDF*	0.500	Dr.E.G.Tulapurkara, Dr.V.Balabaskaran, Dr.P.A.Aswathanarayana
Computation of Supersonic turbulent base flows	Two years	ISRO	4.250	Dr.E.G.Tulapurkara
Theoretical Studies in Composite Airbreathing Propulsion	Two years	ISRO*	4.950	Dr.S.S.Gokhale
Computer Aided Instruction for Air Breathing Propulsion	1.1/2 years	ARDB	9.075	Dr.S.S.Gokhale, Dr.H.S.Mukunda (IISc)
Aerodynamic Load Estimation of Helicopter Rotor in Hover and Climb and Development of Computer Code	One year	IRDF*	0.360	Dr.M.Ramakrishna, Dr.M.Balakrishnan, Dr.S.C.Rajan
Development and Calibration preliminary experiments on a Hypersonic shock tunnel	Three years	ARDB	6.455	Dr.Job Kurian, Dr. A.K. Sreekanth

(*) Sanctioned during 1991-92

4.1.12 Major Consultancy Assignments

Title	Organisation	Amount (Rs. in Lakhs)	Co-ordinator
Development of Software for Relaxation of Boundary Layer	ISRO	0.150	Prof.T.K.Bose
Combustion studies of Solid Fuel Ramjet Development of Computer Programmes for theoretical performance prediction of solid propellant Rocket	DRDO* ISRO	0.847 & 1.130	Prof.S.Krishnan, Prof.K.A.Damodaran, Prof.S.Krishnan
Design of Low Turbulence Wind Tunnel	FCRI	0.040	Dr.E.G.Tulapurkara

* Sanctioned during 1991-92

4.1.13 Honours and Awards

Name of Faculty	Award	Purpose
Dr.E.G.Tulapurkara	PARAM Award 1991	Parallelisation of turbulent flow computation by C-DAC
Prof.A.K.Sreekanth	1st Aerospace Education Award by Aeronautical Society of India 1992	Aerospace Education
Prof.T.K.Bose	Sri Om Prakash Bhasin Award by the Department of Science & Technology 1991	Space and Aerospace

4.1.14. Research Publications

1. S.Savithri and T.K.Varadan, "Laminated Plates under uniformly Distributed and Concentrated Loads", J.Appl. Mech., Vol.59, March 1992, pp.211-214
2. Narasimhan, J.L., Ramjee, V., Diwakar, P.M. and Tulapurkara E.G., "Production work in a curved duct" Int. J. Numerical methods in Fluids, Vol. 13, pp. 907-916,1991

3. T.K.Varadan and K.Bhaskar "Bending of Laminated Orthotropic Cylindrical Shells", Composite Structures, 17(2), 141-156, 1991.
4. K.Bhaskar and T.K.Varadan, "A Higher-Order Theory for Bending Analysis of Laminated Shells of Revolution", Computers and Structures, 40(4), 815-819, 1991.
5. M.Ganapathy, T.K.Varadan and B.S.Sarma, "Nonlinear Flexural Vibrations of Laminated Orthotropic Plates", Computers and Structures, 39(6), 685-688, 1991.
6. M.S.R. Prasad, B.S.Sarma and T.K.Varadan, "Parel Flutter Analysis using High Precision Shear Flexible Element", Journal of Sound & Vibration, 144(1), 9-16, 1991.
7. S.A.Pillai, A.V.S.S.S.R.Sarma, G.Subramanian and T.K.Varadan, "Detection and Characterization of Tight Cracks using photoelastic Coatings", Materials Evaluation, 50(3), 367-372, 1991
8. S.Savithri and T.K.Varadan, "A Simple Higher-Order Theory for Homogeneous Plates", Mechanics Research Communications 19(1), 65- 71, 1992

4.1.15

The Department has 10 non-teaching technical and 13 non teaching and non-technical staff.

4.2 Applied Mechanics Department

4.2.1 Introduction

The Department of Applied Mechanics was established in 1967. Now Ph.D., M.S. and M.Tech. programmes are being offered. The major areas of teaching and research of the Department are:

The Biomedical Engineering Division's research is concentrated in the three main areas of Medical Electronics, Biophysics and Biomechanics, in collaboration with hospitals and medical research institutes, in the areas of Biomechanics of Leprotic hand and foot, Rehabilitation aids, Finite element and Image processing applications in Biomechanics, Macro-micro hemo- dynamics and in Laser applications in medical diagnosis.

The Elasticity Division is doing research in Stress analysis of plates and shells by finite element techniques, Elasto-plastic analysis, Fracture mechanics, Fatigue, reliability and Composite structures.

The Fluid Mechanics Division is doing research in Aerodynamics of bodies, Automobile aerodynamics, Flow problems in diffusers, Wind energy, Flow-visualisation, Computational fluid dynamics using finite element techniques etc.

The Machine Dynamics Division is engaged in research in the areas of Structural dynamics, Vibration and stress analysis using FEM techniques, Acoustics and noise control, Tribology and Maintenance engineering and Chaotic/non-linear vibrations.

4.2.2 New Courses Introduced

The following new course was introduced during the period under report.

Course No.	Title	Structure	Faculty
AM 617	Orthopaedic Mechanics	3 0 0 3	Dr.S. Radhakrishnan

4.2.3 Details of Faculty

Name and Qualification

Major area of specialisation

Professors

R.S.Alwar, Ph.D (IISc)
P.A.Aswathanarayana, Ph.D(IIT Madras)
B.V.Aswathanarayana Rao, Dr.Ing.(Dresden)

Solid Mechanics
Fluid Mechanics
Vibration & Noise Control, Machine Dynamics,
Industrial Tribology, Maintenance Engineering and
Condition Monitoring

N.V.Chandrasekara Swamy, Ph.D (IISc)
N.Ganesan, Ph.D (IIT Madras)

Fluid Mechanics
Vibration, Stress Analysis, Tribology, Acoustics and
Noise control

B.H.Lakshmana Gowda, Ph.D(IIT Madras)

Fluid Mechanics (Turbulent shear flows,
Flow induced vibration)

Megha Singh, Ph.D(Carolina)
S.Narayanan, Ph.D(IIT Kanpur)
R.Palaninathan, Ph.D(IIT Madras)

K.M.Patil, D.Sc.(Washington) [Head]
V.Ramamurti, Ph.D(IIT Madras)

V.Ramjee, Ph.D(IISc)
B.Srinivasa Prabhu, Ph.D(IIT Madras)
P.S.Srinivasan, Dr.Es.Sc. (Poitiers)
R.S. Srinivasan, Ph.D(IISc)

Biofluid mechanics, Medical Instrumentation
Vibration, Random Vibration, Acoustics and Chaos
Structural Mechanics, Composite Structures
and Materials
Biomechanics, Rehabilitation Engineering
Machine Dynamics, Vibration, Stress Analysis,
Rotor Dynamics, Computer Aided Design
Fluid Mechanics
Rotor Dynamics, Tribology, Maintenance Engineering
Fluid Mechanics
Structural Mechanics, Stress Analysis,
Dynamics of Structures, Composite Structures

Associate Professors

M.Balakrishnan, Ph.D(IIT Madras)
J.Raamachandran, Ph.D(IIT Madras)
S.Radhakrishnan, Ph.D(IIT Madras)

Fluid Mechanics/Low speed Aerodynamics
Solid Mechanics, Computer Aided Design
Biomechanics, Rehabilitation Engineering

Assistant Professor

P.Krishna Iyer, Ph.D(IIT Madras)
J.Lakshminarasimhan, Ph.D(IIT Madras)
S.Swarnamani, Ph.D (IIT Madras)

Solid Mechanics, Stress Analysis - Elasticity and
Plasticity
Fluid Mechanics, Incompressible Aerodynamics,
Internal flows
Instrumentation, Machine Dynamics, Tribology,
Medical Ultrasonics Acoustics,
Biomedical Instrumentation

Lecturer

C.Sujatha, Ph.D (IIT Madras)

Machine Dynamics, Acoustics, Instrumentation,
Condition Monitoring, Fibre Optics

Senior Scientific Officer, Gr.II

G.Thomas, M.Sc.(Madras)

Experimental Stress Analysis

Technical Officer

V. Ganesh, M.S.

4.2.4 Students on Roll

Programme	I Year		II Year		III Year		IV Year		V Year		Total		
	M	W	M	W	M	W	M	W	M	W	M	W	Total
Ph.D	10	-	9	-	7	1	10	-	10	-	46	1	47
M.S.	5	-	8	-	6	-	-	-	1	-	20	-	20
M.Tech	14	-	10	-	-	-	-	-	-	-	24	-	24
Total	29	-	27	-	13	1	10	-	11	-	90	1	91

4.2.5 Number of Scholarship/Fellowship Holders

Programme	Institute	CSIR	Others	Total
Ph.D	20	-	7 (4 QIP)	27
M.S.	17	-	1 (Project)	18
M.Tech	12	-	5	17
Total	49	-	13	62

4.2.6 Number of Degrees Awarded

Programme	Number
M.S.	2
M.Tech	4
Total	6

4.2.7 Instruments/Equipment Designed and Developed

1. He-Ne laser based cardiac functional monitor
2. Non-contact Electromagnetic Exciter with force gauge.
3. Pressure Transducers
4. Dual mass rotor test jig

4.2.8 New Facilities Added and Major Equipment Procured

1. Micro-emed system for measuring foot-footwear interface pressure
2. Windmill test set-up
3. Curved duct flow facility
4. Wear and friction monitor, Ducom
5. Wear particle analyser, Tribometrics
6. Fast align - alignment kit

4.2.9 Short-Term Courses/ Workshops/ Seminars/ Symposia/ Conferences Organised

Sl. No.	Co-ordinator(s)	Title of Course/Workshop/Seminar/Symposia/Conference	Period
1.	Dr.Megha Singh	Intl. Conference on Physiological Fluid Dynamics	30-11-91 to 3-12-91
2.	Dr. B.V.A. Rac and Dr.B.S. Prabhu	Short-term course on Plant maintenance & Lubrication for ONGC and IOC	8-7-91 to 12-7-91
3.	Dr. S.Narayanan	Industrial Noise Control (Technology Appreciation Programme)	14-11-91

4.2.10 Short-Term Courses/ Workshops /Seminars/Symposia/Conferences Training Attended

Sl.No.	Name of Faculty	Title	Period/Duration
1.	Dr.V.Ramamurti	Second International Conference on Recent Developments in Air and Structure borne sound and vibration, Al., USA	4th to 6th Mar 1992

4.2.11 Invited Lectures Delivered by the Faculty in Academic Institutions/ Public Bodies

Sl. No.	Name of the Faculty	Topic of the Lecture	Venue	Date
1.	Dr. Megha Singh	Safety aspects of Lasers	Institution of Engineers, Madras	28-29 Feb. 92
2.	Dr.J.Raamachandran	Efficiency of Siddha Medicine	Telecast by Madras Television Centre	18.1.92

3.	Dr.P.A.Aswathanarayana	Turbulent flow & heat transfer in internal passages	Dept. of Civil Engg. Swansea, Wales	29.5.91
4.	Dr.P.A.Aswathanarayana	Investigations of mean and turbulent flow characteristics of a two-dimensional plane diffuser	Dept. of Aerospace Engg. Technical University, Delft, Holland	10.6.91
5.	Dr.P.A.Aswathanarayana	Energy from Ocean Waves	Energy Technology support unit for the Dept. of Energy Oxfordshire, U.K.	7.6.91
6.	Dr.P.A.Aswathanarayana	Energy from Ocean Waves	Dept. of Mech. Engg. Edinborough	10.6.91
7.	Dr.P.A.Aswathanarayana	Energy from Ocean Waves & flow in a diffuser	Dept. of Mech. Engg. Nagoya University, Japan	15.7.91
8.	Dr. B.V.A. Rao	On cost models & reliability of condition based maintenance	IMEX 91, Org. by IME, Bombay	Aug.91
9.	Dr. B.V.A. Rao	Noise and Vibration in Diagnostics	National Symposium on Acoustics organised by ASI and NPL, New Delhi	Oct.91

4.2.12 Visits Abroad

Sl.No.	Name of the Faculty	Country visited	Date	Purpose
1.	Dr. Megha Singh	Germany	2-6 Sept. 91	Attended Conference
2.	Dr.P.A.Aswathanarayana	Standford, USA	8-12 July 91	Chairman for a session at 7th Int. Conf. on Numerical Methods in Thermal Problems
3.	Dr.P.A.Aswathanarayana	Blacksburg, USA	June-July 91	Under Indo-US Co-operation NSF Project
4.	Dr.P.A.Aswathanarayana	Stanford, USA	8-12 July 91	Attended 7th Intl. Conf. on Numerical Methods in Thermal Problems
5.	Dr.P.A.Aswathanarayana	Swansea, Wales	May-June 91	Under Indo British Link Programme
6.	Dr.V.Ramamurti	USA	18 Sep. 91	Sabbatical leave
7.	Dr.B.V.A.Rao	Singapore, Kuala Lumpur	April 91	To conduct programme

4.2.13 Distinguished Visitors to the Department

Sl.No.	Name of the Visitor & Occupation	Date of visit	Purpose (Lecture/Discussion)
1.	Prof. A.Hudson from University of Limburg,,The Netherlands	14-30 Nov. 91	On collaborative International research project funded by DST
2.	Dr. Ir.L.H.Braak from Eindhoven University of Technology, The Netherlands	14-30 Nov. 91	On collaborative International research project funded by DST
3.	Dr. R.Seshadri from Faculty of Engg. University of Regina, Canada	14-12-92	Lecture

4.2.14 Sponsored Projects

Sl.No	Title	Period	Funding Agency	Amount	Co-ordinator(s)
1	Development of blood flow ... in health	1989-1992	CSIR	8.5	Dr.Megha Singh, Dr.K.M.Patil, Dr.S.Swarnamani
2.	Development of Electronic Speckle	1987-1992	DST	17.5	Dr.Megha Singh, Dr.S.Swarnamani
3.	Improved bio-engineering.... development	1988-1991	MHRD	15.0 (First year)	Dr.Megha Singh, Dr.K.M.Patil, Dr.S.Radhakrishnan
4.	Project on foreign collaboration development of foot model & pressure monitoring system leprosy patients	1991-1992	DST	23.4	Dr.K.M.Patil, Dr.P.K.Oommen (CLTRI Chengalpet), Dr.G.N. Malaviya (CJIL Agra) Dr.A.Hudson (Limburg University, The Netherlands) Dr.D.H.Van Campen (Eindhoven University, The Netherlands)
5.	Generation of dynamic data for blade section of wind energy system	3 years	DNES	5.2	Dr.N.V.C Swamy & Dr.P.A. Aswathanarayana
6.	'Niharika Ishan' A new type of wind turbine	1.1/2 years	DNES	2.0	Dr.N.V.C Swamy Dr.P.A. Aswathanarayana
7.	Numerical modeling of complex flows with heat transfer	3 years	NSF	17.39	Dr.K.N. Seetharamu, Dr.P.A. Aswathanarayana
8.	3-D conduction code temperature distribution using FEM for GT blades	3 years	ARDB	6.75	Dr.K.N.Seetharamu Dr.P.A. Aswathanarayana
9.	Flow studies of 'S' blade profiles a fully reversible & flow pump turbine for a tidal plant	1 year	IRDF	0.5	Dr.P.A. Aswathanarayana Dr. V.Balabaskaran Dr.E.G. Tulapurkara
10.	Fluid Mechanics & combustion aspects of interference effects in spray combustion	3 years	ISRO	5.00	Dr.B.H.L. Gowda & Dr.R. Natarajan
11.	Studies on the mixing & combustion phenomena in ramjet	3 years	ARDB	5.17	Dr.B.H.L. Gowda Dr.R.Natarajan Mr.K.S.Padiyar
12.	Numerical prediction of two-dimensional reacting flows with application to ramjet combustion	3 years	ARDB	5.80	Dr.B.H.L.Gowda, Dr.R.Natarajan Dr.V.Ganesan
13.	Helicopter Aerodynamics in hover and climb	1 year	IRDF	-	Dr.B.Balakrishnan, Mr.S.C.Rajan Dr.Ramakrishnan
14.	Reswitching transients and their effect on the design and operation of large induction motor drives	-	CBIP	6.33	-
15.	Active Vibration control of flexible structures	-	ARDB	4.95	Dr.S.Narayanan
16.	Turbomonitoring	-	MHRD	10.00	Dr.B.S.Prabhu Dr.S.Swarnamani
17.	Development of high duty LPG Swirl Burner	1 year	IRDF/IIT	-	Dr.B.V.A.Rao, Dr.U.P.S.Shet Dr.S.Swarnamani

4.2.15 Major Consultancy Assignments

Sl.No.	Title	Organisation	Amount (Rs. in Lakhs)	Co-ordinator(s)
1.	Design of Transducer for study of Tyre Contact Pressure	MRF Ltd.	1.0	Dr.S.Radhakrishnan & Mr.G.Thomas
2.	Performance Evaluation	M/s. Bharat Electronics Madras - 89	0.58	Dr.V.Ramamurthi, Dr.S.Swarnamani, Dr.C.Sujatha, Dr.S.Narayanan, Dr.B.S.Prabhu, Dr.N.Ganesan, Dr.B.V.A.Rao
3.	Seismic Analysis on High performance Butterfly valves	M/s. Xomox (I) Ltd. Madras	0.15	Dr.B.V.A. Rao, Dr.N.Ganesan, Dr.S.Narayanan, Dr.S.Swarnamani
4.	Vibration Analysis of A/2 Cylinder V Engine	M/s. Engine Factory, Madras - 54	0.015	Dr.V.Ramamurthi
5.	Stress Analysis on Geared Power Press	M/s. Sornavinayagha Engineers (P) Ltd., Madras	0.10	Dr.V.Ramamurthi
6.	Experimental Stress Analysis of Cement Mill	M/s. J.K.Cement Works, Nimbahera, Rajasthan	0.20	Dr.V.Ramamurthi, Dr.S.Swarnamani
7.	Experimental Stress Analysis of two gear boxes	M/s. Kirloskar Pneumatic Co., Ltd., Pune	0.40	Dr.V.Ramamurthi, Mr.G.Thomas
8.	Determination of Natural Frequency	M/s. Vibcons Madras 600 098	0.015	Dr.V.Ramamurthi, Dr.C.Sujatha
9.	Noise Level Measurements	M/s.Fenner (India) Ltd., Madras 600 014	0.04	Dr.S.Narayanan, Dr.S.Swarnamani
10.	Seismic Analysis of After cooler Moisture	M/s. Kirloskar Pneumatic and Co., Ltd., Pune	0.60	Dr.S.Narayanan, Dr.N.Ganesan
11.	Experimental Stress Analysis to Electric Mechanical Presses	M/s. Sornavinayagha Engineers (P) Ltd., Madras	0.125	Dr.V.Ramamurthi, Dr.C.Sujatha
12.	Stress Analysis of 100 Ton Press Brake	M/s. Sornavinayagha Engineers (P) Ltd., Madras	0.10	Dr.V.Ramamurthi, Dr.C.Sujatha
13.	Performance Evaluation & Dynamic Characteristics of Stock Bridge Damper	M/s. I.A.C. Electrical (P) Ltd., Calcutta - 4	0.02	Dr.B.V.A.Rao, Dr.N.Ganesan, Dr.S.Swarnamani
14.	Frequency Testing of Vibration Damper Pulley	M/s. Autolec Manufacturing & Marketing Co. P Ltd., Madras	0.015	Dr.S.Narayanan, Dr.C.Sujatha
15.	Seismic Evaluation and Strain Measurement of 132 KV CT	M/s. W.S. Industries (India)Ltd. Bangalore	0.28	Dr.B.V.A.Rao, Dr.N.Ganesan, Dr.S.Swarnamani
16.	Floor Vibration Measurement	M/s. Fortune-Apa Optics Ltd. Madras - 45	0.05	Dr.S.Narayanan, Dr.S.Swarnamani
17.	Vibration Test of Dynamic Braking Resistor	M/s. Kirloskar Electric Co. Ltd. Bangalore	0.12	Dr.S.Narayanan, Dr.B.S.Prabhu, Dr.N.Ganesan, Dr.S.Swarnamani

18.	Noise Control of DG Sets Transmission on Analysis with Damper for ACSR Panther and ground wire	The Cannonore Co-operative Spinning Mills Ltd., Cannonore	0.10	Dr.B.V.A.Rao, Dr.S.Narayanan, Dr.S.Swarnamani
19.	Performance Characteristic Fatigue Test & Transmission on Analysis with Damper for ACSR Panther and ground wire	M/s. Burma Electro Corp., Jalandhar	0.20	Dr.B.V.A.Rao, Dr.N.Ganesan, Dr.S.Swarnamani
20.	Flush Line Vibration	Tamil Nadu Petro Products Ltd., Madras	0.06	Dr.S.Narayanan, Dr.S.Swarnamani
21.	Sound Absorption Characteristics of Phenotherm Material	M/s. Bakelite Hylam Ltd., Hyderabad	0.06	Dr.S.Swarnamani, Dr.A.Raamachandraiah
22.	Performance Characteristics, Fatigue Test & Transmission analysis with Damper for ACSR Leopard & Microstrains Analysis for earth wire	M/s. Burma Electro Corp., Jalandhar	0.13	Dr.B.V.A.Rao, Dr.N.Ganesan, Dr.S.Swarnamani
23.	Seismic Analysis of High Performance Butterfly valves	M/s. Xomox (India) Ltd. Madras	0.10	Dr.B.V.A.Rao, Dr.N.Ganesan Dr.S.Narayanan, Dr.S.Swarnamani
24.	Preliminary Analysis for Seismic Analysis on LT Busduct/Support for Kaifa 1 & 2 MAPP 3 & 4	M/s. Best and Crompton Engg. Ltd., Madras 98	0.05	Dr.B.V.A.Rao, Dr.S.Narayanan, Dr.N.Ganesan
25.	Seismic Test and Seismic Evaluation on Isolated Phase Busduct	M/s. Powergear (P) Ltd., Bangalore	0.30	Dr.B.V.A.Rao, Dr.N.Ganesan, Dr.S.Swarnamani
26.	Earthquake Withstand Test on Surge Arresters	M/s. Oblum Electrical Industries (P) Ltd., Hyderabad	0.24	Dr.S.Narayanan, Dr.B.S.Prabhu, Dr.S.Swarnamani
27.	Seismic Test of Lighting Arresters	M/s. Oblum Electrical Industries (P) Ltd., Hyderabad	0.24	Dr.S.Narayanan, Dr.B.S.Prabhu, Dr.C.Sujatha
28.	Noise Audit	M/s. Indian Tobacco Co. Ltd., Chirala 523 157	0.015	Dr.B.V.A.Rao, Dr.A.Raamachandraiah

4.2.16 Honours and Awards

Name of Faculty	Honours/Awards	Purpose
Dr. Megha Singh	Fellow	International Academy of Medical Sciences
Dr. B.V.A. Rao	President (re-elected)	Association for Machines and Mechanisms, 1991-92
Dr. B.V.A. Rao	Chairman	Training Division of Indian Institute of Plant Engineers 1991-92
Dr. B.V.A. Rao	Chairman	Editorial Committee for the IFTOMM, Prague, Czechoslovakia, August 1991
Dr. B.V.A. Rao	Member	Project Advisory Committee for Mechanical and Civil Engg., Dept. of Science and Technology, Govt. of India

4.2.17 Books

Name of Faculty	Title	Publisher
Dr. Megha Singh	Physiological Fluid Dynamics	Narosa Publisher, New Delhi

4.2.18 Research Publications

1. Ajay V. Kumar, S. Swarnamani and B.V.A. Rao, An experimental study on the effects of lubricant additives in the dynamic characterization of a rotor bearing system, 9th National Conf. on Industrial Tribology, NCIJ, B, 127-137, 1991.
2. Ali Zabihi, B.S. Prabhu, and S. Swarnamani Fault diagnosis of roller bearing through mechanical signature analysis, Modelling, Simulation and Control, B, AMSE Press, Vol 40, No.1, 1991, 53-64.
3. Ali Zabihi and B.S. Prabhu, Fault diagnosis of roller bearing through mechanical signature analysis, VIII World Congress on the Theory of Machines and Mechanisms, Prague, Czechoslovakia, August 26-31, 1991.
4. P.A. Aswathanarayana, V. Ganesan, K. Suzuki and V.K. Chithambaram, Investigations of mean and turbulent flow characteristics of a two-dimensional plane diffuser, Experiments in fluids, 10, 1991, 205-212, 1991.
5. P.A. Aswathanarayana, S. Meenakshisundaram and K. Ganesh Babu Probabilistic model for wave forces acting on a cylinder in random waves, Ocean Engineering.
6. P.A. Aswathanarayana, G. Subash Babu, G. Subramanian, K.N. Seetharamu and J.N. Reddy, Axisymmetric flows through sudden enlargement with heat transfer using consistent penalty FEM, Seventh Int. Conference on Numerical Methods in Thermal Problems, 1991, Stanford.
7. P.A. Aswathanarayana, M.S. Ravisankar and K.N. Seetharamu, Finite element analyses of turbulent and heat transfer through a sudden pipe expansion, Eighth Symposium on turbulent shear flows, 1991, Munich.
8. P.A. Aswathanarayana, S. Meenakshisundaram and K.Ganesh Babu, Probabilistic model for wave forces acting on a cylinder in random waves, Indian National Conference on Ocean Engineering, 1991, Goa.
9. P.A. Aswathanarayana, M.S. Ravisankar, K.N. Seetharamu and J.N. Reddy, FEM analysis of heat transfer in a developing turbulent pipe flow - A computational study of nine models, Eleventh National conference on Heat and Mass Transfer, 1991, Madras.
10. K. Dargaiah, K. Parthasarathy and B.S. Prabhu, Finite Element Method for computing dynamic coefficients of multilobe bearings, STLE/ASME 1991 Tribology Conference, St. Louis, Missouri, USA Oct 13-16, 1991 (Reprint No.91-TC-48-1)
11. N. Ganesan and T.C. Ramesh, Stress analysis of railroad wheels using a conical shell element, Computers and Structures, vol 40, No.3, 1991, 521-526.

12. N. Ganesan and T.C. Ramesh, Stress analysis of composite railroad wheels, Computers and structures, Vol 40, No. 4, 1991, 805-813.
13. B.P. Gautham, G.B. Sarma and N. Ganesan, A critical comparison of two methods for solving elastic contact problems with friction, Computers and Structures, Vol.41, No.1, 1991, 93-97.
14. B.H.L. Gowda, G.W. Rankin and K. Sreedhar, Computation of flow through a severe plane rectangular constriction 3rd Int. Conf. on Physiological Fluid Dynamics, I.I.T. Madras, India, Dec. 1991.
15. B.H.L. Gowda and M.M. Sitheeq, Effects of interference on the pressure distribution on a three-dimensional bluff body in tandem arrangement, Indian Journal of Technology, Vol. 29, 1991, 1-8.
16. Kartik Venkatraman and S. Narayanan, Active control of vortex emitted vibrations of flexible cylindrical structures, Paper presented at Second Joint Japan-USA Conference on Adaptive Structures, Nagoya, Japan, Nov. 1991.
17. A. Manjunath, B.H.L. Gowda and R. Natarajan, Studies on the mixing of two non-axial plane jets in a confined passage : mean flow characteristics, Experiments in Fluids, vol. 11, 1991, 17-24.
18. A. Manjunath, B.H.L. Gowda and R. Natarajan, Experimental investigation of the turbulence characteristics in a two-dimensional dump-type combustor model, Xth Int. Symp. on Air Breathing Engine (ISASE), U.K., Sept. 1991.
19. E. Muralidharan and M. Singh, Influence of diabetes mellitus on the aggregation mechanism as analyzed by He-Ne laser light scattering, Clin Hemorheol 11, 1991, 205-216.
20. J.L. Narasimhan, V. Ramjee, Philip M. Diwakar, and E.G. Tulapurkara, Prediction of wake in a curved duct, Int. JI. of Numerical Methods in Fluids, Vol. 12, 1991, 1-10.
21. S. Narayanan and K. Jayaraman, Chaotic vibration in a non-linear oscillator with coulomb damping, J. Sound and Vibration 146(1), 17-31, 1991.
22. S.Narayanan, R.V.S.Krishna Dutt, A.S.Premnath and S.K.Bhave, Torsion and free vibration characteristics of Turbo-generator end windings, J. Sound and Vibration, 152(2), 1991, 193-204.
23. S. Narayanan and G.V. Raju, Active Control of Non-stationary response of vehicles with non-linear suspensions, Vehicle System Dynamics Journal, 21, 1992.
24. G. Padmanabham and B.H.L. Gowda, Mean and turbulence characteristics of a class of three-dimensional, turbulent wall jets - Part 1 : Mean flow characteristics, Journal of Fluid Engineering, Trans.ASME, Vol. 113, 1991, 620-628.
25. G. Padmanabham and B.H.L. Gowda, Mean and turbulence characteristics of a class of three-dimensional, turbulent wall jets - Part 2 : Mean flow characteristics, Journal of Fluid Engineering, Trans.ASME, Vol.113, 1991, 629-634.

26. Partha Roy, S. Radhakrishnan and N. Ganesan, 'Finite Element Modelling and Correction of Scoliotic spine' -OP-1-G-1, Medical and Biological Engineering and Computing, Vol 29, Supplement, 1991, 17
27. K.M. Patil, J.K. Chakraborty, Analysis of a new polycentric above - knee prosthesis with a pneumatic swing phase control,, Journal of Biomechanics, Vol 24, No. 3/4, 1991, 223-233 (U.K.).
28. K.M. Patil, I. Sailaja, C. Eswaran, M.S. Srinath, A new technique of processing the barographic images for foot pressure measurements. Innov. Tech. Biol. Med, (France), Vol 2. No. 4, 1991, 443-456.
29. K.M. Patil, L.H. Braak, A. Hudson and D.H. Van Campen, Stress patterns in a model of a normal foot, Proceedings of the second National Conference on Biomechanics, Calcutta, 46, Sept. 1991
30. K.M. Patil, M.S. Srinath, K.S. Rao, Standing and Walking Foot Pressures in Tarsal Disintegration of Leprosy Subjects, Proceedings of the Second National Conference on Biomechanics, Calcutta, Sept. 1991, 48.
31. A. Periasamy and M. Singh, Analysis of cardiac displacement pattern as observed on the chest wall by time average speckle interferometry in health and diseases, Innov, Tech. Biomed 12, 1991, 614-638.
32. B.S. Prabhu and A.S. Sekhar, Analysis of a cracked Jeffcott Rotor on hydrodynamic journal bearings, VIII World Congress on the Theory of Machines and Mechanisms, Prague, Czechoslovakia, August 26-31, 1991.
33. B.S. Prabhu and D. Sheeja, Thermal and Non-Newtonian effects on the steady state and dynamic characteristics of hydro-dynamic journal bearings - Theory and Experiments, STLE Annual Meeting, Montreal, Canada, April 29 to May 2, 1991.
34. B.S. Prabhu and S.R. Jayaram, Thermal and Elastic effects on the performance of tilting pad journal bearings, Int. Conf. Frontiers of Tribology, Stratford-upon-Avon, UK, April 15-17, 1991. (Also in journal of Physics D : Applied Physics).
35. J. Raamachandran, Stability of Plates using Charge Simulation Method accepted for presentation at BEM 13th International Conference, Tulse, Oklahomo, USA, 21-23, August 1991.
36. S. Radhakrishnan and Partha Roy, 'A Comparative Evaluation of different treatment methods of Scoliosis correction by Finite Element Technique', Automedica, Vol 1, No.4, 253-266, 1991.
37. G.V. Raju and S. Narayanan, Optimal estimation and control of non-stationary response of a two-degree-of freedom vehicle models, J.Sound and Vibration 149(3), 413-428, 1991.
38. G. Ramachandran, S. Swarnamani and M. Singh, Reconstruction of out-of-plane cardiac displacement patterns as observed on the chest wall during various phases of ECG by capacitance transducer, IEEE Trans Biomed. Engg., 38, 1991, 383-385.

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40. V. Ramamurti, C. Sujatha and H. Irretier, Dynamic strain measurement on a model of a cement mill, Zement Halk Gips, Vol 44, 1991, 123-126.
41. V. Ramamurti and C. Sujatha, Analytical determination of dynamic stresses on practical cement mills using random vibration concept, presented at the Second Int. Conf. on Recent developments in air and structure borne sound and vibration, held at Alabama, USA
42. T.C. Ramesh, N. Ganesan, S. Swarnamani and B.J.C. Babu, Finite element and experimental studies on orthotropic disc., Proc. 6th Int. Conf. Composite Structures, Pailly, Scotland, Sep. 9-11, 1991.
43. B.V.A. Rao, Optimal periodic replacements for a deteriorating production system with inspection and minimal repair - Reliability Engineering and Systems Safety, U.K., 37, 1992.
44. B.V.A. Rao, Study of applied damping treatment on dynamic behaviour of machine tool structures - analytical and experimental, 8th World Congress of IFTOMM, Prague, Czechoslovakia, August 1991.
45. D. Sheeja and B.S. Prabhu, Non-Newtonian effects on the steady state and dynamic characteristics of hydrodynamic journal bearings, VIII World Congress on the Theory of Machines and Mechanisms, Prague, Czechoslovakia, Aug 26-31, 1991.
46. D. Sheeja and B.S. Prabhu, Non-Newtonian Lubrication of natural joints, Physiological Fluid Dynamics, III, Nov 30 to Dec 3, IIT, Madras, 1991, 371-376.
47. D. Sheeja and B.S. Prabhu, Thermohydrodynamic lubrication of Non-Newtonian journal bearings, Theory and Experiments, Int. Conf. Frontiers of Tribology, Stratford-upon-Avon, UK, April 15- 17, 1991 (Also in journal of Physics D : Applied Physics).
48. M. Singh and G. Ramachandran, Reconstruction of sequential cardiac in plane displacement patterns on the chest wall by laser speckle interferometry. IEE Tran Biomed. Engg. 38, 1991, 463 - 489.
49. M. Singh, C.L. Lucase, G.W. Henry, J.I.Ferrciro, B.R.Wilcox, Multi angle visualisation of flow patterns in saccular aneurysm, Biorheology 28, 1991, 333-339.
50. K.R. Sivadas and N. Ganesan, Vibration analysis of laminated conical shells with variable thickness, Journal of Sound and Vibration, 1991, 148(3), 477-491.
51. K.R. Sivadas and N. Ganesan, Free vibration of circular cylindrical shells with axially varying thickness, Journal of Sound and Vibration, 1991, 147(1), 73-85.
52. V. Soamidas and N. Ganesan, Vibration analysis of thick, polar orthotropic variable thickness annular disks, Journal of Sound and Vibration 1991, 147(1), 39-56.

53. B.S.K. Sundarasivarao and N. Ganesan, Deformation of varying thickness of conical shells subjected to axis symmetric loading with various end conditions, Engineering Fracture Mechanics, Vol 39, No. 6, 1991, 1003-1010.
54. B.S.K. Sundarasivarao and N. Ganesan, Deformation of varying thickness composite cylindrical shell subjected to fluid loading with various end conditions, Computers & Structures, Vol 41, No. 1, 1991, 67-74.
55. S. Swarnamani and B.V.A. Rao, Envelope detection and analysis, Proc. National Seminar on condition monitoring and predictive maintenance - Recent Advances, NPC, Madras, PIV, A1-4, 1991.
56. S. Swarnamani and B.V.A. Rao, Conditional monitoring of electrical equipment, Proc. National Seminar on Condition monitoring and predictive maintenance, Recent Advances, NPC, Madras, PVC-1-VC-16, 1991.
57. E.G. Tulapurkara, S. Vengadesan and J.L. Narasimhan, Calculation of Lam. & Turbulent asymmetric wakes, Num. Methods in Lam. Turbulent Flow, Vol.7, Pt.1, Proc. of the 7th Intl. Conf. held in Stanford, July 1991, 337-347.

4.3 Chemical Engineering Department

4.3.1. Introduction

The department of Chemical Engineering was established in 1959. Now, Ph.D, M.S., M.Tech and B.Tech programmes are being offered.

4.3.2 Details of Faculty

Name and Qualifications

Major Area of Specialisation

Professors

M.S. Ananth, Ph.D(Florida)[Head] A. Baradarajan, Ph.D(IIT Madras)	Thermodynamics, Mathematical modelling Bioreactors, Modelling of Bio- reaction Processes, Solid-solid reactions
C. Chandraprasad, Ph.D(IIT Madras)	Optimal, Predictive and Adaptive Control, State and Parameter Estimation
Ch.Durgaprasada Rao, Ph.D(Andhra) T. Gopichand, D.Sc (Andhra) M. Ramanujam, Ph.D(IIT Madras)	Mathematical Modelling, Computer Process control Fluidization, Heat Transfer Particle Technology, Mineral Processing, Environmental Engg.
C.A. Sastry, Ph.D(Bombay) N. Subramanian, Ph.D(IIT Madras) Y.B.G.Varma, Ph.D(IIT Madras)	Environmental Engineering, Bio-chemical Engineering Polymer processing, Rheology Multiphase Systems, Process Development, Equipment Design
T. Venkatram, Ph.D(IISc.)	Process Development, Heat Transfer, Memberane separation, Equipment design

Associate Professors

M. Chidambaram, Ph.D(IIT Madras) K. Krishnaiah, Ph.D(IIT Madras) N.R. Neelakantan, Ph.D(Swansea) T.K. Ramanujam, Ph.D(IIT Madras) K. Remananda Rao, Ph.D(IISc.) D.V.Seetharamamurthy, Ph.D(IIT Madras) S. Subba Rao, Ph.D(IIT Madras) R. Vedaraman, Ph.D(IIT Madras)	Nonlinear Control, Periodic operation of Reactors Chemical Reactor Analysis and Design, Fluidization Polymer Processing, Rheology Environmental Engineering, Particle Technology Mass Transfer, Environmental Engineering Particle Technology, Environmental Engineering Mass transfer, Computer Aided Design Particle Technology, Mineral Processing
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Assistant Professors

A.R.Balakrishnan, Ph.D(Waterloo) S.K.Rakshit, Ph.D(IIT Delhi)	Heat Transfer, Computer Aided Design Biochemical Engineering & Biotechnology, Downstream processing
S.Shankaranarayanan, Ph.D(Queensland)	Optimum Control of Grinding circuits and other mineral beneficiation process
V. Sriramachandra Rao, Ph.D(IIT Madras) T. Swaminathan, Ph.D(IIT Kanpur)	Internal Model Control, Adaptive control Environmental Management, Biotechnology, Membrane Technology
R. Subramanian, Ph.D(IIT Madras) Tapobrata Panda, Ph.D(IIT Delhi)	Polymer Development Biochemical Engineering & Biotechnology, Protoplast fusion technology

Technical Officers

C. Lalithaprasad
V. Raman

4.3.3 Seminars/Symposia organized by the Department

Name of Faculty	Topic
Dr. R. Vedaraman	One Semester Laboratory course in mineral
Dr.T.K. Ramanujam, Dr.D.V.S. Murthy	Processing for the Mining Engineering students of Anna University was organized
Dr. A.R. Balakrishnan	11th National Heat and Mass Transfer Conference, IIT Madras, Dec. 91

4.3.4 Participation In Seminars, Symposia, Conferences, etc.

Sl. No.	Name of Faculty	Particulars of participation in Seminars /Symposia/short term courses	Date
1.	Dr. N. Subramanian	Presented two papers in National Conference on Advances in Polymer Technology, Cochin	1991
2.	Dr. Ch. Durgaprasada Rao	Presented two papers in Chemcon 91 at A.C. College of Technology	Dec. 91
3.	Dr. T. Venkatram	Presented a paper in Chemcon 91 at A.C. College of Technology, Madras	Dec. 91
4.	Dr. A. Baradarajan	Presented a paper in International Meeting on Chemical Engg. and Bio-Technology, Frankfurt, Germany	June 91
		Presented a paper in AIChE Annual Meeting at Los Angeles, USA	Nov. 91
5.	Dr. R. Vedaraman	Presented three papers at the Chemcon 91 at A.C. College of Technology, Madras	Dec. 91
6.	Dr. T.K. Ramanujam	Presented two papers at Chemcon 91 at A.C. College of Technology, Madras	Dec. 91
7.	Dr. D.V.S. Murthy	Presented two papers at Chemcon 91 at A.C. College of Technology, Madras	Dec. 91
8.	Dr. K. Krishnaiah	Presented two papers at Chemcon 91 at A.C. College of Technology, Madras	Dec. 91
9.	Dr. M. Chidambaram	Presented two papers at Chemcon 91 at A.C. College of Technology, Madras	Dec. 91
10.	Dr. S.K. Rakshit	Presented a paper in International Seminar on downstream Processing in Bio-technology in Calcutta	Dec. 91
		Presented two papers at Chemcon 91 at A.C. College of Technology, Madras	Dec. 91
11.	Dr. A.R. Balakrishnan	Presented a paper in Annual Meeting of American Society of Mechanical Engineers	Dec. 91
12.	Dr.N.R. Neelakantan	Presented two papers at Chemcon 91 at A.C. College of Technology, Madras	Dec. 91
		Presented two papers in National Conference on advances in Polymer Technology, Cochin	1991
13.	Dr. T. Panda	Presented a paper on "Will Biofuels fill the Oil Vacuum" in Proc. National Seminar on Energy (The energy and fuel users) Association of India) Seminar on Energy options for the 90's, Madras, pp.107-110	1991

Presented a Paper on Studies on intergeneric hybridization of <i>T. reesei</i> and <i>S. cerevisiae</i> : Comparative analysis of protoplast generation in two genus, 31st Annual Conference of Association of Microbiologists of India, TNAU, Coimbatore, p.26-27	1991
Presented a paper on Characterisation and performance of immobilised whole cell of <i>E. Coli</i> containing penicillin amidase - <i>ibid</i> , p. 61	1991
Presented a Paper on Improved process for the Immobilization and stabilized of whole <i>E. coli</i> containing penicillin amidase: in Proc. Indo-Swiss Seminar on Bio-technology, IVRI, Bangalore, Abst.No.27	1991
Presented a paper on Production of gluconic acid by <i>A. niger</i> : A comparative analysis of calcium gluconate and sodium gluconate methods: AFST (I) IX convention on Application of biotechnology on the development of food processing industries	June 1991
Biosynthesis of penicillin amidase in <i>E Coli</i> by Chemostat culture mode: Chemcon 91. Anna University, Madras, accepted for presentation. pp. 208-209	Dec. 1991
Production of extracellular enzymes from <i>T. harzianum</i> and their role on protoplasting of <i>T. reesei</i> mycelium hybrid - Accepted for presentation, pp 198-199	1991
Kinetics of regeneration of <i>T. reesei</i> and <i>saccharomyces</i> sp. protoplasts : <i>ibid</i> accepted for presentation. pp. 185	1991
Comparative analysis of gluconic acid production using various treated cane molasses: <i>ibid</i> accepted for presentation pp. 201-202	1991
International Conferences: Presented a paper on Critical analysis of process development on in-vitro growth of chick- embryo in Animal cell culture and production of biologicals (proc. 3rd annual meeting of JAACT) Kyoto, Japan, Eds. R Sasaki and K Ikuru, Kluwen Academic publ. Dortrecht, London pp. 47-52	1991
Presented a paper on Studies on physiological aspect of in- vitro development of chick-embryo - <i>ibid</i> -Kyoto, Japan, pp. 245-249	1991
Presented a paper on Stabilities of cellulose and xylanase from the mixed culture of <i>t. reesei</i> and <i>A wentil</i> towards environmental parameters, 6th Intl. symp. on Wood and Pulping Chemistry, APPITA, Melbourne, Australia	30 April-4 May 1991
Presented a paper on Kinetic analysis on role of condensed tannin in biosynthesis of volatile fatty acids by mixed culture - <i>ibid</i> -	1991.
Presented a paper on Improved direct conversion of agropolymers by intergeneric fused protoplasts Analysis of reversion of <i>T. reesei</i> protoplasts Symp. on cellulose and ligno-cellulose chemistry, Chinese Academy Sciences, Guangzhom, China, pp. 151-154	13-15 May 1991
Presented a paper on Problems associated with the efficient separation of protoplasts from parent cells/mycelium, Int-seminar on downstream processing in bio-technology, process engineering design and development Institute, Calcutta, India, Abst. No. OP6, pp.35	19-21 Dec. 1991

4.3.5 Visit of Faculty Members to other Institutions

Sl.No.	Name of Faculty Member	Institutions visited/purpose of visit	Duration/Date
1.	Dr. A. Baradarajan	Visited Technical University, Hannover as Visiting Scientist under BMFT Indo German programme	May-Aug. 91
2.	Dr. K Krishnaiah	Visited Karlsruhe, Germany under DAAD reinvitation programme	July-Sept. 91
3.	Dr.Y.B.G. Varma, Dr.Ch.Durgaprasada Rao and Dr. K. Krishnaiah	Visited KREC, Surathkel to help them in setting up of laboratories	1991
4.	Dr D V S Murthy	Visited Basaveswara Engineering College, Bagalkot under Institutional Net Work Scheme to help them set up Environmental Engg. Lab.	June 4 1991
5.	Dr Y B G Varma	Invitee of DAAD to visit Acheme 91 and fourth Chemical Engineering World Congress in Germany	June 91

4.3.6 Honours and awards

Dr C Chandraprasad has won Silver Medal which was awarded by CSIR for the second best paper on electrochemistry at Students Meet 90 in January 91

4.3.7 Visitors to the Department

1. Prof. T. Veeraraghavan University of Regina, Saskatchewan, Canada S4S OA2
2. Mr Srinivas Batte MOBIL Research Centre, Dallas, USA
3. Mr Sambu Thomas School of Chemical Science, M G University, Kottayam

4.3.8 Quality Improvement Programme

Only one teacher was deputed from Engg. College, Trissur for Ph.D. Programme.

4.3.9 List of publications

1. K Krishnamurthy, S Subba Rao and Y B G Varma, Solids Mixing in a tapered annular gas - solid fluidized bed, Indian J. Technol 29, 186-190, 1991.
2. G S Venkataratnam and Y B G Varma, Effective interfacial area in gas-liquid concurrent downflow through packed beds, Bioprocess Engg. 729-34, 1991.
3. P Sivagnanam, A R Balakrishnan and Y B G Varma, Forced convection subcooled boiling of binary mixtures, The canadian journal of Chem. Engg. 69, 1991.
4. P B Rajendran Nair and M Ramanujam, Classification function in fluid energy milling powder technology 63(1), 79-84, 1991.
5. S N Pal, A V Ramani and N Subramanian, Medical applications of polymers - perspective with PVC as an example - Metals, Materials and processes, 3 (2) 109-120 1991.
6. Reji John, N R Neelakantan and N Subramanian, Chemoheology of urethane network polymerization metals, materials and processes 3 (2) 93-98, 1991.

7. Reji John, N R Neelakantan and N Subramanian, Thermokinetics and rheological properties of polyurethane reactors - *Thermo chimica Acta* 179, 281-293, 1991.
8. Studies on Isothermal urethane polymerisation - *Polymer plastics technology and engineering* 30, 227-238, 1991.
9. A viscometric approach to the study of the kinetics of polyurethane reaction - *polymer - plastics technology and engineering* 30, 545-557, 1991.
10. Reji John, P Ravindran, N R Neelakantan and N Subramanian - Viscometry of isothermal urethane polymerization - *Bulletin of the chemical society of Japan*, 64, 3153-3155, 1991.
11. C V Rajnarayanan, T Venkatram and C A Sastry, Desalination of sea water/brackish water by reverse osmosis, *Ind. J. of Env. protection* 11(2), 81-84, 1991.
12. T V Ananda Babu, H Prabhu, S K Rakshit and A Baradarajan, Studies on the effect of additives on biomethanation, *Research and industry*, 36, 45-48, 1991
13. H J Prabhu, S K Rakshit and A Baradarajan, Studies on biomethanation of water hyacinth, *Research and industry*, 1991.
14. M K Gowtham, S K Rakshit, K Krishnaiah, A Baradarajan, Studies on RTD and Cont. cultures (Single cell protein) in cylindrical and tapered reactors, *Bioprocess Engg.* 7, 41-46, 1991.
15. M Velan and Ramanujam T K, Hydrodynamics of reverse flow jet loop reactor *Indian Chem. Engg.* Vol. 33, No.1 pp. 80-84, 1991.
16. M Velan and T K Ramanujam, Hydrodynamics in a down flow jet loop reactor, *The Canadian J. of Chem. Engg.* Vol. 69, p. 1257-61, Dec. 1991.
17. M Velan and T K Ramanujam, Hydrodynamics and mixing in a down flow jet loop bioreactor, Non-newtonian fluid, *Bio-process Engg.* 7, pp 193-197, 1992.
18. D V S Murthy, C A Sastry and P Sammaiah, Dairy waste water treatment using an anaerobic contact filter, *Indian J. on Environmental Protection.* Vol. II, No.6, June 1991.
19. N Vaidhyanathan, K V Venkatesh, K Soundararajan and K Krishnaiah, Hydrodynamic studies in a turbulent contact absorber, *Indian Chem. Engg.* Vol. 33, No3, 3-6, 1991.
20. L R Miranda, K Krishnaiah, M.S. Ananth, A simple mathematical model for KR iron making process, *Trans Indian Inst. Metals*, Dec. 91.
21. M Chidambaram and Y S N Malleswara Rao, Non linear control of a mixed-culture fed batch bioreactor, *Indian Chemical Engineer*, V. 33, T53-T57, 1991.
22. C J Kirubakaram, K. Krishnaiah, S.K. Seshadri, Experimental study of the production of activated carbon from coconut shells in a fluidized bed reactor, *Ind. Engg. Chem. Res.* 30, 2411-2416, 1991.

23. Srinivasa Prabhu E and M Chidambaram, Robust control of a distillation column by the method of inequalities, *J. process control* VI, 171-176, 1991.
24. P S R Babu and T Panda, Effect of Recycling of fermentation broth for the production of penicillin amidase, *Process Biochemistry U.K.*, 26, 7-14, 1991.
25. P S R Babu and T Panda, Studies on improved techniques for Immobilising and stabilising penicillin amidase associated with E. Coli Cells, *Enzyme and Microbial Technology, USA*, 13, 676- 682, 1991.
26. P S R Babu and T Panda, Immobilization of whole E. Coli containing penicillin amidase using cross-linking agents and fillers, *Biotechnology Techniques, U.K.*, 5 (3), 227-232, 1991.
27. S K Rakshit and V Sahai, Optimization control strategy for the enhanced production of cellulose enzyme using the new mutant trichoderma reesei E-12 *Bioprocess engineering, Vol. 6, P. 101- 107, 1991.*
28. M A Salim, M Sadasivam and A R Balakrishnan, Transient analysis of Heat pump assisted distillation systems 1, *The Heat Pump, Int. J. of Energy Research*, 15, 123-135, 1991.
29. M A Salim, M Sadasivam and A R Balakrishnan, Transient analysis of Heat Pump assisted distillation systems 2, *Column and system dynamics, Int. J. of Energy Research*, 15, 137-148, 1991.
30. M Sadasivam and A R Balakrishnan, Analysis of Thermal effects in packed bed liquid desiccant dehumidifiers, *Chemical Engineering and Processing*, 30, 79-85, 1991.
31. P Sivagnanam, A R Balakrishnan and Y B G Varma, Forced convection subcooled boiling of binary mixtures, *Canadian J. of Chemical Engineering*, 69, Dec., 1991.
32. R C Panda, K Yamuna Rani, T K Radhakrishnan and V S Ramachandra Rao, Modelling of a Fluidized bed dryer for digital control, *Indian Journal of Technology*, Vol. 29, pp. 71-76, February 1991.
33. R C Panda and V S Ramachandra Rao, Adaptive control of an anaerobic digester, *Indian Chemical Engineer*, Vol. XXXIII, No. 1, pp. 63-67, January-March 1991.
34. Rames C Panda, V S Ramachandra Rao, Fluidized bed dryer: Dynamic modelling and Control, *Chem. Engg. Technology, Weinheim*, 14, pp. 307-310, 1991.

4.4 Chemistry Department

4.4.1 Introduction

The Department of Chemistry was established in 1961. Now Ph.D. and M.Sc., programmes are being offered. The major areas of teaching and research of the Department are:

Analytical and Radiochemistry	Organic Chemistry
Biochemistry	Polymer Chemistry
Catalysis	Photo Chemistry
Electrochemistry	Chemical Kinetics
Inorganic Chemistry	Spectroscopy and theoretical chemistry

4.4.2 New courses introduced

The following new courses were introduced during the period under report.

Course No.	Title	Structure	Faculty
CY 752	Computational Methods in Chemistry	3 0 0 3	Dr. M.S. Gopinathan

4.4.3 Details of Faculty

Name and Qualification	Specialisation
Professors	
G. Aravamudan, Ph.D(Mysore)	Inorganic Chemistry, Coordination and solid state chemistry
K.K. Balasubramanian, Ph.D(IIT Madras)	Organic Chemistry, Synthesis, mechanisms, Photo Chemistry
M.S. Gopinathan, Ph.D(IIT Kanpur)	Theoretical Chemistry
C. Kalidas, Ph.D(Jadavpur)	Thermodynamics, Electrochemistry and Fast Reaction Kinetics
V.Mahadeva Iyer, Ph.D(Madras)	Chemical Kinetics, Polymer Chemistry, Catalysis
P.T. Manoharan, Ph.D(Columbia)	Theoretical Chemistry, Spectroscopy
R. Narayan, Ph.D(Bombay)	Electrochemistry, Photoelectrochemistry, Electrochemical Machining
C. Narayana Pillai, Ph.D(Northwestern)	Organic Chemistry, Catalysis
T.V. Ramakrishna, Ph.D(Birmingham)	Analytical and Environmental Chemistry
V. Ramakrishnan, Ph.D(Annamalai)[Head]	Photochemistry, Theoretical Chemistry, Catalysis
M. Ramakrishna Udupa, Ph.D(IIT Madras)	Inorganic Chemistry
D.V. Ramana, Ph.D(IIT Madras)	Organic Chemistry, Mass Spectroscopy
R.Ramaswamy, Ph.D(IIT Madras)	Electrochemistry, Oscillatory reactions
M. Srinivasan, Ph.D(Madras)	Organic Chemistry, Polymer Chemistry, Catalysis
C.S. Swamy, Ph.D(IISc.)	Surface Chemistry, Catalysis
B. Viswanathan, Ph.D(IIT Madras)	Surface Science, Catalysis, Solid State Chemistry, Hydrogen energy

Professors (Adjunct)

T.K.K. Srinivasan, Ph.D(Banaras)
S. Subramanian, Ph.D(Leicester)

Theoretical Chemistry, Spectroscopy
Theoretical Chemistry, Spectroscopy, Magnetic
Resonance
Theoretical Chemistry, Spectroscopy

Surjit Singh, Ph.D(IIT Kanpur)

Associate Professor

C.S. Venkatachalam, Ph.D(IIT Madras)

Thermodynamics and Electrochemistry and
Electro organic reactions

Assistant Professors

N.Balasubramanian, Ph.D(IIT Madras)
(Mrs.) Chandra Sainathan Ph.D(IISc.)
(Mrs.) K. Lalitha, Ph.D(Mysore)
S. Sankararaman, Ph.D(Victoria)
M.S. Subramanian, Ph.D(IIT Madras)
T. Subramanyan, Ph.D(IIT Madras)
M.N. Sudheendra Rao, Ph.D(IISc.)
N. Sundaram, Ph.D(IIT Madras)
G. Sundararajan, Ph.D(Rutgers)
S. Vancheesan, Ph.D(IIT Madras)
T.K. Varadarajan, Ph.D(IIT Madras)
R.P. Viswanath, Ph.D(IIT Madras)

Analytical and Environmental Chemistry
Biochemistry
Biochemistry
Organic Photochemistry
Analytical and Radio Chemistry
Inorganic Chemistry
Inorganic Chemistry
Organic Chemistry, Synthesis and Mass Spectroscopy
Organometallic Chemistry
Inorganic Chemistry, Catalysis
Catalysis
Catalysis

Senior Scientific Officer Gr.I

K.D.Chandrasekaran, Ph.D(IIT Madras)

Materials Science

Visiting Faculty

K. Vidya Sagar, Ph.D(IISc.)

Synthetic and Structural Solid State Chemistry

During the year under review the following Professors retired after superannuation and reemployment.

1.	Dr. J.C. Kuriacose	30.6.91
2.	Dr. J. Rajaram	30.6.91
3.	Dr. V.R. S. Rao	31.12.91

4.4.4 Students on Roll

Programme	I Year		II Year		III Year		IV Year		V Year		Total	
	M	W	M	W	M	W	M	W	M	W	M	W
Ph.D	15	11	29	16	10	4	4	2	5	-	63	33
M.Sc.	14	14	11	8	-	-	-	-	-	-	25	22
Total	29	25	40	24	10	4	4	2	5	-	88	55

4.4.5 Number of Scholarship/Fellowship holders

Programme	Institute	CSIR	Others	Total
Ph.D	60	22	18	100
M.Sc.	13	-	-	13
Total	73	22	18	113

4.4.6 No. of Degrees Awarded

Programme	Number
Ph.D	17
M.Sc.	14

4.4.7 Instruments/Equipments Designed and developed

1. Ceramic Filters for materials preparation (Dr K D Chandrasekaran)
2. 2 cm dia fluidization set up (Dr K D Chandrasekaran)

4.4.8 New facilities added and Major Equipment procured

AT-286 personal computer with CGA monitor and coprocessor.

4.4.9 Short term courses Workshop/Seminars/Symposia/Conferences/ Training/Attended by the Faculty in recognised Academic Institutions and Public Sectors.

S.No.	Name of Faculty	Title	Period/Duration
1.	Dr C S Swamy	6th National Workshop cum Seminar on Catalysis and energy conversion and environment, Dhanbad	28-30 Dec. 1991
2.	Dr B Viswanathan	6th National Workshop on Catalysis ISM, Dhanbad	Dec. 1991
3.	Dr K K Balasubramanian	10th Annual Conference of Indian Council of Chemistry, Goa	April 1991
4.	Dr M R Udupa	VIII National Symposium and Workshop on Thermal analysis, RRL, Bhuvanesar	16-21 Dec. 1991
5.	Dr S Sankararaman	DAE Symposium on radiation and Photochemistry BARC, Bombay	27-31 Jan. 1992
6.	Dr S Vanchesan	Indo-Soviet Meet on Organometallics, CSMCRI Bhavnagar	24-25 Oct. 1991
7.	Dr M.N.S.Rao	National Symposium on Toxicity, Tirupati	1991
8.	Dr.R.P.Viswanath	VI National Workshop on Catalysis, ISM, Dhanbad	Dec.1991
9.	Dr G Sundararajan	Symposium on Modern Trends in Inorganic Chemistry, Bhavanagar	Oct.1991
10.	Dr.Mrs.T.S.Chandra	32nd AMI Conference, M.K. University, Madurai	10-12 Jan. 1992

4.4.10 Invited Lectures Delivered by the Faculty in Academic Institution/Public Bodies.

Sl.No.	Name of the Faculty	Topic of the Lecture	Delivered at	Date
1.	Dr P T Manoharan	Exchange Interaction	University of Monash	May 1991
2.	Dr P T Manoharan	Modulation of Home environment	University of La Trobe Melbourne, Sydney, Australia	May-June 1991
3.	Dr P T Manoharan	Modulation of Home environment	UWA Perth, Australia	Aug. 1991
4.	Dr K Lalitha	Glutathione Metabolism	T N Agri. Univ. Coimbatore	
5.	Dr C Kalidas	Physicochemical aspects of metals complex and their relevance to ionsolvation	National Symposium on Electrochemical Studies	Aug 1991

6.	Dr M N S Rao	Newer Perspectives in Modern Inorganic Chemistry	Anna Adarsh College, Annanagar	Sept. 1991
7.	Dr R Narayan	Double Layer on Electro Chemistry	P G Center, Pondicherry	March 1992
8.	Dr R Narayan	Electrochemistry on Molten Salts	A C Tech, Madras	Jan. 1992
9.	Dr R. Narayan	Corrosion	O.E.C. IIT Madras	Jan. 1992
10.	Dr S Sankararaman	Pico Second Dynamics	BARC, Bombay	Jan. 1992
11.	Dr S. Sankararaman	Photochemistry of charge transfer complexes	IIT, Bombay	Jan. 1992
12.	Dr B Viswanathan	Photoassisted Catalytic properties	ISM, Dhanbad	Dec. 1991
13.	Dr T V Ramakrishna	Determination of Inorganic & Methylated arsenic	Andhra University, Vizag	Dec. 1991

4.4.11 Visits Abroad

S.No.	Name of Faculty	Country Visited	Date	Purpose
1.	Dr P T Manoharan	Australia Malaysia	Jan. 91-Jan 92 Jan 92	Sabbatical To deliver lectures
2.	Dr M N Sudheendra Rao	Canada	June 90- June 91	Sabbatical
3.	Dr R Narayan	USA	May-June 91	International Conference on Electro-Chemistry
4.	Dr D V Ramana	Amsterdam, The Netherlands	August 91	12th International Mass Spectrometry Conference
5.	Dr M S Gopinathan	Germany	Jan-June 91	Sabbatical
6.	Dr N Balasubramanian	Germany	May-Aug 91	DAAD Programme Short-term visit
7.	Mr S Subramanian (Ph.D Scholar)	Germany	Sept. 91-Mar. 92	Advanced Research Work
8.	Mr Sreekumar (Ph.D Scholar)	Germany	Sept.-Dec. 91	Advanced Research work

4.4.12 Distinguished Visitors to the Department

S.No.	Name of the Visitor & Occupation	Date of Visit	Purpose of visit Lecture/Discussion
1.	Prof. Rober E. Huie National Instt. of Standards and Technology, Maryland	7.9.91 to 11.9.91	Lecture & Discussion
2.	Dr G Gerner, EHICS-DCOA, France	28.9.91 to 2.10.91	Lecture & Discussion
3.	Prof D W Sharp, Univ. of Glasgow, Scotland	18.2.92	Lecture
4.	Dr Wolfgang Holderich, BASF Labs. Germany	29.1.92 to 13.2.92	Lecture & Discussion
5.	Prof Dr Karl Hepmann Steinberg, Consultant, Merseberg, Germany	17.2.92 to 5.3.92	Lecture and Discussion
6.	Prof Dr Ing. J. Weitkamp, Stuttgart Univ.	26.2.92 to 5.3.92	Lecture and Discussion
7.	Dr St. Ernst, Germany	26.2.92 to 5.3.92	Lecture and Discussion

4.4.13 Sponsored Projects

S.No.	Title	Period	Funding Agency	Amount (in Lakhs)	Coordinators
1.	Development of FCC Catalyst for Refinery	1986-1992	Madras Refin. Ltd., Madras	32.0	Dr C N Pillai Dr B Viswanathan
2.	Development of Materials	2 years	B.E.L, Bangalore	1.54	Dr V R K Murthy (Physics) and Dr B Viswanathan
3.	Development of Ceramic Materials	3 years	DRDO	28.0	Dr V R K Murthy (Physics) and Dr B Viswanathan
4.	Photocatalytic reduction of Nitrogen	3 years	CSIR	3.0	Dr B Viswanathan
5.	Spectroscopic Investigations of the Inter and Intramolecular interactions	3 years	DST	15.0	Dr P T Manoharan
6.	Studies on Novel Methanogenic Isolate	July 91-93	Non Conventional energy sources	4.96	Dr K Lalitha
7.	Chemical Composition of ground water	1 year	ICSR, IIT M	1.5	Dr N Balasubramanian
8.	Preferential solvation studies of Gr.IIA and B metal salts in mixed solvents	3 years	CSIR	1.5	Dr C Kalidas
9.	Metathetical polymerisation of alkyenes with Gr.VI metal carbonyls as catalyst	3 years	DST	3.5	Dr G Sundararajan
10.	Development of bio-technology processes using agrobased wastes	3 years	Tamil Nadu State Council of Sci. & Tech.	1.52	Dr T S Chandra
11.	Biogeotechnology of metals	1 year	IRDF(IIT M)	0.72	Dr T S Chandra
12.	Development of pulsed EPR spectrometer	3 years	DST	71.7	Dr P T Manoharan & Dr S Subramanian
13.	END capping isocyanates for HTPB-TDI Binder system	3 years	ISRO (IITM)	6.25	Dr M Srinivasan
14.	Migration of chemical ingredients in rocket fuel grains	3 years	ISRO(IITM)	4.53	Dr M Srinivasan
15.	National Institute of Standards of Technology Project	3 years	Joint Indo-US Project	17.4	Dr K K Balasubramanian

4.4.14 Major Consultancy Assignments

S.No	Title	Organisation	Amount (in Lakhs)	Coordinators
1.	Surface studies of alloys	MRP (BARC) Mysore	Being worked out	Dr P T Manoharan
2.	Analytical services by the Catalysis Divn., Chy Dept.	All R&D Organisations about 30 which includes Acc., CSIR & Industries	0.5	Dr C S Swamy

4.4.15 Honours and Awards

S.No.	Name of the Faculty	Honours/Awards	Purpose
1.	Dr P T Manoharan	Member, UGC Chemistry Panel INSA-COSTED, National Committee	-
2.	Dr K Lalitha	Best Poster	60th Annual Scientific session of Biological Chemists of India, 1991
3.	Dr R Narayan	Vice President	Electrochemical Society of India, Bangalore
4.	Dr R Narayan	Member, Board of Editors	Journal of Electrochemical Society of India
5.	Dr M S Gopinathan	Fellow of the Indian National Science Academy, New Delhi	-
6.	Dr G Sundararajan	INSA/Royal Society International Exchange Programme for Scientist	Invitation from Imperial College, London
7.	Dr J C Kuriacose	Eminent Scientist Award	Significant contributions in the field of Catalysis
8.	Dr V Srinivasan	Eminent Scientist Award	Significant contributions in the field of Catalysis

4.4.16 Research Publications

1. J. Christopher and C.S. Swamy, Surface Characterisation and Catalytic activity of $\text{Ln}_2\text{Ti}_2\text{O}_7$ ($\text{Ln}=\text{Y}, \text{Sm}, \text{Gd}, \text{Tb}$) J. Material Science, 26, 1991, 2966-80.
2. J. Christopher and C.S. Swamy, Studies on the catalytic decomposition of N_2O on LnSrFeO_4 : J. Molecular Catalysis 68, 1991, 199- 213.
3. U. Kameswari, J. Christopher and C.S. Swamy, Catalytic decomposition of N_2O on $\text{La}_2\text{Cu}_{0.5}\text{M}_{0.5}\text{O}_4$ ($\text{M} = \text{Co}, \text{Ni}, \text{Cu}$ and Zn); React. Kinetic. Catal. Lett. 44, 1991, 31.8.
4. S. Subramanian and C.S. Swamy, "Oxygenation of Y-Ba-Cu-O using nitrous oxide gas", J. Material Science Letters, 10, 1991, 1088-9 5.
5. P. Selvam, B. Viswanathan, C.S. Swamy and V. Srinivasan, " Surface Properties of LaNi_5 ; A Reinvestigation", Int. J. Hydrogen Energy 16, 1991, 23-33.
6. I. Bernard Rufus, B. Viswanathan, V. Ramakrishnan, and J.C. Kuriacose, "XPS Studies on metallised (Pt, Rh, Ru, Ph and Ni) on CdS", Ind. J. Chemistry, 30A, 1991, 804-6.
7. V. Vishwanathan, S. Narayanan, G. Pandey and B. Viswanathan, "Benzyl chloride transformation as a probe for electron transfer on Rh under SMSI State" React. Kinet. Catal. Lett, 45(1), 1991, 155-9.
8. R. Pragasam, N.S. Raman, V.R.K. Murthy and B. Viswanathan, "Conductivity measurements on some high T_c superconductivity materials at microwave frequencies", Phys Stat. Sol 125(a), 1991, 583-8.
9. K.S. Rajam, S.R. Rajagopalan, M.S. Hegde and B. Viswanathan, "Characterization of Electroless nickel by ESCA, Materials Chemistry and Physics" 27, 1991, 141-154.

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11. P.V. Lalitha, P. Sambasiva Rao and R. Ramaswamy, "An EPR study of chemical oscillators, *Current Science* 61(5), 1991, 352-3
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4.4.17 Any Other Relevant Details

The department has 3 scientific officers 14 nonteaching technical and 17 nonteaching staff.

4.5 Civil Engineering Department

4.5.1 Introduction

The Department of Civil Engineering was established in 1959. The department now offers Ph.D, M.S., M.Tech and B.Tech programmes.

4.5.2 Details of Faculty

Name and Qualification	Major Area of Specialisation
Professors	
H. Achyutha, Ph.D(IIT Madras)	Concrete Technology, Experimental Stress Analysis, Nuclear Structures
P.K. Aravindan, Ph.D(IIT Madras)	Reinforced Concrete & Prestressed Concrete Structures, Bridges and Shell Structures, Industrial Structures
K. Elango, Ph.D(IIT Madras)	Water Resources Sys. Analysis, Computational Hydraulics, Hydrology
V. Kalyanaraman, Ph.D(Cornell)	Steel Structures, Stability of Structures, Construction Engineering & Management
P. Kalyanasundaram, Ph.D(IIT Madras)	Building Tech. & Practice, Concrete Techn. & Practice, Construction Engineering and Management
C.S. Krishnamoorthy, Ph.D(London)[Head]	Finite Element Analysis, Computer Aided Design and Expert systems, Structural Optimization
N.R.Krishnaswamy, Ph.D(IIT Kanpur)	Foundation Engineering, Reinforced Earth, Expert Systems
Nainan P.Kurian, Ph.D(IIT Madras)	Shell Foundations, Reinforced Earth, Expert Systems
V.Paramasivam, Ph.D(IIT Madras)	Finite Element Analysis, Nuclear Structures, Structural Design to resist Missile Impact
R.Radhakrishnan, Ph.D(IIT Madras)	Analysis of Tall Structures, Wind Forces on Structures, Earthquake Resistance Design of Structures
N.Rajagopalan, Dr.-Ing (Stuttgart)	Reinforced Concrete & Prestressed Concrete, Bridge Structures, Water Retaining Structures, Computer aided design of water retaining structures and bridge structures
H.Raman, Ph.D(IIT Madras)	Simulation & optimisation of water resources systems, Finite Element and Boundary Element solutions in water Resources and estuarine modelling
P.Srinivasa Rao, Dr.-Ing (Munchen)	Reinforced & prestressed concrete structures, Design of tall structures, Bridges and shell structures
H. Suresh Rao, Ph.D(IIT Madras)	Modelling of surface and ground water systems, Physical scale modelling of hydraulic structures, Hydrogen Analysis
Visiting Professors	
T.S. Ramanatha Ayyar	Environmental Geotechnic, Ground Improvement, Soft clay
R. Jayaraman	Open Channel Flow, Instrumentation for Hydraulic Experiments, Water Resources Engineering

Associate Professors

M.S. Mathews, Ph.D(IIT Madras)

V.R.Rengaraju, Ph.D(IISc),

B.S.Thandaveswara, Ph.D(IISc)

Building technology and practice, Functional design of buildings, Ferrocement Technology Pavement Engineering, Transportation Planning, Geotechnical Engineering
Numerical modelling of unsteady free surface flows, Surface water hydrology, Irrigation System Analysis

Assistant Professors

A. Boominathan, Ph.D(USSR)

S.R. Gandhi, Ph.D(IIT Madras)

K.Gopalakrishna, M.Tech (IIT Kanpur)

A.Meher Prasad, Ph.D(Rice,Houston)

S.Mohan, Ph.D(IISc Bangalore)

S.B. Pattnaik, Ph.D(IIT, Kanpur)

K.Srinivasan, Ph.D(IIT Madras)

V.Tamizh Arasan, Ph.D(IIT Madras)

Soil and foundation Dynamics, Ground improvement techniques, Foundation engineering
Pile foundations, Pile instrumentation, Pile Drivability
Industrial waste water treatment, Air pollution monitoring and control General environmental Engineering and ecology
Structural dynamics, Structural reliability, Off shore structures
Water resources systems engg., Stochastic Hydrology, Irrigation water management
Civil engineering, City planning, Transportation systems Engg.
River basin planning and Management Stochastic, Modelling of stream flow, Water resources system management
Transport planning, Highway engg., Traffic Engg.

Lecturers

S. Rajeev, M.Tech (IIT Madras)

A.Ramachandraiah, Ph.D(IIT Madras)

Computer aided engineering, Engineering optimization, Knowledge based systems in Engg. design
Building acoustics and noise control, energy aspects of buildings and building physics

Visiting Faculty

K.N.Satyanarayana, Ph.D

Construction engg. and management, Quality management, Highway materials

Senior Scientific Officers Grade II

R.Ambalavanan, M.Sc (Engg), MBA (Madras)

K.Ananthanarayanan, M.E (Madras)

M. Subbireddy, M.S (IIT Madras)

Analysis and design of Structural masonry, Building sciences, Construction management
Project scheduling and Construction management, Surveying and Operations Research
Traffic Engineering, Public Transportation

Technical Officer (SG)

P.R. Kothandaraman

Technical Officers

K. Bhaskaran

M. Innaci

V. Raman

4.5.3 Instruments/Equipments Designed & Developed

Prof.C.S.Krishnamoorthy and Mr.S.Rajeev Developed a software environment, PENCAD (Programming Environment for Computer Aided Design) on microcomputer, PENCAD - software support includes GKS (Graphics Kernal System), ENDBMS (Engineering Data Base Management Systems) and KBES (Knowledge-Based Expert Systems).

Prof.H.Raman, engaged in developing C.MOS based recording system for various types of flow measurements.

4.5.4 New Facilities & Major Equipment Procured

PC/AT - 286

100T Universal Testing Machine for the Concrete and Systems Laboratory

Electronic Theodolite - Survey Lab.

Minolta Brightness meter

4.5.5 Seminars/Symposia /Conferences/Short-Term Courses Organised

Topic	Principal Coordinator	Date
STC on Advanced Bridge Deck Analysis and Design	Dr.N.Rajagopalan	June 1991
Workshop on Computer Graphics in Computational Mechanics	Dr.V.Paramasivam	Jan. 1991
STC on Finite Element Method for Practising Engineers	Dr.V.Paramasivam	Dec. 1991
Workshop on Computer Graphics in Computational Mechanics	Dr.H.Achyutha	Jan. 1991
STC on Analysis and Design of Foundations for Static and Dynamic Loads	Dr.N.R.Krishnaswamy	Nov. 1991
STC on Advances in Transportation Systems: Planning & Management	Dr.V.R.Rengaraju	Mar. 1992
ISTE Winter School on Modelling the Urban Bus Transit Network Systems	Dr.S.B.Pattnaik	Dec. 1991

4.5.6 Participation In Seminars, Symposia/Conferences

Name	Title of Symposium/Seminar and Venue & Date	Nature of Participation
Dr.C.S.Krishnamoorthy	Intl. Symposium on Fatigue and Fracture in Steel and Concrete Structures, SERC, Madras Dec. 1991	Member, Advisory Committee
Dr.P.Srinivasa Rao	Intl. Conf. on Bridges and Flyovers, Hyderabad, Feb. 1991	Chairman - Session III (Construction)
Dr.Nainan P.Kurian	STC on Analysis and Design of Foundations for Static and Dynamic Loads, IIT Madras	Invited Speaker
Dr.S.B.Pattnaik	STC on Advances in Transportation Systems: Planning and Management	Publication Secretary & Member, Orgn.Committee
Dr.S.R.Gandhi	Seminar on Pile Design and Construction Practices in India, Univ. Karlsruhe, Jan. 1992	Invited Speaker
Dr.A.Boominathan	STC on Analysis and Design of Foundations for Static and Dynamic Loads, IIT Madras, Nov. 1991	Invited Speaker
Dr.S.Mohan	IWWA 24th Annual Convention, Hyderabad, Jan. 1992	Invited speaker
Dr.S.Mohan	Ntl. Seminar on Large Reservoir - Environmental Loss or gain, Nagpur, Feb. 1992	Invited Speaker
Dr.S.Mohan	STC on Micro Computer Applications in Irrigation Systems, Jan.1992	Invited Speaker
Dr.V.Tamizh Arasan	National Seminar on Advances in Transportation Systems: Planning and Management, IIT Madras, March 1992	Invited speaker

4.5.7 Visit of Faculty Members to other Institutions

Name	Institution visited	Purpose	Period/Duration
Dr.C.S.Krishnamoorthy	Carnegie Mellon Univ. USA	Indo-US Project	May-June 1991
	Univ.College of Swansea UK	Indo-British collaborative Project	June 1991
	Ruhr-Universitat, Bochum, Germany	Sandwich programme under DAAD	July 1991
Dr.P.Srinivasa Rao	REC, Calicut	Guest Lecture	10 Jan. 1992
Dr.S.R.Gandhi	Institut fur Grundbau Boden und Felsmechanik Technische Hochschule, Darmstadt	DAAD invitation,	
Dr.S.Mohan	REC, Warrangal	Guest Lectures	March 1992
Dr.A.Ramachandraiah	School of Architecture & Planning, UK	Academic	Jan-July 1991
	Sheffield City Polytechnic	To study sound and vibration activities	May 1991
	Institute of Sound & Vibration Research, Southampton	To study sound and vibration activities	June 1991
	Building Research Station Watford, UK	To study the ventilation and energy efficient aspects of buildings	June 1991

4.5.8 Distinguished Visitors to the Department

Name	Affiliation	Period
Dr.B.Ashtakala	Associate Professor, Civil Engineering Dept., Concordia University, Montreal, Canada	Dec. 1991
Prof.J.M.Davis	University of Stalford, UK	Feb. 1992

4.5.8 Major Consultancy Assignments

Sl.No.	Title of Assignment	Organisation	Amount (Rs.)	Coordinators
1.	Stress analysis of tracks	CVRDE, DRDO, Avadi, Madras	1,70,000	Dr.C.S.Krishnamoorthy, Dr.K.N.Seetharamu, Dr.N.Sivaprasad, Dr.R.Krishnakumar
2.	Boiler supporting structure at Vijayawada & Muddanur	BHEL, Trichy	8,00,000	Dr.P.Srinivasa Rao
3.	Design que-complex	TTD, Tirupathi	1,75,000	Dr.P.Srinivasa Rao, Dr.S.Narasimha Rao, Dr.K.Ganesh Babu
4.	Design of new berths	Port Trust Visakhapatnam	70,000	Dr.P.Srinivasa Rao
5.	R.C. TV Towers	All India Radio, New Delhi	-	Dr.P.Srinivasa Rao

6.	Design of NDCT Towers	Karnataka Power Corporation	75,000	Dr.P.Srinivasa Rao
7.	Concrete mix design	NPCC, TNEB	75,000	Dr.P.Srinivasa Rao
8.	Computer aided simulation study of Thambaraparani systems	Public Works Department, Tamilnadu	24,00,000	Dr.H.Raman, Dr.K.Elango, Dr.S.Mohan
9.	Typical design of overhead reservoirs	TWAD Board	1,28,000	Dr.N.Rajagopalan
10.	Typical design of intake power and pipe bridge	TWAD Board	60,000	Dr.N.Rajagopalan
11.	Design of bridges for carrying over head track for MTP	Southern Railways	1,25,000	Dr.N.Rajagopalan
12.	Health monitoring structures and design of a raw water reservoir	SPIC	30,000	Dr.N.Rajagopalan,
13.	Design of superstructure for Varanasi bridge	Hindustan Constrn. Company Ltd.	60,000	Dr.N.Rajagopalan
14.	Proof consultancy for intake well tunnel and approach bridge	Viger Concrete Consultants P.Ltd.	40,000	Dr.N.Rajagopalan
15.	Development of low relaxation steel for prestressing works	JCT Limited, New Delhi	40,000	Dr.N.Rajagopalan
16.	Design of 5 bridges in Himachal Pradesh	RITES, New Delhi	2,25,000	Dr.N.Rajagopalan
17.	Geotechnical investigations with foundation recommendations	ESI Sub Division, Madras	33,690	Dr.Nainan P.Kurian, Dr.S.R.Gandhi
18.	Soil investigation along cooling water channel and recommendations	TNEB, Madras	1,86,500	Dr.Nainan P.Kurian, Dr.N.R.Krishnaswamy
19.	Soil investigation and advice on foundations	TNHB, Madras	31,500	Dr.Nainan P.Kurian, Dr.N.R.Krishnaswamy
20.	Soil investigation for tower foundations of 400 KV Transmission systems	Neyveli Lignite Corporation Ltd. Neyveli	1,17,000	Dr.Nainan P.Kurian
21.	Soil investigation and advice on foundations	Madras Metropolitan Development Authority	76,000	Dr.Nainan P.Kurian, Dr.N.R.Krishnaswamy
22.	Geotechnical investigations and foundation recommendations	Garrison Engineer, Air Force Station Madras	29,500	Dr.Nainan P.Kurian
23.	Selection of building materials for specific requirements and assessment	Telecom Civil Division, Madras	25,000	Dr.P.Kalyanasundaram, Mr.R.Ambalavanan
24.	Investigations on concrete admixtures for suitability for particular uses	Bureau of Indian Standards, Bangalore	26,000	Dr.P.Kalyanasundaram, Mr.R.Ambalavanan
25.	Design of conveyor structure	CEM India	5,50,000	Dr.P.K.Aravindan, Dr.V.S.Raju
26.	Review and designs of fertiliser Plants	Bindae Agro Ltd.	2,00,000	Dr.P.K.Aravindan, Dr.V.S.Raju
27.	Essar Towers	Essar, Bombay	1,00,000	Dr.P.K.Aravindan, Dr.V.S.Raju
28.	Building for Cochin Refineries Limited	Cochin Refineries Ltd., Cochin	1,00,000	Dr.P.K.Aravind
29.	Design of 300m height TV tower at Chotan Hills	Larsen and Tubro Ltd., Madras	25,000	Dr.V.Kalyanaraman
30.	R & D of sleeved col. system	T.I. Ltd., Madras	50,000	Dr.V.Kalyanaraman

31.	Checking the design of bridge across Zuari river in Goa	Konkan Railways, Bombay	70,000	Dr.V.Kalyanaraman
32.	Static and dynamic analysis of tracking pedestal	Bharat Electronics Ltd., Bangalore	25,000	Dr.V.Kalyanaraman, Dr.A.Mehar Prasad
33.	Soil exploration along cooling water channel	Tamilnadu Elect. Board, Madras	1,90,000	Dr.N.R.Krishnaswamy
34.	Checking structural design and bill of quantities	Tamilnadu Pollution Control Board	75,000	Dr.T.P.Ganesan, Mr.R.Ambalavanan
35.	Qualification Tests on coal tar based coating materials for iron and steel works	Aban Constructions, Madras	27,000	Dr.V.R.Rengaraju, Dr.V.Tamizh Arasan
36.	Design and advice on treatment of 13 diary/chilling centres in Tamil Nadu	NDDDB, Madras	2,30,000	Dr.P.Srinivasa Rao, Mr.K.Gopalakrishna
37.	Design of sewerage treatment system	Special Dev. Authority Korba	80,000	Mr.K.Gopalakrishna

4.5.10 Honours and Awards

Faculty	Name of Award	Purpose	Date
Dr.H.Raman	Dorr Oliver Award	Awarded by Indian Water Works Association, Bombay for the Best Paper published in the Journal of Indian Water Works Association, 1990	9.1.91.
Dr. B. S. Thanda veswara	Certificate of Merit and Cash prize of Rs.1,000/-	Awarded by National Institute of Hydrology for Outstanding and important contribution in the field of Hydrology	14.7.91
Dr.S.Mohan	Dorr Oliver Award	Awarded by Indian Water Works Association, Bombay for the Best Paper published in the Journal of Indian Water Works Association, 1991	9.1.91
Dr.S.Mohan	IWWA	Awarded by Indian Water Works Association, Bombay for the Second Best Paper published in the Journal of Indian Water Works Association, 1991	22.1.92
Dr.S.Mohan	Certificate of Merit	Awarded by CBIP at Jaipur for the best paper published in the year 1991	20.2.92

4.5.11 Sponsored Projects

Sl.No.	Title	Period	Funding Agency	Amount (Rs.)	Coordinators
1.	Knowledge-based expert systems for Civil Engg. design	3 yrs.	National Science Foundation, USA	21,63,000	Dr.C.S.Krishnamoorthy, Mr.S.Rajeev, Dr.V.Kalyanaraman, Dr.P.Kalyanasundaram, Dr.N.Rajagopalan
2.	Technology cell for utilisation of mixer & wastes in devpt. of high performance cements and concrete	2 yrs	MHRD	20,00,000	Dr.P.Srinivasa Rao, Dr.K.Ganesh Babu

3.	Flood simulation and Multi objective power multi Reservoir operation	3 yrs.	Central Board of Irrigation and Power	7,96,000	Dr.H.Raman, Dr.K.Elengo
4.	Water resources project management	3 yrs.	MHRD	7,50,000	Dr.H.Raman, Dr.S.Mohan
5.	Expert systems for water resources management	3 yrs.	Dept. of Science & Tech.	4,60,000	Dr.H.Raman, Dr.S.Mohan
6.	Nuclear structures research cell	3 yrs.	MHRD	15,00,000	Dr.H.Achyutha, Dr.V.Paramasivam
7.	Stress analysis of pipe junction	3 yrs.	B R N S	3,20,000	Dr.V.Paramasivam, Dr.Achyutha
8.	FE methods for reactor structures	5 yrs.	Indo-German Bilateral Cooperation	1,60,000 +2.6 DM	Dr.V.Paramasivam, Dr.Achyutha
9.	Hydraulic routing of flood towards flood Management	3 yrs.	Dept. of Science & Technology	4,57,000	Dr.H.Suresh Rao, Dr.B.S.Thandaveswara
10.	Storm surges and creek hydrology	3 yrs.	DOD-CODAPS	18,20,000	Dr.H.Suresh Rao, Dr.B.S.Thandaveswara, Dr.R.Madhavan
11.	Analysis of layered fibre composite stiffened panels	3 yrs.	ARDB	3,45,000	Dr.V.Kalyanaraman
12.	Expert system based computer aided engg. of steel structures	3 yrs.	Dept. of Science & Technology	16,37,000	Dr.V.Kalyanaraman, Mr.S.Rajeev
13.	New Plan Scheme Transportation Engg.	5 yrs.	MHRD	30,00,000	Dr.V.R.Rengaraju, Dr.D.J.Victor, Dr.V.Tamizh Arasan
14.	Soil-Structure interaction effects on design of circular raft foundations	1 yr.	IRDF, ICSR, IIT Madras	54,000	Dr.A.Mehar Prasad, Dr.S.R.Gandhi, Dr.P.K.Aravindan, Dr.K.Muthukrishnaiah
15.	Analysis of fast breeder reactor vessel under thermal and pressure loads	1 yr.	IRDF, ICSR, IIT Madras	87,000	Dr.V.Paramasivam, Dr.R.M.S.Gowda

4.5.12 List of Publications

1. C.S.Krishnamoorthy, C.Srinivasa Rao and S.Rajeev, "Architecture of a Design Synthesiser for KBES", Proc. of the Second Intl. Conf. on The Application of AI Techniques to Civil and Structural Engineering, Sep. 1991, pp.79-86.
2. C.S.Krishnamoorthy, S.Karimulla Raja, S.Rajeev and H.Shiva Kumar, "Development Environment for Knowledge Based Systems for Engineering Design", Proc. of the Second Intl. Conf. on The Application of AI Techniques to Civil and Structural Engineering, Sep. 1991, pp.165-174.
3. C.S.Krishnamoorthy, C.Srinivasa Rao and S.Rajeev, "Synthesis in Engineering Design", Jl. of Structural Engineering, Vol.18, No.4, Jan. 1992, pp.125-132.
4. P.Srinivasa Rao, P.K.Aravindan and K.Ramanjaneyulu, "Buckling Safety and Cooling Tower Shells - Evaluation of Some Important Codal Provision", ACI Jl., Vol.88, No.3, 1991, pp.325-329.

5. P.Srinivasa Rao, P.K.Aravindan and K.Ramanjaneyulu, "Buckling Analysis of Cooling Tower Shells subjected to Non-Axisymmetric Wind Pressures", *Jl. of Computers and Structures*, Vol.40, No.4, 1991, pp.849-856.
6. P.Srinivasa Rao, "Problems in Quality Assurance and Quality Control of High Strength Concretes", Invited Key-note speech, National Seminar on High Strength Structural Concrete, Bangalore Dec.1991.
7. K.Ganesh Babu, G.L.V.Raja and P.Srinivasa Rao, "Concrete Mix Design - An Appraisal of the Current Codal Provisions", *The Indian Concrete Journal*, Vol.66, No.2, Feb. 1992, pp.87-95.
8. P.Srinivasa Rao, "Large Scale Solar Power Stations in India -Time for Action", paper presented at IABSE Congress, New Delhi, March 1992.
9. H.Raman and S.Vasudevan, "Optimal Reservoir Operation by Dynamic Programming", *Jl. of Indian Water Works Association*, Vol.23, No.2, April 1991, 105-112.
10. H.Raman and S.Vasudevan, "Cropping Pattern Optimization by Conjunctive use of Surface Water and Ground Water", *Jl. of Power and River Valley Development*, Vol.XLI, No.5, May 1991, pp.92-97.
11. H.Raman and S.Vasudevan, "Flood Control by Simulation", *Proc. of National Symposium on Dam Safety*, Trichy, June 1991, pp.56-66.
12. H.Raman, "Use of Computers in Realtime Management of Water Resources Systems", *National Symposium on Use of Computers in Hydrology and Water Resources*, New Delhi, Dec. 1991, pp.5(i) - 5(xi).
13. H.Raman and S.Vasudevan, "Reservoir Operation Optimization - A Computer Aided Approach", *National Symposium on Use of Computers in Hydrology and Water Resources*, New Delhi, Dec. 1991, pp. 5(1)- 5(17).
14. H.Raman, S.Mohan, K.Srinivasa Raju and S.Mahatma, "An Integrated Model for Multi Reservoir Operation", *National Symposium on Use of Computers in Hydrology and Water Resources*, December 1991, New Delhi, pp.5(18)-5(24).
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4.5.13 Book Publication

1. C.S.Krishnamoorthy and S.Rajeev, "Computer Aided Design - Software and Analytical Tools", Joint Publication by Springer Verlag, Germany and Narosa Publishing House, New Delhi, Jan. 1992, p.455.
2. Nainan P.Kurian, "Micro Concrete: The Modelling Material for Concrete", Joint Publication by Oxford and IBH Publishing Co., New Delhi, 1992, p.82.
3. Nainan P.Kurian, "Design of Foundation Systems - Principles and Practices", Joint Publication by Narosa Publishing House, New Delhi and Addison Wesley, Singapore, Jan.1992, p.704.

4.5.14 Any other relevant details

200 sq. m of Laboratory space has been built on the third floor of Structural Engineering Laboratory to accommodate the Nuclear Structures Research Cell.

4.6 Computer Science and Engineering Department

4.6.1 Introduction

The Department of Computer Science and Engineering was established in 1973. Now Ph.D, M.S., M.Tech. and B.Tech. programmes are being offered. The major areas of teaching and research of the Department are:

Artificial intelligence, Expert systems, Parallel and Distributed processing, Computer Architecture, Data base systems, Data Communication, Computer Networks, Theoretical Computer Science, Automata theory, Computational complexity, Simulation and Modelling, Speech recognition and synthesis, Digital Signal processing, VLSI algorithms for parallel processing, Supercomputing, Artificial neural networks, Machine translation and motion planning.

4.6.2 New Courses Introduced

The following new course was introduced during the period under report.

Course No.	Title	Structure	Faculty
CS 776	Knowledge Structures for Planning and Understanding	4 0 0 3	Dr.Deepak Khemani

4.6.3 Details of Faculty

Name and Qualification

Major Area of Specialisation

Professors

R.Kalyanakrishnan, Ph.D(Yale)

Computer Architecture, Computer System Design, Micro processors, Digital Electronic Systems, Computer Graphics, Statistical Signal Processing
Theoretical Computer Science

Kamala Krithivasan, Ph.D(Madras)

H.N.Mahabala, Ph.D(Saskatchewan)

C.R.Muthukrishnan, Ph.D(IIT Kanpur)

VLSI Design, Artificial Intelligence, Expert Systems
Software Engineering, Computer Architecture,
Distributed and Parallel Processing

R.Nagarajan, Ph.D(IIT Madras) [Head]

Operations Research, Simulation and Systems
Engineering, Expert Systems, Performance
evaluation of Systems

B.Yegnanarayana, Ph.D(IISc)

Digital Signal Processing, Speech and Vision,
Voice input/output systems, Artificial Neural Networks

Associate Professors

C.Pandurangan, Ph.D(IISc)

Algorithms, Parallel and VLSI Algorithms,
Graph Theory and Computational Geometry

S.V.Raghavan, Ph.D (IIT Madras)

Research and Development related to computer
network and protocols with emphasis on OSI

Assistant Professors

Deepak Khemani, Ph.D(IIT Bombay)
T.A.Gonsalves, Ph.D(Stanford)

Artificial Intelligence, Knowledge based systems
Computer Networks, Distributed Systems,
Performance Evaluation
Artificial Intelligence
Digital System Design, Microprocessor based
peripherals, Parallel processing
Parallel Computing

N.Parameswaran, Ph.D(IISc)
S.Raman, Ph.D(IIT Madras)

C.Siva Ram Murthy, Ph.D(IISc)

Lecturers

C.Chandrasekhar, M.Tech(IIT Madras)
Hema A. Murthy, M.Eng.(Mc Master)
D.Janaki Ram, Ph.D(IIT Delhi)
G.V.Ramana Rao, M.Tech(IIT Madras)
G.Raviprakash, M.Tech(IIT Kanpur)
Ravi Mittal, Ph.D(Roorkee)

Speech Recognition, Neural Networks
Digital Signal Processing
Artificial Intelligence, Machine Learning
Artificial Intelligence, Parallel Processing
Software Engineering, Artificial Intelligence
Fault Tolerant Computers, Parallel & Distributed
Computing
Digital System Design, Computer Vision
Digital Electronics, Microprocessor based Design,
Speech Signal Processing, Parallel Processing

Sukhendu Das, M.Tech(IIT Delhi)
R.Sundar, M.Tech(IISc)

Senior Scientific Officers II

N.Aiwar, M.S.(IIT Madras)

Mircoprocessor based system Design,
I/O in Indian Languages, Machine Translation
Computer Networks, Distributed Computing
Pattern Recognition, Computer Vision

B.Prabhakaran, M.S.(IIT Madras)
J.T.Sanjeeva Murthy, M.Tech(IIT Delhi)

4.6.4 Students on Roll

Course	I Year	II Year	III Year	IV Year	V Year	VI Year
B.Tech	27	25	31	30	-	-
M.Tech	37*	-	-	-	-	-
M.S.	14	11	5	5	1	-
Ph.D	6	4	7	2	5	2

* including 5 women students

4.6.5 Number of scholarships/fellowships holders

Course	Institute	QIP
M.Tech	30	4
M.S.	24	-
Ph.D	11	2

4.6.6 New facilities added and major equipment procured

1. 1860 based symphony 860 workstations
2. AT-486 systems
3. Modi copying machine

4.6.7 Short-term courses/workshops/seminars/symposia/conferences organised

Faculty	Name of the course	Duration
Dr. S.Raman	5-day Course on "Microprocessor- based System Design" for Dept. of Electronics	27-31 Jan. 1992

4.6.8 Short term courses/workshops/seminars/symposia/Conferences/training attended by the faculty in recognised academic institutions and public sectors

Sl.No.	Name of faculty	Title	Period/duration
1.	B.Yegnanarayana	Regional workshop on Computer processing of Asian Languages, Kanpur	March 1992
2.	B.Yegnanarayana	Discussion meeting on AI and Expert System Technologies in the Indian Context, Bangalore	July 1991
3.	B.Yegnanarayana	International Conference on Acoustics, Speech and Signal Processing, Toronto, Canada	May 1991
4.	G.V.Ramana Rao	Regional Workshop on Computer Processing of Asian Languages, Kanpur	March 1992
5.	Hema A.Murthy	International Conference on Acoustics, Speech and Signal Processing, Toronto, Canada	May 1991
6.	Dr.S.Raman	Discussion Meeting on AI & Expert System Technologies in the Indian Context, IISc. Bangalore	July 22- 26, 1991
7.	Dr.S.Raman	UNESCO Regional Workshop on New Information Technologies: Machine Translation, NISTADS, New Delhi	Dec. 16-20, 1991

4.6.9 Invited Lectures delivered by the faculty in academic institutions/public bodies

Sl.No.	Faculty	Title and Venue	Date
1.	Dr.Kamala Krithivasan	'L' systems and Kolam patterns" at the National Seminar on Mathematics and its Applications - Seethalakshmi Ramaswamy College, Trichy	Aug. 1991
2.	Dr.C.Siva Ram Murthy	Lecture at the 79th Indian Science Congress at Vadodara on 'Task Assignment in Multiprocessor Systems'	Jan. 3-8 1992
3.	Dr.T.A.Gonsalves	The FDDI High-Speed Fibre-Optic Network, ISTE-sponsored Winter School on Local Area Networks, Anna University, Madras	Dec. 20 1991
4.	Dr.S.Raman	Invited to present a talk on The Projected Impact of Machine Translation, at Akshara 92, the CSI National Convention on Information Technology Application in Indian Languages, Bhubaneswar	Feb. 7-9 1992

4.6.10 Visits Abroad

S.No.	Name of faculty	Country	Date	Purpose of visit
1.	B.Yegnanarayana	U.S.A.	April-June 91	Technical visit to US-West Advanced Technologies
2.	C.Pandurangan	Univ.of Saskatchewan, Canada	June-July 91	Visiting Professor
3.	C.Pandurangan	National Chio Tung Univ., Taiwan	Dec. 91	Visiting Professor

4.6.11 (a) Sponsored projects

Sl.No.	Title	Duration	Sponsor	Value (lakhs)	Coordinator(s)
1.	TDMA Rural Telephony Ph.II	1990-92	CDOT	23.0	Dr.B.Ramamurthi, Dr.A.Jhunjunwala
2.	Telematics Ph.II	1991-93	MHRD	15.0	Dr.A.Jhunjunwala, Dr.B.Ramamurthi
3.	Foundation of Mathematics in the Indian Tradition	1991-94	DST	5.34	Dr.A.Jhunjunwala, Dr.B.Ramamurthi
4.	Application of Artificial, Neural Networks in Remote Sensing	1991-94	ISRO	5.84	Dr.B.Yegnanarayana, Mr.R.Sundar, Mr.C.Chandrasekar
5.	Development of Neural Network Models for Classification	1991-95	DOE	19.63	Dr.B.Yegnanarayana, Mr.R.Sundar, Mrs.Hema A.Murthy, Mr.C.Chandrasekar
6.	Computing with Artificial Neural Networks	1991-93	MHRD	15.00	Dr.B.Yegnanarayana, Mr.R.Sundar, Mr.C.Chandrasekar
7.	Microprocessor Applications	1991-96	MHRD	14.00	Dr.B.Yegnanarayana, Dr.S.Raman, Mr.R.Sundar
8.	Algorithms for Robot Motion Planning	1991	DOE	-	Dr. Kamala Krithivasan

(b) Research-based Consultancy Projects

Sl.No.	Title	Duration	Sponsor	Value (lakhs)	Coordinator(s)
1.	Fibre-Optic double ring Telemetry system	1991-92	IL, Kota	5.50	Dr.A.Jhunjunwala, Dr.B.Ramamurthi
2.	G732 Compatible Mux with Drop & Insert Capability	1991-92	WSI, Bangalore	3.25	Dr.A.Jhunjunwala, Dr.B.Ramamurthi
3.	Operator Console for EPABX	1991-92	WSI, Bangalore	1.25	Dr.A.Jhunjunwala, Dr.B.Ramamurthi
4.	Portable Telephone Tester	1991-92	Telematics India Ltd.	0.75	Dr.A.Jhunjunwala, Dr.B.Ramamurthi
5.	Failsafe Signal Multiplexer System for Railways	1991-92	Crompton-Greaves Ltd.	5.50	Dr.A.Jhunjunwala, Dr.B.Ramamurthi

(c) Institute projects

Sl.No.	Title	Duration	Value (lakhs)	Coordinator(s)
1.	Library Computerization	1990-92	9.00	Dr.A.Jhunjunwala, Mr.M.N.Seetharaman
2.	Academic Records Computerization	1991-92	2.0	Dr.A.Jhunjunwala, Dr.A.Kuppurajulu

4.6.12 Honours and Awards

Sl.No.	Faculty	Honour/Award
1.	Dr. C.Siva Ram Murthy	Indian National Science Academy (INSA) Medal for Young Scientists for 1991.

4.6.13 Books

Name of faculty	Title	Publisher
B.Yegnanarayana, R.Ramaseshan and A.Ravichandran	Studies in Sensor Array Imaging	I.I.T. Madras, Nov. 1991

4.6.14 Research Publications

1. A. Mahamuni & T.A. Gonsalves, "Heuristic Load Sharing in Distributed Systems: Developments and Directions", Computer Science & Informatics, V.20, No.2, Dec. 90, pp. 15--27. [Issue was published in 1991.]
2. M.K. Ashok, V.V.R. Prasad, K.K. Sridharan, T.A. Gonsalves and A. Jhunjhunwala, "CLAM: Automation of a Large Academic Library", Proc. Indian Computing Congress '91, Hyderabad, India, Tata- McGraw Hill, Dec. 91, pp.455-463.
3. R. Mittal, B.N.Jain and R.K. Patney, "Link Augmented Binary (LAB) Tree: Its structure, Routing, Fault tolerant properties", Proceedings of the Fifth International Parallel Processing Symposium, April 30-May 2, 1991, Disneyland, California.
4. R. Mittal, B.N.Jain and R.K. Patney, "Subtree availability in Binary Tree Architectures", Proceedings of International Conference on Computing and Information (ICCI'91) Carleton University, Ottawa, Canada, May 27-29, 1991, Proceedings Published as Lecture Notes in Computer Science, Vol. 497, pp.312- 322.
5. S.Selvakumar and C. Siva Ram Murthy, "Static Task allocation for heterogeneous Distributed Computing Systems", in Proc. IEEE International Conference on Energy, Computer, Communication and Control Systems, New Delhi, August 28-30, 1991.
6. V.V.R. Prasad and C. Siva Ram Murthy, "Downloading Node programs/data into hypercubes", Parallel Computing, Vol. 17, pp.633-642, 1991.
7. S.Selvakumar and C. Siva Ram Murthy, "An efficient algorithm for mapping VLSI circuit simulation programmes onto multi- processors", Parallel Computing, Vol. 17, pp.1009-1016, 1991.
8. A. Datta, R. Srikant, and K.Krithivasan, "Fast sequential and parallel algorithms for finding the largest rectangle separating two sets" International Journal of Computer Mathematics, Vol. 37, 1991, pp.49-61.
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10. A. Datta and K.Krithivasan, "An efficient algorithm for the maximum empty rectangle problem in three dimensions", Proc. Third Canadian Conference on Computational Geometry, 1991.
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12. Srinivasa Rao Arikati, C.Pandurangan, G.K.Mancher, "Efficient reduction for path problems on Circular-Arc Graphs", BIT, Vol.31, pp.182-193, 1991.
13. A.Srinivasan, C.Pandurangan, "Efficient Algorithms for the minimum weighted dominating clique problem on permutation graphs", Theoretical Computer Science, Vol.91, pp.1-21, 19891.
14. R.Mahesh, C.Pandurangan, Arvind Srinivasan, "On finding the minimum bandwidth of interval graph", Information and Computation, Vol, 95, 218-225, 1991.
15. R.Ravi, C.Pandurangan, M.Marate, "An optimal algorithm to solve all pair shortest path problem on interval graphs", Networks, Vol.22, pp.22-23, 1992.
16. Ravio Sundaram, Karan Sher Sing, C.Pandurangan, "Tree width of a circular arc graph", WADS 91, Ottawa, Canada, Aug. 1991
17. A.Saoudi, M.Nivat, C.Pandurangan, Ravi Sundaram, GDS Ram Kumar, "A Parallel Algorithm for Recognising the schuffle of two strings", 6th International Parallel Processing Symposium, March 23-26, 1992.
18. P.Eswar, C.Chandrasekhar, and B.Yegnanarayana, Use of fuzzy mathematical concepts in character spotting for automatic recognition of continuous speech in Hindi", Journal on Fuzzy Sets and systems, Vol.46, No.1, pp.1-9, Feb. 1992.
19. G.V.Ramana Rao and B.Yegnanarayana, "Word boundary hopothesization in Hindi Speech", Computer Speech and Language, Vol.5, No.4, pp. 379-392, Dec. 1991.
20. B.Yegnanarayana and R.Sundar, "Signal Processing issues in realizing voice input to computers", Asia-Pacific Engineering Journal, Dec. 1991.
21. Hema A.Murthy and B.Yegnanarayana, "Format Extraction from group delay functions", Speech Communication, Vol.10, pp.209-221, Aug. 1991.
22. B.Yegnanarayana, S.Rajendran, S.R.Rajesh Kumar, V.R.Ramachandran and A.S.Madhukumar, "Knowledge sources for a text-to-speech system in Hindi", Proc. Regional Workshop on computer processing of Asian Languages, Kanpur pp.233-242, March 1992.
23. G.V.Ramana Rao, "Detection of word final vowels in speech using first formant energy", Proc. Regional Workshop on Computer Processing of Asian Languages, Kanpur pp.243-247, March 1992.

24. S.Raman and P.N.Sridharan, "The roles of world knowledge and belief systems in machine translation, Proc. UNESCO Regional Workshop on New Information Technologies - Machine Translation, NISTADS/NISSAT, New Delhi, pp.37-45, Dec. 1991.
25. Shriram Revankar and B.Yegnanarayana, "Machine Recognition and correction of freehand geometric line sketches", 1991 IEEE Int. Conf. on System, Man and Cybernetics, Virginia, pp.87-92, Oct.1991.
26. A.S.Madhukumar,S.Rajendran and B.Yegnanarayana, "Synthesizing intonation for Indian Languages", Proc. 1991 IEEE Region 10 Int. Conf. (TENCON 91)New Delhi, India, pp.224-228, Sept. 1991.
27. N.Venkata Subramanian, N.Alwar, G.Mallikarjuna, P.Prabhakar Rao and S.Raman, "Bidirectional machine translation in Indian languages, Proc. EUROSPEECH 91, Geneva, Italy, pp.1067-1070, Sept.1991.
28. A.S.Madhukumar, S.Rajendran, C.Chandrasekhar and B.Yegnanarayana, "Synthesizing intonation for speech in Hindi", Proc. EUROSPEECH 91, Geneva, Italy, pp.1153-1156, Sept. 1991.
29. A.S.Madhukumar, S.Rajendran, and B.Yegnanarayana, "Significance of prosodic knowledge in a text-to-speech system for Hindi", Proc. XII Int. Congress on Phonetic Sciences, Aix-en-Provence, France, pp.494-497, Aug. 1991.
30. B.Yegnanarayana, "Speech technology for man-machine communication through Indian languages", Proc. Discussion meeting on AI and Expert System Technologies in the Indian context, Bangalore, pp.43-52, Jul. 1991.
31. A.Ravichandran and B.Yegnanarayana, "A two stage neural network for translation, rotation and size-invariant visual pattern recognition", Proc. ICASSP-91, Toronto,pp.2392-2396, May 1991.
32. B.Yegnanarayana, Hema A.Murthy and V.R.Ramachandran, "Speech processing using modified group delay functions", Proc. ICASSP- 91, Toronto, pp.945-948, May 1991.

4.7 Electrical Engineering Department

4.7.1 Introduction

The Department is an integrated one encompassing both the areas of Electrical and Electronics Engineering. At present the department comprises of the following laboratories.

- * Communication Systems Laboratory
- * Electronic Circuits, Semiconductor Devices Laboratory
- * Aeronomy, Laser, Communications Laboratory
- * High Frequency Technology Laboratory
- * Television Engineering Laboratory
- * Control Engineering including Guidance, Thyristor control and Robotics Laboratory
- * Electrical Machines and Drives Laboratory
- * Measurements and Instrumentation Laboratory
- * High Voltage Engineering Laboratory
- * Power Systems Laboratory
- * Microprocessor and Digital Systems Laboratory.

B.Tech Degree Courses are offered in two Streams

1. B.Tech Degree in Electrical and Electronics Engineering with emphasis on power systems, machinery, control engineering and related subjects.
2. Electronics and Communication Engineering with emphasis on electronics, control engineering, communication systems and related topics.

M.Tech Degree in Electrical Engineering

Four major streams of study are available at M.tech level

- i) Communication Systems Engineering
- ii) Energy Systems Engineering
- iii) Integrated Electronic Circuits and Systems
- iv) Control, Guidance and Instrumentation Systems.

Areas of research for M.S. and Ph.D Degree in Electrical Engineering:

Electronic Circuits, Communication Systems, Digital Techniques and Computer Technology, Electro magnetic Interference and Compatability, Fibre Optic Communication, Image and Digital Signal Processing, Laser Communication, Microwave Engineering, Television Engineering, Semiconductor Devices, Control Engg., Electrical Machines and Drives, Guidance

Systems, High Voltage Engineering, Measurements and Instrumentation, Networks and Systems, Simulation of Power Electronic Systems, Power Systems, Photonics and Robotics.

4.7.2 New Courses Introduced

Course No.	Title	Structure	Faculty
EE 476	Introduction to Robotics	3 0 0 3	Dr.V.Seshadri
EC 208	Microprocessors and Microcomputers	3 1 0 4	Dr.S.Srinivasan, Dr.C.Eswaran
EE 319	Microprocessors Lab.	0 0 3 1	Mr.G.T.Manohar

4.7.3 Details of Faculty

Name of Faculty & Qualification	Area of Specialisation
Professors	
M.K.Achuthan, Ph.D(IIT Kharagpur)	Semiconductors, IC's
Ashok Jhunjhunwala, Ph.D(Mine)	Telematics
D.K.Banerjee, Ph.D(Benaras)	High Frequency Technology
M.V.Chalapathi Rao, Ph.D(IIT Madras)	Control Theory
C.Eswaran, Ph.D(IIT Madras)	Networks, Dig.Filters, Microprocessors
P.A.Janakiraman, Ph.D(IIT Madras)	Robotics, Control Systems, Instrumentation, Image Processing
A.Kuppurajulu, Ph.D(Moscow)	Power Systems, Computer Applications
M.Mukunda Rao, Ph.D(Andhra)	Lasers, Fibre Optics
V.G.K.Murti, Ph.D(Illinois)	Networks, Instrumentation
K.Narayana Bhat, Ph.D(IIT Madras)	Semiconductors Fabrication
Y.Narayana Rao, Dr.Ing.(Braunschweig)	High Voltage Engineering
K.Radhakrishna Rao, Ph.D(IIT Kanpur)[Head]	VLSI, Analog and Digital IC's
J.P.Raina, D.Sc.(Louvain)	Fibre Optics, Television
K.Ramar, Ph.D(IIT Madras)	Power Systems, Computer Applications
B.Ramaswami, Ph.D(IIT Madras)	Power Electronics, Control
P.Sankaran, Ph.D(IIT Madras)	Networks, Magnetic Materials
V.V.Sastry, Ph.D(IIT Kharagpur)	Machines, Power electronics, Simulation
V.Seshadri, Ph.D(IIT Madras)	Control Systems
G.Sridhara Rao, Ph.D(IIT Madras)	Machines, Power Electronics, Simulation
S.Srinivasan, Ph.D(IIT Madras)	Microprocessors, Computers
Vedam Subrahmanyam, Ph.D(IIT Madras)	Power electronics, Machines
V.Venkata Rao, Ph.D(Iowa)	Digital Filters, Communications
S.S.Yegnanarayanan, Ph.D(IIT Madras)	Machines, Simulation
Associate Professors	
C.Dattatreyan, Ph.D(Sheffield)	High Frequency Technology
R.Parimelalagan, Ph.D(Madras)	Power electronics
C.Venkatasashaiah, Ph.D(IIT Madras)	High Voltage, Power Systems
Assistant Professors	
M.Antony Reddy, Ph.D(IIT Madras)	Electronic Circuits
Bhaskar Ramamurthy, Ph.D(California)	Telematics, Communications
V.Jagdeesh Kumar, Ph.D(IIT Madras)	Measurements, Instrumentation
G.T.Manohar, M.Tech(IIT Madras)	Microprocessors, Computers, Control Systems
T.A.Ramalinga Bhat, Ph.D(IIT Madras)	Communications
P.Sasidhara Rao, Ph.D(IIT Madras)	Machines
T.J.Vitto, Ph.D(IIT Madras)	Semiconductors

Lecturers

4
G.Govardhanagiri Rao, M.Tech(IIT Madras)
M.Krishnamurthy, M.Tech(IIT Madras)
P.C.Majhee, M.Tech(IIT Madras)
Varadarajan Subrahmanyam, M.E.(IISc.)

Measurements
Power Systems
Measurements, Instrumentation
High Frequency Technology

Senior Design Engineer

P.Rama Seshagiri Rao, M.S.(IIT Madras)

Semiconductors Fabrication

4.7.4 Students on Roll

Course	I year		II year		III year		IV year		V year		Total	
	M	F	M	F	M	F	M	F	M	F	M	F
Ph.D	12	2	7	0	4	1	3	1	4	0	30	4
M.S.	10	1	3	1	4	0	5	1	3	1	25	4
M.Tech	-	-	38	6	-	-	-	-	-	-	38	6
B.Tech	-	-	-	-	65	3	64	1	-	-	129	4
Total	22	3	48	7	73	4	72	3	7	1	222	18

4.7.5 Number of Scholarships/Fellowship Holders

Course	Institute
Ph.D	34
M.S.	29
M.Tech	44
Total	107

4.7.6 No. of Degrees Awarded

Course	Number awarded
Ph.D	5
M.S.	4
M.Tech	31
B.Tech	65
Total	186

4.7.7 Instruments/Equipments Designed and Developed

1. Electronically Compensated Reference Current Transformer
2. Speech Recognition and Speech Output for Robots

4.7.8 New Facilities added and Major Equipments Procured

- * A New PC Laboratory is being created in ESB 119 with a large number of Personal Computers and Terminals for Siemens Main Frame Computer
- * High Pressure Oxidation System
- * LPCVD system for Doped and Undoped Polysilicon
- * Reactive Ion Etching System
- * Optical Fibre Sensors for Voltage and Current Measuring PC based Instrumentation Systems

4.7.9 Short term Courses/Workshops/Seminars/Symposia Conducted

Sl.No.	Course title	Duration	Co-ordinator
1.	Intensive Course in Control Theory for Bharat Electronics Engineers	Nov-Dec. 1991	Dr. P.A.Janakiraman and Dr. S.Srinivasan
2.	QIP Course on Power Systems Simulator as an Educational Tool	1-week May 1991	Dr. K.Ramar and Dr. A.Kuppurajulu
3.	QIP Course on Microwave Communications	9-20 Dec.1991	Dr. C.Dattatreyan
4.	Digital Modulation and Coding	Nov-Dec.1991	Dr.B.Ramamurti
5.	Technical Seminar on Diesel Engine Driven Generator Sets	Aug. 1991	Dr. S.S.Yegnanarayanan.

4.7.10 Short term Courses/ Workshops/Seminars/Conferences Attended by the Faculty

Sl.No.	Details of Course	Date	Faculty
1.	6th International Workshop on Physics of Semiconductor Devices, New Delhi	Dec. 1991	Dr. K.N.Bhat
2.	Motorola Workshop on DSP and Communication	Oct. 1991	Dr. S.Srinivasan
3.	International Conference on Advances in Power Systems Control, Operation and Management, Hong Kong	Nov.1991	Dr. K.Ramar

4.7.11 Invited Lectures Delivered by Faculty in Academic Institutions

Sl.No.	Title	Institution	Date	Faculty
1.	Power System Simulator	National University of Singapore	Nov 1991	Dr. K.Ramar
2.	P.S.S. for Testing and Training in EMC	University of Malaya	Nov 1991	Dr. K.Ramar
3.	Power System Simulator as an Educational Tool	Thiagarajar College of Engineering, Madurai	March 1991	Dr. K.Ramar
4.	Speech Coding	IETE Technical Symposium Bangalore	Aug 1991	Dr. B.Ramamurti
5.	Robotics and Applications	MIT, Madras	Feb 1991	Dr.P.A.Janakiraman
6.	Finite Elements Modelling in Electrical Engineering Commonwealth Awareness Workshop on Mathematical Modelling	Sponsored by CSIR (UK) Held in CLRI Madras		Dr.S.S.Yegnanarayanan

4.7.12 Visits Abroad

S.No.	Country Visited	Date	Faculty
1.	Short term Research Visit to Canada	May-July 1991	Dr. C.Eswaran
2.	Visited Asian Institute of Technology, Univ.of Singapore and Univ. of Malaysia.	Nov-1991	Dr. K.Ramar

4.7.13 Distinguished Visitors and Lectures Delivered

Sl.No.	Name	Affiliation	Purpose of visit
1.	Dr.L.L.Rai	Director, Power and Energy systems, City University, London	An Integrated EMS/SCADA for Control of Distributed Networks. The Future of Information Engg in Power Engg., Chaotic Phenomena in Power Systems, Effect of Harmonics on Power System Protection
2.	Dr. P.N.Choudry	Pro-term Chairman	IEEE Laser and Electro- optics, Metropolitan Area Networks, Photonic Switching, Echo Cancellation in Telephone Networks
3.	Prof.J.Misiewicz	Technical University, Poland	Growth of Ordered Semiconductor Structures by Pulsed Laser Evaporation and Epitaxy
4.	Dr. V.Narasimham	Control Data Corporation, USA	State Estimation in Power Systems
5.	Prof.P.Bhattacharya	Solid State Electronics Lab. University of Michigan USA	Applications of Strained Heterostructures to Opto electronic Devices
6.	Dr.Vijay Iyengar	IBM Thomas Watson Research Center, USA	Delay Fault Testing for Digital IC's
7.	Dr.M.Govindarajan	University of Southern California, USA	InGaAs/InP Photo receivers for Fibre Optics
8.	Dr.Ramu Ramanathan	Ferranti Intl.Controls Corp. USA	The State of the art in Energy Management Systems
9.	Mr. S.Raghupathy Deputy Director	Energy Audit, UNDP	Energy Bus Project, Energy Conservation
10.	Prof.S.S.Venkata	Univ. of Washington, USA	A.I. Applications to Power Systems Protection

4.7.14 Sponsored Projects

Sl.No.	Title	Duration	Funding Agency	Amount	Co-ordinator(s)
1.	LPCVD Polysilicon MOSFET Technology for 3-D Integration	4 Yrs	DOE	45.0	K.N.Bhat, P.R.S.Rao, K.Gopinath
2.	TDMA Phase II	90-91	CDOT	23.0	A.Jhunjunwala, B.Ramamurti
3.	Telematics-II	91-93	HRD	15.0	A.Jhunjunwala, B.Ramamurti
4.	Foundation of Mathematics	91-94	DST	5.34	A.Jhunjunwala, B.Ramamurti
5.	Development of Optical Couplers	86-91	ARDB	46.8	J.P.Raina
6.	Development of a Compatible Digital Fibre Optic Communication Data Bus for Strategic Aircraft	87-91	ARDB	37.86	J.P.Raina
7.	Development of Fibre Optic Sensor	88-91	HRD	10.0	J.P.Raina

8.	Design Development Fabrication of High Resolution of B & W and CCD Cameras with auto Iris Control	91-	HRD	1.10	J.P.Raina
9.	Parallel Implementation for Real Time Image Processing using DSP's	91-92	IRDF	-	S.Srinivasan & B.Yegnanarayana
10.	Reswitching Transients and their Effects on the Design of Large HT Motors for Thermal Power Plant Auxiliaries	88-91	CBIP	5.5	S.S.Yegnanarayanan, G.S.Rao, C.Venkateshiah

3.7.15 Major Consultancy Assignments

Sl.No.	Title	Sponsor	Amount	Co-ordinator(s)
1.	Feasibility Report on Development of Electronic Thermometer	Ponds India Ltd.	3000.00	Dr.S.Srinivasan, Dr.C.Eswaran, Mr.M.Kumaravel
2.	Feasibility Studies of PECVD Nitride for Anti reflection Coating for Solar Cells	BHEL Hyderabad	150000.00	K.N.Bhat
3.	MRL Power Systems Expansion Studies	Madras Refineries Ltd.	50000.00	Dr. A.Kuppurajulu, Dr. K.Ramar
4.	PSS for Testing Load Despatch Center Hardware	CMC Ltd	200000.00	Dr. A.Kuppurajulu, Dr. K.Ramar
5.	Wireless Multiaccess Messaging System Intelligent Comm.	Equipment Pvt Ltd.	260000.00	Dr.A.Jhunjunwala
6.	Development of Drop and Insert PCM	ITI Naini	250000.00	Dr.A.Jhunjunwala, Dr B.Ramamurthy
7.	Telephone Sharing Systems Innovation	Comm. System, Hyderabad	140000.00	Dr.B.Ramamurthy, Dr. A.Jhunjunwala
8.	Development of Digital Communication Educator Kit	Universal Instruments	75,000.00	Dr.B.Ramamurthy, Dr. A.Jhunjunwala
9.	Fibre Optic Double Ring Telemetry System	Instrumentation Ltd. Kota	550000.00	Dr.B.Ramamurthy, Dr. A.Jhunjunwala, Dr.Timothy Gonsalves
10.	G732 Compatible Mux with Drop and Insert Capability	W.S.Industries	325000.00	Dr.B.Ramamurthy, Dr. A.Jhunjunwala, Dr.Timothy Gonsalves
11.	Operator Console for EPABX	W.S.Industries	125000.00	Dr. T. Gonsalves, Dr. A.Jhunjunwala, Dr.B.Ramamurthy
12.	Portable Telephone Tester	Telematics Systems Ltd	75000.00	Dr.B.Ramamurthy, Dr. A.Jhunjunwala, Dr.T.Gonsalves
13.	Failsafe Signal Multiplexer System for Railways	Crompton Greaves	550000.00	Dr. A.Jhunjunwala, Dr.B.Ramamurthy, Dr. T.Gonsalves
14.	Ferroresonant Voltage Stabilizers	Consolidated Control Ltd.	8000.00	Dr. S.S.Yegnanarayanan Dr. G.S.Rao
15.	Rotating Rare Earth Permanent Magnetic Excited 3-phase 2-pole Alternator		85000.00	Dr.S.S.Yegnanarayanan, Dr. G.S.Rao

4.7.16 Honours and Awards

Dr.V.G.K.Murthy was elected as Fellow of Indian National Academy of Engineering.

4.7.17 Books

Sl.No.	Title of Book	Faculty
1.	Robotics and Image Processing (Under Review)	Dr.P.A.Janakiraman.

4.18 Research Publications

1. S.Srinivasan, A. Singh and S.S.Gill, Two Dimensional Addressing Scheme for Digital Signal Processors. Electronic Letters, Vol. 27, No. 28, PP 677-679, April, 1991.
2. C.Eswaran, An Integral Coefficient Bandpass Filter for ECG, Journal of Med. and Biological Engg and Computing, Vol. 29, pp. 333-336, May 1991.
3. C.Mallikarjun and K.N.Bhat, Analytical Expressions for Subthreshold Charges and Currents in Thin-film SOI MOSFETs, Electronic Letters (UK) Vol.27, No..5, pp.431-433, Feb, 1991.
4. C.B. Gaud and K.N. Bhat, Two-dimensional Analysis and Design Considerations of High Voltage Planar Junctions Equipped with Field Plate and Guard Ring, IEEE Trans. on Electron Devices (USA) Vol.38, No..6, pp.1497-1504, June 1991.
5. S.Karmalkar and K.N.Bhat, The Remote base Transistor Biasing Scheme of the Thyristor for Three Terminal Measurement of the Base Parameters, Solid State Electronics (UK) Vol.34 No..6 pp 613- 615, June 1991.
6. S.Karmalkar and K.N.Bhat, The Shifted Rectangle Approximation of Symplifying the Analysis of Ion Implanted MOSFETS and MESFETS, Solid State Electronics, (UK), Vol.34, No.7 pp.681-692, July 1991.
7. C.Mallikarjun and K.N.Bhat, A Rigorous Numerical Model for Drain Currents of SOI MOSFETs, NASECODE-VII, Copper Mountain Colorado (USA) April, 1991.
8. C.B.Goud and K.N.Bhat, Modelling and Optimisation of Semi Insulator Passivated High Voltage Field Plate Devices, Workshop on Physics of Semiconductor Devices, New Delhi, pp.631-632, Dec. 1991
9. H.O.Modi, V.Jagdeesh Kumar and P.Sankaran, Feed back Compensated Synchronous and multiplexer type PSD's IEEE Trans. on Instrumentation and Measurement, Vol.40 No.3, June 1991, pp.646- 49.
10. H.O.Modi, V.Jagdeesh Kumar and P.Sankaran, Signal Recovery Techniques in Optical Fibre Current Sensors, Proceedings of International Conference on I & M Singapore, Jan 1991.

11. H.O.Modi, V.Jagdeesh Kumar and P.Sankaran, Successive Subtraction Type ADC's. Proceedings of International Conference on I & M Singapore, Jan 1991.
12. H.O.Modi, V.Jagdeesh Kumar and P.Sankaran, Microprocessor based IEEE-488 Protocol, Proceedings of International Conference on I & M Singapore, Jan 1991,
13. K.Ramar and A.Kuppurajulu, Pole Assignment for Multi-input Multi- output Systems using Output Feed Back, Automatica, Vol. 27, 1991,
14. S.Velusamy and K.Ramar, Design of Observer based Load Frequency Controller for Interconnected Power Systems, Intl. Journal of Energy Systems, 1991.
15. A.Kuppurajulu and K.Ramar, Pole Assignment using Proportional plus Derivative Output Feed back, IETE Review, Vol.8,1991.
16. K.Ramar and A.Srinivas, Design of SVC Stabilisers for Multi machine Power Systems, International Conference on Advances in Power Systems, Control and Management, Hong Kong, Nov, 1991.
17. S.Vadivel, G.Bhuvaneswari and G.S.Rao, Unified Approach to Real-time Implementation of Microprocessor based BWM Waveforms.
18. T. Nagabhusan Rao and B.Ramamurti, Fully Digital Burst Modem, Journal of IETE, Vol.36, pp.397-405, 1990.
19. J.Jegannathan and B.Ramamurti, An FFT based Algorithm for Reconstructing Inhomogeneous Circular Cylindrical Shells from Noisy Data, Sadhana, Vol.15,pp 235-247,1990.
20. Sumam.S.David and B.Ramamurti, Multiband Excited Linear predictive Coder with a two sided short-term Predictor, Signal Processing, Vol. 25,pp 69-80, 1991.
21. Sumam S. David and B.Ramamurti, Two Sided Filter for Frame Base Prediction, IEEE Trans on Signal Processing, Vol. 39, pp 789- 794, April 1991
22. P.A.Janakiraman and K.V.Ranga Rao, On line Identification Scheme via Modified Response Error Method, Presented in an International Conference, USA.
23. C.Venkataseshaiah and D.V.S.S.Siva, Evaluation of Impulse Voltage Generator Characteristics using a PC, International Symposium on High Voltage Engg., (ISH)92, Dresden, Germany, Aug 1992.
24. S.S.Yegnanarayanan, C.Venkataseshaiah and D.V.S.S.Siva, A Method for Predicting the Maximum Possible Switching on Over Voltages in 3-phase HT Induction Motors International Conference on Electrical Rotating Machines, Paper No:IB-5, Jan. 1992.
25. S.S.Yegnanarayanan, C.Venkataseshaiah, G.S.Rao, and D.V.V.S.Siva, Comparison of Different Methods of Estimation of Surge Impedance of a 3-Phase HT Induction Motor, Ibid Paper No: IIB-61.

4.8 Humanities and Social Sciences Department

4.8.1 Introduction

The Department of Humanities and Social Sciences was established in 1959. Ph.D., M.S., and M.Tech. programmes are being offered. The major areas of teaching and research of the Department are:

- a. Undergraduate courses in Humanities and Social Sciences.
- b. M.Tech. courses in Industrial Management
- c. M.S. and Ph.D. courses in Operations and Manufacturing Systems Management, Materials Management, Reliability Engineering, Financial Management and Business Policy & Strategy, Organisational Behaviour, Personnel Management and Industrial Relations, Applied Decision Analysis, Operations Research, Systems Analysis and Modelling, Forecasting Methods, Science and Technology Policy Studies.

German Literature, New Literature in English, Applied Economics, Applied Econometrics, Modern Indian History, Socio Economic Cultural Developments, Industrial and Social Psychology, Linguistics and Teaching of English as a Second Language. (T.E.S.L)

4.8.2 New Courses Introduced

The following new courses were introduced during the period under report.

Sl.No.	Course No.	Title	Structure	Faculty
1.	HS 741	Management of Finance, Marketing and Personnel	3 0 0 3	Dr.L V L N. Sharma Dr. R.N. Anantharaman S. Jayachandran
2.	HS 834	A Critical Analysis of American Fiction	3 0 0 3	Dr.(Mrs) Elizabeth Nainan Kurian
3.	HS 838	Psycholinguistics	3 0 0 3	Dr.R.N. Anantharaman Dr.S.C. Chaudhary

4.8.3 Details of Faculty

Name & Qualification

Major areas of Specialisation

Professors

S.Ambirajan, Ph.D(Andhra) Ph.D.(Manchester)
Dipak Chaudhuri, Ph.D(IIT Kharagpur)[Head]

Economic History, Development Economics
Reliability Engineering, Operations Research,
Production & Materials Management, Maintenance
Management

A.V.Krishna Rao, Ph.D(Andhra)

Effective Communication in English Technical
Reports, Indian Writing in English

R.Rajagopalan, Ph.D(IIT Kanpur)

Production Management, Group Technology,
Science and Technology Policy
Financial Management, Business Policy, Corporate
Strategies

L.V.L.N.Sarma, Ph.D(IISc)

Associate Professors

T.T.Narendran, Ph.D(IIT Madras)
C.Ramachandran, Ph.D(IIT Madras)

Industrial Management
Modern Indian History, Labour History

Assistant Professors

R.N.Anantharaman, Ph.D(Bangalore)
S.C.Chaudhary, Ph.D(CIEFL Hyderabad)

Organisational and Consumer Behaviour
Theoretical Linguistics, ELT & Need Based
Courses in English

(Mrs.)Elizabeth Nainan Kurian, Ph.D.(IIT, Madras)
(Ms)Evangeline Manickam, Ph.D(Madras)
L.S.Ganesh, Ph.D(IIT Madras)

American Fiction
English
Technology Forecasting, Applied Systems Analysis
and Project Management

T.J.Kamalanabhan, Ph.D(Madras)
V.S.Kumar, M.A.(Madras)
(Mrs)R.Malathy, Ph.D(Madras)

Industrial Psychology, Organisational Behaviour
English

V.R.Muraleedharan, Ph.D(IIT Madras)
C.Rajendran, Ph.D(IIT Madras)
B.Subramanian, Ph.D(Karnataka)
D.Veeraraghavan, Ph.D(IIT Madras)

Applied Econometrics, Labour Economics,
Economics of Science and Technology
Health Economics
Production Management and Computer Simulation
English and German
Social and Economic History, Labour Movements.

Lecturers

M.Durgaprasada Rao, M.B.A(Andhra)
S.Mohan, M.A.(Madras)
G.Srinivasan, Ph.D(IIT Madras)

Management Accounts, General Management
English
Group Technology, Production Management,
Operations Research

Visiting Faculty

(Mrs.) Birgit Schindler
(Mrs.) Irina Elina

German Language Teaching
Russian Language Teaching

Senior Scientific Officer Gr.II

S.Jayachandran, M.B.A.(Madras)

Marketing Management

4.8.4 Students on Roll

Programme	I Year		II Year		III Year		IV Year		V Year		Total		
	M	W	M	W	M	W	M	W	M	W	M	W	Total
Ph.D	4	3	4	1	2	2	3	-	2	-	15	6	21
M.S.	2	-	-	2	2	-	-	-	-	-	4	2	6
M.Tech	45	2	-	-	-	-	-	-	-	-	45	2	47
Total	51	5	4	3	4	2	3	-	2	-	64	10	74

4.8.5 Number of Scholarships/Fellowships holders

Programme	Institute	Number CSIR	Others	Total
Ph.D	16	-	-	16
M.S.	6	-	-	6
M.Tech	40	1 (Sponsor)	6 (QIP)	47
Total	62	1	6	69

4.8.6 Number of Degrees Awarded

Programme	Number
Ph.D	8
M.S.	2
M.Tech	24
Total	34

4.8.7 New Facilities added and Major Equipment procured

Modernisation of Industrial Engineering Laboratory ZENITH SUPERLAN SYSTEM comprising

1.	FILE SERVER	486 CPU @ 25 MHZ	1 No
2.	NODE TYPE I	80386 CPU @40 MHZ with VGA Monitor	1 No
3.	NODE TYPE II	80386 CPU @25 MHZ with 4 MB RAM	2 Nos
4.	NODE TYPE III	80386 CPU @25 MHZ with 3 MB RAM	6 Nos
	Total Value		Rs.11,36,480.00

Modernisation of Psychology Laboratory

1.	PC/AT	80286 @16 MHZ with EGA Monitor	1 No
	Total Value		Rs.62,500.00

4.8.8 Short-term Courses/Workshops/Seminars/Symposia/Conferences organised

Sl.No.	Co-ordinator(s)	Title of Course/ Workshop/ Seminar/ Symposia/Conf.	Period
1.	Dr R.N. Anantharaman	Workshop on Management for Administrative Staff of IIT, Madras	Nov. 1991
2.	Dr S.C. Chaudhary & Mr.S.Mohan	Workshop on Spoken Communication	May 1991
3.	Dr T.T. Narendran	Winter School on Operations Research Applications to Manufacturing Management	Dec. 1991
4.	Dr S.C. Chaudhary	Workshop on Spoken Communication	Mar. 1992
5.	Dr A.V. Krishna Rao	Protest in Literatures in English at IIT Madras	Mar. 1992

4.8.9 Short term Courses/Workshops/Seminars/Symposia/Conferences/Training attended by the Faculty In recognised Academic Institutions and Public Sectors

Sl.No.	Name of Faculty	Title	Period
1.	Dr.A.V. Krishna Rao	"Australian Literature", Ethiraj College, Madras	July, 1991
		"Fiction in English", Meenakshi College, Madras	Aug, 1991
		"Folk Dance", Ethiraj College, Madras	Oct. 1991
		"Impact of Progress on Mankind", Stella Maris College, Madras	Feb. 1992
		"Indian Fiction in English", Loyola College, Madras	Feb. 1992
		"Communication for Persuasion", CCE, IIT Madras, Sponsored Workshop on Personality Development	Mar. 1992
2.	Dr. S.C. Chaudhary	"Reducing Barriers of Communication Across Indian Languages" Conference on A.I & E.S Technologies in Indian Context, Bangalore	July 1991
3.	Dr.(Mrs.) R. Malathy	"Fertility & Woman's Labour Force Participation in Urban Tamil Nadu" India	-
		"Micro Economic Workshop on Labour and Population" Yale University, U.S.A.	July 1991
4.	Dr G. Srinivasan & Mr. K.Srinivasan	"A Vehicle Routing Based Algorithm for Machine Part Grouping Problem in Group Technology" 24th Convention of Operations Research	Dec. 1991

4.8.10 Invited Lectures Delivered by the Faculty In Academic Institutions / Public Bodies

Sl.No.	Name of the Faculty	Topic of the Lecture	Delivered at	Date
1.	Dr R.N. Anantharaman	Interpersonal Skills	Indian Airlines, Madras	21.1.91
		Psychological Factors in accidents	Regional Labour Institute, Madras	6.2.91
		Motivation	NLC, Neyveli	25.2.91
		Psychology of Aging	Anna Institute of Management	12.6.91
2.	Dr A.V. Krishna Rao	Indian Fiction in English	Mother Teresa Univeristy	9.4.91
3.	Dr L.S. Ganesh	Systems Engineering	M/s Sundaram Fasteners	May 1991
		Technology Forecasting	SJCE, STEP, Mysore	May 1991

4.8.11 Sponsored Projects

Title	Period	Funding Agency	Amount (Rs. in lakhs)	Co-ordinator(s)
Reliability Engineering	1989-	MHRD	10.00	Dr. Dipak Chaudhuri
Basic Business	April 91	ISTE	0.15	Mr V.S. Kumar Dr. S.C.Chaudhary
Effective Presentations	May 91	ISTE	0.15	Dr. S.C.Chaudhary Dr.(Mrs).Elizebeth Nainan Kurian

4.8.12 Major Consultancy Assignments

Title	Organisation	Amount	Co-ordinator(s)
Development of a Decision Support System for Career Management	M/s.Bharat Dynamics Ltd.	1.414 Lakhs	Dr T.T.Narendran Dr L.S. Ganesh

4.8.13 Honours and Awards

Name of Faculty	Honours/Awards
Dr Dipak Chaudhuri	Listed in the Directory of Speakers of Institute of Industrial Engineers, U.S.A. First Council Member of Asia Pacific Society of Industrial Automation, Hong Kong. Senior Member of The Institute of Industrial Engineers, U.S.A.
Dr L.V.L.N. Sarma	Nominated by the Ministry of Finance, Govt of India, New Delhi as Public Representative on the Board of Directors, Madras Stock Exchange Ltd., Madras. Editorial Advisor, "Business Spectrum" Quarterly Journal of Indian Centre for Business Research, Madras.
Dr R. Malathy	Post-Doctoral Fellowship, Rockefeller Foundation, Mar-July 1991.

4.8.14 Books

Name of Title	Title	Publisher
Dr.(Mrs.) Elizabeth Nainan Kurian	A Religious Response To The Existential Dilemma in The Fiction of J.D. Salinger"	Intellectual Publishing Co., New Delhi
Dr.(Mrs.) R. Malathy	Chapter titled "Women's Schooling and Time Allocation" Theory and Empirical Evidence	Himalaya Publishing House
Dr.(Mrs.) R. Malathy Dr P. Duraisamy	Monograph on Educational Investments and Returns of Scientific and Technical Manpower in India	-

4.8.15 Research Publications

1. V. Jayabalan and Dipak Chaudhuri , "Sequential Imperfect Preventive Maintenance Policies for Reliable System", Vol.20, No.6, June, 1991 p16-21: Industrial Engineering.
2. Dr.(Mrs.) R. Malathy, "Estimating Substitution and Income of Female Labour Supply", Journal of Quantitative Economies, Vol.7, No.1, 1991.
3. Dr C. Ramachandran and Dr A. Thankappan, "National Politics and Working Class Movement in Madras", Indo-British Review, A Journal of History, Vol.XVIII, No.1, Jan, 1992.
4. Shyam Kumar and Dr C. Rajendran, "A Simulation Approach to Capacity Planning in Auto-Electrical Ancillary Unit", Modelling, Simulation and Control, Vol.28, No.4, 1991.

5. Dr G. Srinivasan and Dr T.T. Narendran "Graphics : A Non- hierarchical Clustering Algorithm for Group Technology" International Journal of Production Research, Vol.29, 1991.
6. Dr S.C. Chaudhary "An Explanation of Simplification in Pidgeons" Indian Linguistics, Vol.50, Dec, 1991.
7. Dr A.V. Krishna Rao "Structure and Symbolism in Paul Scott's Raj Quartet", Explorer, Vol.II, July 1991, Ed by R.A. Singh & N.K. Lal, Sasaram, Bihar.

4.8.16 Any other Relevant Details

The Department had 1 Scientific Officer, 3 non-teaching technical and 8 non-teaching non-technical staff.

4.9 Mathematics Department

4.9.1 Introduction

The department of Mathematics was established in 1959. Now Ph.D., M.Sc programmes in Mathematics (pure and applied) are offered. In addition, the department gives courses in Mathematics to the students of B.Tech, M.Tech and Ph.D students of sister departments. The major areas of teaching and research of the department are:

1. Continuum Mechanics
2. Stochastic processes and their applications
3. Graph Theory
4. Cosmology
5. Operation Research
6. Functional Analysis
7. Mathematical modelling
8. Approximation theory
9. Theoretical Physics and Particle Physics
10. Application of Algebras.

4.9.2 Details of Faculty

Name & Qualification

Major area of Specialisation

Professors

P. Achuthan, Ph.D(IIT Madras)

Approximation Theory, Optimization methods, Mathematical models, Mathematics in Industry, Nonlinear problem techniques and application to practical problems in industries, Society, Organisation, Theoretical Physics
Fluid mechanics, Suspension Rheology, Polar fluids.
Complex analysis, Theory of Splines, Lacunary interpolation, Approximation theory
Theory of relativity, Brans-Dicke theory, Cosmology, the Early Universe, the interface of cosmology, high energy Physics, Astronomy and Astro Physics, the Physical, Chemical and Biological evolution of the universe

A. Avudainayagam, Ph.D(IIT Madras)

P. Bhattacharyya, Ph.D(London)

V.B.Johri, Ph.D(Gorakhpur)

(Mrs) S.Kalpakam, Ph.D (IIT Madras)

S.N. Majhi, Ph.D(IIT Madras)

P.R.Parthasarathy, Ph.D(Annamalai)

K.R.Parthasarathy, Ph.D(IIT Kharagpur)

H.S.Paul, Ph.D(Kharagpur)

L.V.K.V.Sarma, Ph.D(Kharagpur)

Applied Probability and Stochastic Processes, Operations research
Fluid mechanics, Bio-fluid mechanics, Mathematical modelling
Applied probability and Stochastic models, Mathematical ecology, Operations research, Statistical inference
Graph theory, Network
Electricity, Piezoelectricity, Pyroelectricity, Maganeto-thermo electricity, Wave probagation, Biomedical engineering
Continuum mechanics with particular reference to problems involving gas dynamics, Nonlinear waves, Solitons

U.N.Srivastava, Ph.D(IIT Madras) [Head]

Applied mathematics, Differential equations, Continuum mechanics, Parameter Identification, Singular Perturbation Problems, Boundary Layer theory, Differential inequalities, Mathematical ecology, Dynamical systems

V.Subba Rao, Ph.D(IIT Kharagpur)

Numerical Analysis, Approximation theory, Computational fluid dynamics

R.Subramanian, Ph.D(IIT Madras)

Applied probability, Stochastic processes, Operations research

Associate Professors

C.M.Purushotham, Ph.D(IIT Kharagpur)

Hydrodynamic stability and wave propagation problems, Magneto hydrodynamics, Dust gas dynamics

S.N.Venkataraman, Ph.D(IIT Madras)

Fluid mechanics, Variational Methods, Dual variational principles

Assistant Professors

S.G.Kamath, Ph.D(Delhi)

S.H.Kulkarni, Ph.D(IIT Bombay)

Y.Nagendra, Ph.D(IIT Kharagpur)

Theoretical Physics, Elementary particle Physics
Functional analysis and Numerical analysis
Statistical quality control, Statistical methods and analysis, Identifying the factor(s) responsible for the poor (or good) quality items, Analysis of variance response surface analysis (to find the optimal factor combination)

C.V.Raghava Rao, Ph.D(IIT Madras)

Fluid mechanics, Numerical methods in fluid mechanics

A.Rangan, Ph.D(IIT Madras)

Probability theory, Stochastic processes, Operations research, Application to biological Sciences, Rural models,

D.S.Subramaniam, Ph.D(IIT Madras)

Inventory controls, Ecology, Reliability
Differential equations, Stability of motion, Functional and Differential equations, Applications to control systems

P.V.Subramanyam, Ph.D(IIT Madras)

(Mrs) W.B.Vasantha, Ph.D(Madras)

Fixed point theory and applications
Group theory, Ring theory, Group rings, Lattice theory, Semi groups, Coding theory, Application of Algebra

P.Veeramani, Ph.D(IIT Bombay)

Fixed point theorems and their applications to problems in Optimization and best approximation.

Senior Scientific Officer

K.Swaminathan, Ph.D(Agra)

Fluid dynamics, Ship-hydrodynamics, Mathematics problems related to naval Architecture and Ocean engineering, System simulation and development of software for control systems, Explosion generated shock waves applied to naval ships.

4.9.3 Students on roll

Programme	I Year		II Year		III Year		IV Year		V year		Total
	M	W	M	W	M	W	M	W	M	W	
Ph.D	7	2	6	2	3	3	2	2	2	-	29
M.Sc	11	15	4	16	-	-	-	-	-	-	46
M.Tech	125	-	-	-	-	-	-	-	-	-	125
B.Tech	250	-	250	-	-	-	-	-	-	-	500
Total	393	17	260	18	3	3	2	2	2	-	700

4.9.4 Number of Scholarship/Fellowship holders

Programme	Institute	CSIR	Others	Total
Ph.D	22	7	-	29

4.9.5 Number of Degree awarded

Programme	Number
Ph.D	5
M.Sc.	22
Total	27

4.9.6 Short term Courses, Workhops, Seminars, Conferences Organised

S.No.	Title	Date	Coordinator(s)
1.	A one day symposium of "Stochastic Processes and their applications" in honour of Prof.S.K.Srinivasan, IIT Madras	June 25 1991	Dr.R.Subramanian.
2.	A one-day symposium on Advances in Mathematics	Dec. 1991	Dr. S.H.Kulkarni
3.	An intercollegiate meet "FORAYS"	2 days in Feb. 1992	Dr.S.H.Kulkarni

4.9.7 Lectures delivered

S.No.	Title	Venue	Date	Faculty
1.	Lectures on Probability, Binomials, Exponentials and logarithmic series and other mathematical topics to the P.G. Maths Teachers	Kendriya Vidyalaya IIT Madras	May 1992	Teaching faculty of Mathematics Department
2.	Stochastic Modelling; ideas and Techniques at the XII Annual conference of the Indian Society for probability and Statistics	University of Science and Technology, Cochin	09-12 Dec. 1991	Dr.R.Subramanian
3.	"Desicion theory in a seminar on Operations Research	Meenakshi College for Women, Madras	24.09.91	Dr.R.Subramanian

4.9.8 Books

Name of faculty	Title	Publisher
S.H.Kulkarni & B.V. Limaye	Real functional Algebras	Marcel Deckker Inc., New York. Aug 1992.
R.Subramanian Editor along with Prof.Bechman & Prof.Gopalan	Proceedings of Symposium on Stochastic processes and application	Springer Verlag 1991

4.9.9 Research Publications

1. V.Subba Rao and Yousef.H.Zharan, A finite difference method for hyperbolic equations, JMPS, 25, 1991, 331-341.
2. V.Subba Rao and G.Latha, A slope modification method for shallow rate equations. Int.J.Num.Methods in Fluids, 14, 1992, 189-196.
3. S.H.Kulkarni and S.Arundhathi, Isometrics of real function algebras, Ann. Soc. Math. Polan. Conam. Math., 30 1991, 343-356.
4. R.Subramanian and N.Ravichandran, Correlation functions in reliability theory in stochastic processes and applications, Proceedings of Symposium, Springer-Verlag 1991, 282-292.
5. S.Kalpakam and G.Arivaringan, A lost sales inventory system with multiple reorders. Proc. Symposium on Stochastic processes and applications (Eds) M.S.Beckmann et.al, Springer-verlag, 1991, 241-252.
6. S.Kalpakam and K.P.Sapna, On control of production rates of inventory systems, JMPS, 25 (1991).

4.10 Mechanical Engineering Department

4.10.1 Introduction

The Department of Mechanical Engineering was established in 1959. Ph.D., M.S., M.Tech., and B.Tech. programmes are being offered. The major areas of teaching and research of the Department are :

- * Heat Transfer and Thermal Power
- * Hydro Turbo Machines
- * I.C. Engines
- * Machine Elements
- * Manufacturing Engineering
- * Mechanical Handling
- * Precision Engineering & Instrumentation
- * Refrigeration and Airconditioning
- * Thermal Turbo Machines
- * Thermodynamics & Combustion Engineering

4.10.2 New Courses Introduced

The following new courses were introduced during the period under report:

Sl.No.	Course No.	Title	Structure	Faculty
1.	ME 636	Climatology II (Modified)	3 0 0 3	Dr.Prakash M.Maiya
2.	ME 760	Special HVAC Applications	3 0 0 3	Dr.Prakash M.Maiya
3.	ME 743	Introduction to Fracture Mechanics	3 0 0 3	Dr.R.Krishnakumar
4.	ME 744	Metrology Computer Aided Inspection	3 0 0 3	
5.	ME 745	Metal Removal Processes	3 0 0 3	
6.	ME 746	Production System Design & Control	3 0 0 3	
7.	ME 747	Advanced Materials and their Processing	3 0 0 3	Faculty of Manufacturing Engineering Section
8.	ME 748	Tooling for Manufacturing and Automation	3 0 0 3	
9.	ME 751	Microprocessors and Computers for Integrated Mfg., Systems	3 0 0 3	
10.	ME 753	Computer Aided Design for Manufacturing	3 0 0 3	
11.	ME 754	Flexible Manufacturing Systems	3 0 0 3	
12.	ME 755	Computer Numerical Control in Manufacturing	3 0 0 3	
13.	ME 756	Computer Networking and Standards in Computer Integrated Manufacturing	3 0 0 3	
14.	ME 759	Computational Methods in Design and Manufacture	3 0 0 3	
15.	ME 761	Sensors for Intelligent Manufacturing & Condition Monitoring	3 0 0 3	Faculty of Manufacturing Engineering Section
16.	ME 762	Advanced Machine Tool Design	3 0 0 3	
17.	ME 767	Expert Systems in Manufacturing	3 0 0 3	
18.	ME 769	Machine Vision and its Applications	3 0 0 3	

4.10.3 Details of Faculty

Name and Qualification

Major area of Specialisation

Professors

K.A.Bhaskaran, Ph.D(IIT Madras)
 V.Ganesan, Ph.D(IIT Madras)
 K.V.Gopalakrishnan, Ph.D(IIT Madras)
 K.Gopinath, Ph.D(IIT Madras)
 O.V.Krishnaiah Chetty, Ph.D(IIT Madras)
 R.Krishnamurthy, Ph.D(IIT Madras)
 V.M.Krishna Sastri, Ph.D(Delaware)
 K.Lakshminarayana, Ph.D(IIT Madras)
 M.Madhusudana Rao, Ph.D(IIT Madras)
 B.Nagalingam, Ph.D(IIT Madras)
 T.Nagarajan, Ph.D(IIT Madras)
 R.Natarajan, Ph.D(Waterloo)
 M.A.Parameswaran, Ph.D(IIT Madras)
 P.K.Philip, Ph.D(IIT Madras)
 D.Prithvi Raj, Ph.D(Liverpool)
 H.C.Radha Krishna, Ph.D(IIT Kanpur)
 V.Radhakrishnan, Ph.D(IIT Madras)
 R.Raman, Ph.D(IIT Madras)
 A.Ramamohana Rao, Ph.D(IIT Madras)
 K.N.Seetharamu, Ph.D(IIT Madras)
 M.S.Shunmugam, Ph.D(IIT Madras)
 V.Sriramulu, Ph.D(IIT Madras)
 S.Srinivasa Murthy, Ph.D(IIT Madras)
 M.A.Veluswami, Ph.D(MIT USA)
 N.Venkatrayulu, Ph.D(IIT Madras)
 A.Venkatesh, Ph.D(IIT Madras)
 S.P.Venkateshan, Ph.D(IISc.)
 Vijay R. Raghavan, Ph.D(IIT Madras)

Combustion and Propulsion
 I.C.Engines
 I.C. Engines
 Machine Design
 Manufacturing Engineering
 Metal Cutting, Gear Tribology
 Energy, Heat Transfer
 Machine Design
 Mechanical Handling
 I. C. Engines
 Precision Engg. & Robotics
 Thermal Engineering
 Mechanical Handling
 Machining, Tools, CAD/CAM
 Turbomachines
 Hydroturbomachines
 Manufacturing Engineering
 Precision Engineering
 Machine Design
 Heat Transfer, Fluid Flow
 Metrology
 Combustion, Solar Energy
 Refrigeration and Air- conditioning
 Machine Elements
 Turbomachines
 Thermal Sciences
 Heat Transfer
 Heat Exchangers, Fluidized Beds

Associate Professors

Ajit Kumar Kolar, Ph.D(IIT Madras)
 S.Kumaraswamy, Ph.D(IIT Madras)
 Pramod S. Mehta, Ph.D(Loughborough,UK)
 U.S.Premananda Shet, Ph.D(IIT Madras)
 Y.G.Srinivasa, Ph.D(IIT Madras)
 P.Srinivasa Rao, Ph.D(IIT Madras)

Fluidized Bed, Combustion and Heat Transfer
 Hydroturbomachines
 I.C.Engines
 Combustion Engineering
 Instrumentation and Control
 I. C. Engines

Assistant Professors

V.Balabaskaran, Ph.D(IIT Madras)
 K.N.Gopalan, Ph.D(IIT Madras)
 K.R.Govinda Mallan, Ph.D(IIT Madras)
 M.Govardhan, Ph.D(IIT Madras)
 V.Jayaprakash, Ph.D(IIT Madras)
 R.Krishnakumar, Ph.D(IIT Madras)
 S.Krishnamurthy, Ph.D(IIT Madras)
 G.Kuppuswamy, Ph.D(IIT Madras)
 M.M.Mayuram, Ph.D(IIT Madras)
 A.Mani, Ph.D(IIT Madras)
 G.Muthuveerappan, Ph.D(IIT Madras)
 K.Narayanasamy, Ph.D(IIT Madras)
 K.Ramakoteswara Rao, Ph.D(IIT Madras)
 B.Ramamoorthy, Ph.D(IIT Madras)
 N.Ramesh Babu, Ph.D(IIT Madras)
 M.Singaperumal, Ph.D(IIT Madras)

Hydroturbomachines
 Analysis Simulation & Dynamics
 I.C.Engines
 Flow Studies in Turbomachines
 Stress Analysis
 CAD/CAM, Finite Element Method
 Machine Design
 Machine Tools & Manufacturing
 Design, Surface Engineering
 Refrigeration & Air Conditioning, Conservation,
 Solar Energy
 Structural Vibration in Fluids
 Surface Topography, Manufacturing Method
 Machine Design, Mechanical Handling Equipment
 CAI, QC, Image Processing
 Manufacturing Engineering
 Fluid Power, Precision Engineering

20
N.Sivaprasad, Ph.D(IIT Madras)
N.Sitaram, Ph.D(Pennsylvania State)
K.V.Thyagarajan, Ph.D(IIT Madras)
L.Vijayaraghavan, Ph.D(IIT Madras)

Finite Element Analysis
Thermal Turbomachines
Machine Design
Metal Cutting, CAD

Lecturers

4
K.S.Padiyar, M.Tech(IIT Kharagpur)
Prakash M. Maiya, Ph.D(IIT Bombay)
V.N.Rajan, M.S.(IIT Madras)
D.V.Ramalingeswara Rao, M.Tech(IIT Madras)

Thermodynamics
Thermal Science
Energy Engineering
Instrumentation and Control Engineering

Chief Design Engineer

T.S.Chennabasavan, M.Sc.Engg.(Aston)

Machine Design

Senior Design Engineer

S.D.Kalander Saheb, M.Tech(IIT Madras)

Design and Production

4
Senior Scientific Officer

S.Boopathy, M.E.(Bharatiar)

Production Engineering

Senior Maintenance Engineer

A.Arun, B.E.(Madras)

Refrigeration Engineering

4.10.4 Students on Roll

Programme	I Year		II Year		III Year		IV Year		V Year		Total		
	M	W	M	W	M	W	M	W	M	W	M	W	Total
Ph.D	16	1	20	-	18	-	25	1	5	-	84	2	86
M.S.	2	-	6	-	9	-	13	1	4	-	34	1	35
M.Tech	-	-	-	-	-	-	62	-	-	-	62	-	62
B.Tech	74	2	70	2	63	-	59	1	2	-	268	5	273
Total	92	3	96	2	90	-	159	3	11	-	448	8	456

(Students on roll beyond 5 years are shown in V year)

4.10.5 Number of Scholarship/Fellowship holders

Programme	Institute	Number			Total
		CSIR	Others		
Ph.D	71	-	-		71
M.S.	28	-	-		28
M.Tech	52	-	3(DRDL Fellowship)		55
Total	151	-	3		154

4.10.6 No. of Degrees Awarded

Sl.No.	Programme	Number
1.	Ph.D	17
2.	M.S.	16
3.	M.Tech	117
4.	B.Tech	67
	Total	217

4.10.7 Instruments/Equipment Designed and Developed

- * A Compact Swirl Burner (HSB)
- * Improvement in Telemetry system contactless communication

4.10.8 New Facilities added and Major Equipment procured

- * Telemetry Unit
- * Laser Doppler Anemometer
- * Zenith Super LAN system
- * Modem
- * Servo Stabilizer 22.5 KVA
- * 40 MB Hard disc for AT
- * Acoustic Emission system (2 channel) with sensors & accessories
- * CCD Camera with accessories
- * Fisher FMS model
- * Deckel Machining Centre
- * Weiler CNC lathe with Siemens controller and accessories
- * PC-AT/486 and PC-XT Systems
- * Godrej Printer 930k, 132 column, 300 CPS

4.10.9 Short-term Courses/Workshops/Seminars/Symposia/Conferences organised

S.No.	Title of course	Period	Co-ordinator(s)
1.	Summer School on Robot in Manufacturing	20-5-91 - 1-6-91	Dr.P.K.Philip
2.	ZOPP Workshop at Welding Research Lab. University of Roorkee	11-10-91	Dr.M.Singaperumal (Moderated on behalf of GTZ)
3.	National Conference on Design Engineering-NACOMM 91	12-14 Dec. 91	Dr.M.A Parameswaran and Dr.N.Sivaprasad
4.	11th National Heat and Mass Transfer Conference	21-23 Dec. 91	Dr.S. Srinivasa Murthy
5.	Workshop on Economics and Management of Energy Conversion and use	17-21 Feb. 92	Dr. R. Natarajan

4.10.10 Short term Courses/Workshops/Seminars/Symposia/Conferences/ Training attended by the Faculty in recognised Academic Institutions and Public Sectors

S.No.	Name of Faculty	Title	Period/Duration
1.	Dr.Ajit Kumar Kolar	11th International Fluidised Bed Conference, Montreal, Canada	21-24 April 91
2.	Prof.V.Ganesan	International Conference on Computation in Engineering & Science, Melbourne, Australia	13-15 Aug. 91
3.	Prof.A.Venkatesh	Solar World Congress 91, Denver, Colorado, USA	17-24 Aug. 91
4.	Prof.R.Natarajan	10th International Symposium on Air Breathing Engine, Nottingham, UK	1-6 Sept. 91

5.	Prof.S.P.Venkateshan	16th National Symposium on Instrumentation, Cochin	26-29 Nov. 91
6.	Prof.A.Venkatesh	Energy-91, Madras	28 Oct 91
7.	Dr.S.Kumaraswamy	All India Seminar on Mech. Engg. Education, Institution of Engineers (India) AP, Hyderabad	29- 30 Oct. 91
8.	Prof.V.M.K.Sastri	ASME Winter Annual Meeting Conference, Atlanta, USA	1-6 Dec. 91
9.	Dr.G.Kuppuswamy	International 91 Conference - Signals, Data Systems, ASME, France	9-11 Dec. 91
10.	Prof.M.S.Shunmugam	National Conference on Design Engineering, NACOMM-91, IIT, Madras	12-14 Dec. 91
11.	Mr.V.N.Rajan	24th National Seminar on Energy, Madras	12- 14 Dec. 91
12.	Mr.S.D.Kalander Saheb	National Conference on Design Engineering, NACOMM-91, IIT Madras	12-14 Dec. 91
13.	Prof.O.V.Krishnaiah Chetty	National Conference on Design Engineering, NACOMM-91, IIT Madras	12-14 Dec. 91
14.	Prof.V.M.K.Sastri	11th National Conference on Heat and Mass Transfer, IIT Madras	21-23 Dec. 91
15.	Prof.S.P.Venkateshan	11th National Conference on Heat and Mass Transfer, IIT Madras	21-23 Dec. 91
16.	Prof.K.N.Seetharamu	11th National Conference on Heat and Mass Transfer, IIT Madras	21-23 Dec. 91
17.	Prof.Vijay R.Raghavan	11th National Conference on Heat and Mass Transfer, IIT Madras	21-23 Dec. 91
18.	Prof.S.Srinivasa Murthy	11th National Conference on Heat and Mass Transfer, IIT Madras	21-23 Dec. 91
19.	Dr.A.Mani	11th National Conference on Heat and Mass Transfer, IIT Madras	21-23 Dec. 91
20.	Dr. Prakash M.Maiya	11th National Conference on Heat and Mass Transfer, IIT Madras	21-23 Dec. 91
21.	Dr.S.Kumaraswamy	18th National Conference on Fluid Mechanics & Fluid Power, Indore	29-30 Dec. 91
22.	Dr.A.Mani	National Solar Energy Conference - 91, Pune	16-18 Dec. 91
23.	Dr.S.Kumaraswamy	43rd AGM of Aeronautical Society of India	7-8 Feb. 92

4.10.11 Invited Lectures Delivered by the Faculty in Academic Institutions/Public Bodies

S.No.	Name of the Faculty	Topic of the Lecture	Delivered at	Date
1.	Prof.V.Radhakrishnan	Computer Integrated Mfg.	AIT, Bangkok	Mar-April 91
2.	Prof.A.Ramamohan Rao	Gear Research at IIT Madras	NASA Lewis Research Centre Cleveland, Ohio State Univ. USA	June 91
3.	Prof.A.Ramamohan Rao	Surface durability of Gears	General Motors, Detroit, USA	June 91
4.	Prof.A.Ramamohan Rao	Surface durability of Gears	University of Illinois, Chicago, USA	June 91
5.	Mr.S.Boopathy	Robot Programming	Madras Productivity Council	July 91
6.	Dr.Y.G.Srinivasa	Control Systems	Hindustan Motors, Tiruvallur	Aug. 91
7.	Dr.M.Singaperumal	Proportional Hydraulics	Hindustan Motors, Tiruvallur	Aug. 91

8.	Dr.R.Krishna Kumar	Finite Element Method	ICF, Madras	Sept. 91
9.	Prof.A.Ramamohan Rao	Failure Analysis	Brakes India, Madras	Oct. 91
10.	Dr.R.Krishna Kumar	Introduction to Fracture Mechanics	BHEL, Trichy	Nov. 91
11.	Dr.S.Kumaraswamy	Pumps & Compressors	Malladi Project Management Centre Madras	Nov. 91
12.	Prof.P.K.Philip	Keynote Address on Milling	REC Warangal	Dec. 91
13.	Prof.OV.Krishnaiah Chetty	Planning & Scheduling	REC Warangal	Dec. 91
14.	Prof.V.Radhakrishnan	Precision Mfg.	PSG College Coimbatore	Jan. 92
15.	Prof.V.Radhakrishnan	CNC Technology	BHEL, Ranipet	Feb. 92
16.	Dr.N.Ramesh Babu	Programming of CNC Machines	BHEL, Ranipet	Feb. 92
17.	Mr.S.Boopathy	Programmable Logic Controller	BHEL, Ranipet	Feb. 92

4.10.12 Visits abroad

Sl.No.	Name of the Faculty	Country visited	Date	Purpose
1.	Dr.Ajit Kumar Kolar	Canada, USA, Germany	19.04.91- 26.06.91	Conference and Technical Visits
2.	Prof.Vijay R.Raghavan	Germany	08.06.91-14.07.91	DAAD Invitation to Aachen
3.	Prof.R.Krishnamurthy	Japan, USA	24.07.91-25.08.91	Conference
4.	Prof.V.Ganesan	Australia	15.08.91-30.08.91	Conference
5.	Prof.T.Nagarajan	Germany	01.09.91	DAAD Reinvitation
6.	Prof.Vijay R Raghavan	Egypt	23.09.91-04.10.91	Visiting Professor to Mansoura University
7.	Prof.V.Radhakrishnan	Germany	06.10.91-21.10.91	Finalising Equipment under Indo German Agreement
8.	Prof.V.M.K.Sastri	USA	16.11.91-10.12.91	Receiving Fellow ASME Award

Staff

9.	Mr.R.Sreenivasan	Germany	06.09.91-01.12.91	Advanced Training
10.	Mr.M.Rajendran	Germany	06.09.91-01.12.91	Advanced Training
11.	Mr.C.D.N.Karunakaran	Germany	06.09.91-01.12.91	Advanced Training
12.	Mr.C.Jagadiswaran	Germany	06.09.91-01.12.91	Advanced Training

4.10.13 Distinguished visitors to the Department (important Dignitaries above the level of Professor)

Sl.No.	Name of the Visitor & Occupation	Date of Visit	Purpose of Visit (Lecture/Discussion)
1.	Mr.V.Ranganathan Dy. Proj. Director ADA Bangalore	19.06.91	Lecture
2.	Prof.D.Shetty Univ. of Hartford USA	23.08.91	Lecture
3.	P.A. Hans Wagner Technische Hochschule Karlsruhe Germany	13.09.91	Discussion
4.	Mr.S.Govindrajan M/s.Carburettors Ltd. Maraimalai Nagar	13.09.91	Lecture

5.	Mr.S.Ram Managing Director M/s Wheels India Ltd. Madras	27.09.91	Discussion
6.	Prof.(Mrs)P.P.Parikh IIT Bombay	29.09.91	Discussion
7.	Mr.V.Vidyasagar DST	30.09.91	Discussion
8.	Mr.Dixit Vice President Mysore Kirlosker Engines	04.10.91	Discussion
9.	Dr.G.Satyanaarayanan Lehigh University	07.10.91 - 19.11.91	Visiting Faculty
10.	Mr.P.Ramadas Vice President Mysore Kirloskar Ltd.	25.10.91	Discussion
11.	Dr.P.N.Vaidyanathan Florida Univ. USA	30.10.91	Lecture
12.	Prof.R.I.Lewis Univ. of Newcastle upon Tyne UK	2.12.91	Lecture and Discussion
13.	Five Member Chinese Delegation	06.12.91	Discussion
14.	Prof.A.Williams Univ. of Leeds UK	10.12.91	Discussion
15.	Mr.R.D.Kale Head, Engg. Development Division Indira Gandhi Centre for Atomic Research Kalpakkam	13.12.91	Discussion
16.	Prof.E.V.Schlunder Univ.of Karlsruhe Germany	21.12.91- 23.12.91	Attended National HMT Conf. and Visit to HTTP and R&AC Labs. - Lecture
17.	Prof.Tetsu Fujii Kyushu Univ. Japan	21.12.91- 23.12.91	Attended National HMT Conf. and Visit to HTTP and R&AC Labs. - Lecture
18.	Prof.Hartnett Univ. of Illinois USA	21.12.91- 23.12.91	Attended National HMT Conf. and Visit to HTTP and R&AC Labs. - Lecture
19.	Prof.R.K.Shah Univ. of Buffalo USA	21.12.91- 23.12.91	Attended National HMT Conf. and Visit to HTTP and R&AC Labs. - Lecture
20.	Dr.B.Gopalakrishnan West Virginia University USA	10.01.92	Lecture
21.	Mr.Sundaram Iyer Siemens Germany	24.01.92	Discussion
22.	Mr.R.K.Kapoor Sr.Manager BHEL Haridwar	27.01.92- 30.01.92	Discussion
23.	Mr.R.B.S.Chauhan Group Head(FAG) Corporate R&D BHEL, Hyderabad	27.01.92- 30.01.92	Discussion
24.	Prof.R.W.Lewis Univ. College of Swansea UK	31.1.92	Visit to HTTP Lab. & Discussion
25.	Prof.Knocke Univ. of Aachen Germany	19.02.92	Discussion
26.	Dr.A.W.E. Henham Director of Energy Engg. Univ. of Surray UK	20.02.92	Discussion
27.	Dr.M.Jeandin Centre for Advanced Research, Paris	21.02.92	Lecture
28.	Dr.R.Rajagopalan Concordia Univ. Canada	12.03.92	Discussion

4.10.14 Sponsored Projects

Sl.No.	Title	Period Year(s)	Funding Agency	Amount (in Lakhs)	Co-ordinator(s)
1.	Pressurised Fluidised Combustion of low grade Coal	3	NSF	53.10	Prof.V.M.K.Sastri Dr.Ajit Kumar Kolar
2.	Studies on Advanced Propulsion System for Aerospace Vehicles	4	DRDL	19.98	Prof.V.Sriramulu Prof.K.A.Damodaran
3.	CAD/CAM Programme	1	MHRD	15.00	Prof.V.Radhakrishnan Prof.C.S.Krishnamoorthy

4.	Computer Aided Inspection	1	MHRD	10.00	Prof.V.Radhakrishnan
5.	Supersonic Combustion Studies	4	ISRO(IIT M)	07.95	Prof.V.Sriramulu Prof.K.A.Damodaran
6.	Interference Effects in Spray Combustion	3	ISRO(IIT M)	06.86	Prof.R.Natarajan Prof.B.H.L.Gowda
7.	Studies on the Mixing and Combustion Phenomena in Ramjet Combustion Chambers	3	ARDB	05.79	Prof.R.Natarajan Prof.B.H.L.Gowda
8.	Numerical Prediction of Two dimensional Reaction Flows with Application of Ramjet Combustion	3	ARDB	05.40	Prof.R.Natarajan Prof.V.Ganesan
9.	Tip Clearance Flows in Compressors	3	ARDB	05.00	Prof.N.Venkatrayulu Dr.N.Sitaram
10.	Computer Aided Design of Gear Cutting Tools	2	CSIR	01.60	Dr.M.S.Shunmugam Dr.V.Jayaprakash
11.	Flow Studies of S Blade profiles used in a fully reversible Axial Flow Pump Turbine by a Tidal Power Plant	1	IRDF	Staff salary	Dr.V.Balabhaskaran Dr.E.G.Tulapurkara Dr.P.A.Aswathanarayana
12.	Design and Development of a new Helical Swirler	1	IRDF	Staff salary	Prof.U.S.P.Shet Prof.B.V.A.Rao Dr.S.Swarnamani

4.10.15 Major Consultancy Assignments

S.No.	Title	Organisation	Amount (in Lakhs)	Co-ordinator(s)
1.	Trishul Missile Launcher Hydraulic Servo System	BHEL, Ranipet	4.60	Dr.Y.G.Srinivasa Dr.M.Singaperumal
2.	Software Development for AS/RS	BHEL, Hyderabad	0.45	Prof.V.Radhakrishnan Prof.O.V.K.Chetty Dr.N.Ramesh Babu Mr.S.Boopathy
3.	Cavitation Noise Diagnosis	BHEL (R&D) Hyderabad	0.30	Dr.S.Kumaraswamy
4.	Gun Barrel Hydraulics Simulation	Marshall & Sons, Madras	0.25	Dr.Y.G.Srinivasa Dr.M.Singaperumal
5.	Design of Leak Detector of water pumps for Automobiles	Carburetors India Ltd. Madras	0.25	Prof.S.P.Venkateshan Mr.N.Devasahayam
6.	Part programming of CNC Machines - I Course	TAFE, Madras	0.12	Prof.V.Radhakrishnan Dr.N.Ramesh Babu
	II-course	TAFE, Madras	0.12	-do-
7.	Assessment of the performance of a Thermal efficiency improving device for a domestic LPG stove	V.M.Rao Consultant Madras	0.10	Prof. R. Natarajan Prof.A.Venkatesh Dr.U.S.P. Shet
8.	Impeller Redesign	Best and Crompton Madras	0.10	Dr.S.Kumaraswamy
9.	Improvement of a Rotovator	National Engg. Co. Madras	0.05	Dr.M.A.Veluswami Dr.K.V.Thyagarajan Dr.S.Krishnamoorthy

4.10.16 Honours and Awards

Sl.No.	Name of Faculty	Honours/Awards	Purpose
1.	Prof.V.M.K. Sastri	Fellow ASME,	
2.	Dr.H.C.Radha Krishna	Member, Governing Council CWPRS, Pune	Technical Advice

4.10.17 Books

Sl.No.	Name of Faculty	Title	Publisher
1.	Dr.M.M.Mayuram Prof.R.Krishnamurthy Prof.K.Gopinath Dr.A.S.Ragunathan Dr.K.V.Krishnamurthy	Surface Coating/Treatment Techniques - Education Module	ISTE 1991
2.	Prof.Vijay R.Raghavan	Heat Exchangers (Warmelibertrager) (Co-translator with H.Martin)	Hemisphere Pub. Co. 1992

4.10.18 Research Publications

1. K. Thyagarajan and K.A.Bhaskaran, Effect of Argon Dilution on the Pre-Ignition Oxidation Kinetics of Benzene, International Journal of Energy Research, V.15, 1991, pp. 235- 248.
2. V.Ganesan, K.Suzuki, K.Aswatha Narayana and V.K.Chithambaran, Investigations of Mean and Turbulent Flow Characteristics of of a Two-Dimensional Plane Diffuser, Journal of Experiments in Fluids, V.10, 1991, pp. 205-212.
3. S.Subramaniam, V.Ganesan and P.Srinivasa Rao, An Experimental Investigation of Flow Characteristics in the Swirl Chamber of a C.I.Engine, SAE Paper No.910480, 1991, pp. 1-12.
4. V.Ramachandra Raju, N.V.Mahalakshmi, C.B.Pawar, P.Srinivasa Rao and V.Ganesan, Turbulent Wakes in a conical Diffuser - A Numerical Approach, Proc. Eighth International Conference on Mathematical and Computer Modelling, Maryland, USA, Apr. 1991.
5. V.Ganesan, P.Srinivasa Rao, D.Mohan Krishna and K.Rajagopal, In- cylinder Fluid Flow Analysis During Compression Process of a Four-Stroke C.I.Engine - A Three Dimensional Approach, Proc. International Conference on Computational Engineering Science, Melbourne, Australia, Aug. 1991.
6. V.Ramachandra Raju, N.V.Mahalakshmi, P.Srinivasa Rao and V.Ganesan, Flow Predictions in Adverse Pressure Gradient Conditions With Low Reynolds Number Turbulence Models - A Comparative Study, Proc. International Conference on Computational Engineering Science, Melbourne, Australia, Aug. 1991.
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8. P. Ramesh Babu, B.Nagalingam and K.V.Gopalakrishnan, Exhaust Emission Control through Catalytic Activation of the Combustion in a Two Stroke S.I. engine, Proc. International Conference on Environmental Pollution, Lisbon, Portugal, V.1, Apr. 1991, pp. 195-203.
9. Jabez Dinagar, B.Nagalingam, K.V.Gopalakrishnan, Evaluation of a single cylinder Low Heat Rejection Research Engine for Reduced Emissions, Proc. First International Conference on Combustion Technologies for a Clean Environment, Portugal, Oct. 1991.
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12. S.Dhandapani, B.Nagalingam and K.V.Gopalakrishnan, Catalytically Activated Combustion of Methanol in Single Cylinder Four Stroke and Two Stroke Spark Ignition Engines, Proc. IX International Symposium on Alcohol Fuels, Milan, Italy, Nov. 12-15, 1991.
13. S.Parthasarathy, B.Nagalingam and K.V.Gopalakrishnan, Catalytic Coating vs. Ceramic Coating - A Comparative Study of the Performance of Four Stroke and Two Stroke S.I. Engine with Methanol as Fuel, Proc. IX International Symposium on Alcohol Fuels, Milan, Italy, Nov. 12-15, 1991.
14. A.Ramesh, B.Nagalingam and K.V.Gopalakrishnan, A comparative study of Two Types of Hot Surface Ignition Engines, Proc. IX International Symposium on Alcohol Fuels, Milan, Italy, Nov. 12-15, 1991.
15. S.Jabez Dhinagar, B.Nagalingam and K.V.Gopalakrishnan, Design and Development of An Electronic Device For Indication and Variation of Injection Timing in an I.C.Engine, Proc. All India Conference on Applied Instrumentation, University of Roorkee, Feb. 14-15, 1992
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27. V.Sivasankaran and R. Krishnamurthy, Plastic Deformation of Ceramic Cutting Tools, Int. Conf. on Mech. Behaviour of Metals, ICM-6, Kyoto, Japan, July-Aug. 1991
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30. M. Pugazhendi, R. Krishnamurthy and M. A. Veluswami, Condition Monitoring in Drilling, Int. Conf. on Design Automation & CIM, Coimbatore, India, Jan. 1991
31. A. R. Sitaram and R. Krishnamurthy, Resistance Spot Welding of D54S Aluminium Alloy, Int. Conf. on Aluminium, IISc. Bangalore, Aug. 2-6, 1991
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53. V.K.Seshadri and T.Nagarajan, End Point Position Control of Flexible Robot Arm, Proceedings Int. AMSE Conference "Neural Networks" San Diego, USA, May 29-31, V.1, pp.269-277.
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4.11 Metallurgical Engineering Department

4.11.1 Introduction

The Department of Metallurgical Engg. was established in 1959. Now, Ph.D, M.S., M.Tech., and B.Tech. programmes are being offered. The major areas of teaching and research of the Department are:

- | | |
|------------------|-------------------------|
| a. Metal Casting | c. Metal Joining |
| b. Metal Forming | d. Materials Technology |

4.11.2 New courses introduced

The following new courses were introduced during the period under report.

Sl.No.	Course No.	Title	Faculty
1.	MT 659	Transport Phenomena in Metallurgical Processes	Dr.S.Ramakrishna Iyer Dr.S.Raghavan
2.	MT 661	Special Topics in Chemical Metallurgy	Dr S.K.Seshadri
3.	MT 665	Ceramic Science and Technology	Dr.C.V.Gokularathnam Dr.Paramanand Singh
4.	MT 321	Refractories and Ceramics	Dr.Paramanand Singh Dr.S.Ramakrishna Iyer
5.	MT 663	Advanced Metallurgical Thermodynamics	Dr.S.Raghavan Dr.S.K.Seshadri
6.	MT 667	Residual Stress Analysis	Dr.P.Kesavan Nair

4.11.3 Details of Faculty

Name and Qualification

Major areas of specialisation

Professors

R. Vasudevan, Dr.Ing.(Achen)	Engineering physical metallurgy, Materials technology, X-ray Diffraction
K.S.Raghavan, Ph.D(Pennsylvania)	Physical metallurgy, Electron microscopy
H.Md.Roshan, Ph.D(IIT Madras)	Metal casting
K.A.Padmanabhan, Ph.D(Cantab.)	Conventional metal forming, Superplasticity, Mechanical metallurgy
V.M.Radhakrishnan, Ph.D(IIT Madras)	Fracture mechanics, High temperature materials
O.Prabhakar, Ph.D(IIT Madras)	Metal casting, Non-destructive testing
D.R.G.Achar, Ph.D(IIT Madras)	Metal joining, Failure analysis
K.J.L.Iyer, Ph.D(IIT Madras)	Physical metallurgy, Failure analysis, Materials science
S.Sundaresan, Ph.D(IIT Madras)	Metal Joining

Associate Professors

P.Venugopal, Ph.D(IIT Madras)

S.D.Pathak, Ph.D(IIT Madras)

S.K.Seshadri, Ph.D(London)

Metal forming

Mechanical metallurgy, Materials technology,

Metal casting

Extractive metallurgy, Corrosion, Utilisation of renewable agricultural resources

Assistant Professors

C.V.Gokularathnam, Ph.D(Florida)

S.Ramakrishna Iyer, Ph.D(IIT Madras)

S.Raghavan, Ph.D(IISc.)

P.Kesavan Nair, Ph.D(IIT Madras)

K.Prasad Rao, Ph.D(IIT Madras)

D.G.R.Sharma, Ph.D(IIT Madras)

Paramanand Singh, Ph.D(IIT Bombay)

K.Swaminathan, Ph.D(IIT Madras)

Powder metallurgy, Rapid solidification

Furnace Technology, Corrosion, High Temperature materials

Physico-chemical aspects of process metallurgy

Physical Metallurgy, X-ray Diffraction

Metal Joining, Corrosion

Metal Casting, Non-Destructive Testing

Powder Metallurgy, Ceramics, Composites

Metal Forming

Lecturer

V.Sampath, Ph.D(IISc.)

Materials Technology

4.11.4 Students on Roll

Programme	I Year		II Year		III Year		IV Year		V Year		Total		Total
	M	W	M	W	M	W	M	W	M	W	M	W	
Ph.D	4	-	8	1	11	-	4	-	26	-	53	1	54
M.S.	-	-	4	-	1	-	3	-	4	-	12	-	12
M.Tech	-	-	16	-	-	-	-	-	-	-	16	-	16
B.Tech	-	-	22	1	20	4	22	1	-	-	64	6	70
Total	4	-	50	2	32	4	29	1	30	-	145	7	152

4.11.5 Number of Scholarships/Fellowships holders

Programme	Number			Total
	Institute	CSIR	Others	
Ph.D	17	-	1	18
M.S.	5	-	-	5
M.Tech	10	-	-	10
Total	32	-	1	33

4.11.6 No. of Degrees Awarded

Sl.No.	Programme	Number
1.	Ph.D	9
2.	M.S.	3
3.	M.Tech	16
4.	B.Tech	22
	Total	50

4.11.7 Instruments/Equipment Designed and Developed

1. Ultrasonic power source, transducer, concentrator for high power ultrasonic insonation of materials.
2. A solid state piston engine using a memory array spring and low grade heat.
3. Atmosphere controlled sintering furnaces (1000°C)
4. Hall-flow meter
5. Ball-mill containers
6. Experimental set up for high temperature solid electrolyte galvanic cell for determination of thermodynamics of metal oxide systems
7. Development of the electrolytic heating process, Design of a gum which could quickly bore through metallic materials (brittle) without producing cracks, (3 patents already taken in the area).
8. Development of a rapid fatigue testing process, using ultrasonics for testing fatigue strengths of metals/joints.
9. Developing the process modelling laboratory and work has been standardized.
10. Work along with the engineers of Tube products of India to develop steel tubes for two wheelers applications, as replacement for imported Japanese material.
11. The development of tooling for viscous extrusion of YBCO super conducting wire, designed and developed by Dr.P. Venugopal is used by persons of IIT, Madras engaged in the super- conducting area of research.
12. A TPB attachment to the servo-hydraulic 400 KN fatigue machine has been designed and fabricated. This is being used for COD studies for fracture toughness determination. This set up along with the electronic clippage developed in the MTF laboratory will be actively utilised in fracture toughness determination of indigenous produced micro alloyed steels from TISCO.
13. Development of Metallurgical Thermodynamics laboratory involving the high temperature solid electrolyte galvanic cell technique.
14. Designing and fabrication of Retained austenite attachment to RigaKv stress analyser.
15. Design and fabrication of an attachment to improve the scan range of RigaKv strain flex.
16. Setting up facility for low resistance measurement.
17. Establishing research facilities in P/M, Ceramics, Composites and Hard Metals.

4.11.8 New Facilities added and Major Equipment procured

- * DARTEC, Servo-hydraulic universal Testing machine, U.K.
- * Keithley 617 high impedance electrometer.
- * Pulsed GTA welding unit, 350 A capacity.
- * Digital direct-reading micro-hardness tester.
- * Computerised potentiostat is going to be installed with in a short time.
- * PID temperature controller (Programmable)
- * Shaping machine 24" "Master make", attached with 3HP motor.
- * Low temperature both for preparing thin tails for electron microscopy.
- * Low cycle fatigue testing equipment.
- * Optical grid analyser for measuring surface strains.
- * CD room for x-ray identification of phases.
- * Controlled drive and automatic plotter for the Homsfield Transometer.
- * Symphony 860 system .

4.11.9 Short-term Courses/Workshops/Seminars/Symposia/ Conferences organised

Sl.No.	Co-ordinator(s)	Title of course/ Workshop/Seminar/ Symposia/Conf.	Period
1.	K.Prasad Rao	Finite Element Analysis of Superplastic materials	Aug. 91
		Welding Technology	14-15 Nov. 91
		Adhesive bonding	7th Nov. 91
2.	Paramanand Singh	Workshop on Finite Element Analysis of the forming of Superplastic metallic sheets	13 Sept. 91

4.11.10 Short term courses/Workshops/Seminars/Symposia/Conferences/ Training attended by the Faculty in recognised Academic Institutions and Public Sectors

Sl.No.	Title	Period/Duration	Name of Faculty
1.	Symposium on Joining of Materials for 2000 AD	Dec. 91	Prof.S. Sundaresan
2.	National Welding Seminar-91	25-27 Oct. 91	Dr K. Prasad Rao
3.	Short term course on Particle characterization of modern image analysis	5-6 Dec. 91	Dr. Paramanand Singh
	International Conference and Exhibition on Advances in Materials & Processes	16-19 Feb. 92	Dr. Paramanand Singh
	Application of few salient Strategies for reduction of Fourster Analysis data for Powder Characterisation		

4.11.11 Invited Lectures Delivered by the Faculty in Academic Institutions/Public Bodies

Sl.No.	Name of the Faculty	Topic of the Lecture	Delivered at	Date
1.	Prof.R.Vasudevan	Heat Treatment of Die Casting Dies	Hotel Park Sheraton Madras	9 Jan. 92
		Thermo-nuclear treatments; classification of Steel	Welding Research Institute, Trichy	13-14 Feb. 92
		Research work in certain off-beat areas	IIW and IIM Trichy	13 Feb. 92

		Metallurgy for Non-metallurgical Executives	T1 Cycles Ambattur	9 Mar. 92
		Dial M for memory	MMS Hotel Ashoka	20 Mar. 92
2.	Prof S.Sundaresan	Metal Joining	Tube Products	19 Nov. 91
		Metal Joining	Tube Products	9 Mar. 92
		Welding Metallurgy	IIM	16 Nov. 91
		Welding & Die-casting Dies	Die Casting Soc. of India	9 Jan. 92
		Welding of Titanium alloys	WRI Trichy	20 Jan. 92

4.11.12 Distinguished visitors to the Department (important dignitaries above the level of Professors)

Sl.No.	Name of the Visitor & Occupation	Date of Visit	Purpose of visit (Lecture/Discussion)
1.	Dr. R.B.Wood, University of Wales, UK	29.07.91	Finite element analysis of the forming of superplastic metallic sheets
2.	Dr.U.Muralidharan, Principal Research Engineer, The Timken	20.12.91	Impact of material, manufacturing and design component durability
3.	Dr. Nazare, Institute of Material Science, German Nuclear Research Centre, Kalsruhe, Germany	09.01.92	Processing and Texturing of Monolithic YBCO Superconductors
4.	Dr.R.Halmshaw, Past President of the British Institute of Non-Destructive Testing, Northampton UK	04.02.92	The influence of scattered radiation in Radiographic methods

4.11.13 Sponsored Projects

Sl.No.	Title	Period	Funding Agency	Amount (in Lakhs)	Co-ordinator(s)
1.	Effect of US vibration on the ageing characteristics of alloys of a) Al b) Mg	1988-1993	ISRO	6.00	Prof R.Vasudevan Prof.KJL Iyer
2.	Assessment & evaluation of Cobalt-band Ternay alloys	upto Dec. 91	ARDB	1.95	Prof. K.S.Raghavan
3.	Defect analysis in Wing Bay casting		DRDL	0.40	Prof. H.Md.Roshan
4.	Superplastic Forming of some Aluminium & Titanium alloys - Phase II	1987-1991	Aero.R&D Bd. New Delhi	5.86	Prof.K.A.Padmanabhan
5.	Some analytical and experimental studies of the formability of LPG grade steel	1988-1991	SAIL	5.80	Prof.K.A.Padmanabhan
6.	Indo-German project on Materials testing	1986-1993	GTZ Germany	DM 3.2 Millions	Prof.K.A.Padmanabhan
7.	Fatigue behaviour & fatigue crack growth studies on Mg & Al alloys	upto Mar.93	ARDB	6.62	Prof.V.M.Radhakrishnan
8.	CAD in Metal casting face to and modeling of metallurgical microstructure	1990-1993	DST	10.32	Prof.O.Prabhakar

9.	Welding of titanium alloys	3 years	DST	11.98	Prof S.Sundaresan
10.	Thermodynamics and phase relations in system NiO-MgO-ZnO using a solid electrolyte galvanic cell	3 years	CSIR	1.50	Dr S.Raghavan Dr S.K.Seshadri
11.	Processing and characterisation of super conducting YBCO wire	1989-1991	DST	1.00	Dr.P.Venugopal
12.	Development of New contact materials	1 year	ICSR		Dr.Paramanand Singh Dr K.N.Bhat
13.	Studies on plasma sprayed ceramic coatings	3 years	DST	4.09	Dr K.Prasad Rao Dr C.V.Gokularathnam
14.	Modeling of fluidised bed iron ore reduction process	1 year	IIT/IRDF		Dr D.G.R.Sharma

4.11.14 Major Consultancy Assignments

Title	Organisation	Amount (in Lakhs)	Co-ordinator(s)
Fracture Toughness of TISTEN-52 steel plates by CTOD	TISCO Jamshedpur	6.00	Dr.S.D. Pathak
Mech. behaviour of IS2062 in phase I & AISI304 stainless in second phase at high temperature	BHEL Hyderabad	0.256	Dr.S.D.Pathak
Installation of a Superplastic Forming facility	VSSC Trivandrum	5.00	Dr.K.A.Padmanabhan
Computer simulation	Kernforschungszentrum, Germany	DM10,000	Dr. O. Prabhakar
Creep testing of materials & Assessment of Remnant life	ENMAS Engg. Ent. Ltd. Madras	0.68	Dr K A Padmanabhan
Evaluation of the high cycle fatigue life of tubes	Tube Investments of India Avadi, Madras	0.495	Dr K A Padmanabhan
Evaluation of the High cycle fatigue life of Tubes	Tube Products of India Madras	0.18	Dr K A Padmanabhan
Measurement of residual stress measurement	Ashok Leyland Madras	0.176	Dr P.Kesavan Nair
Studies involving x-ray diffraction (stress measurement phase identification)	Ashok Leyland, Ltd. L&T McNeil, ISRO, Carborundum Universal and others	about 0.7	Prof R.Vasudevan Dr.P.Kesavan Nair
Failure analysis	Coromandel Fertilisers, Visakapatnam	0.30	Dr.K.J.L. Iyer
Testing of condenser Tubes failures	Ennore Thermal Power Station, Madras	0.17	Dr K.J.L. Iyer
Analysis of stud bolts for Pacol Reactor	Tamilnad Petro-Products Ltd. Madras	0.14	Dr.K.J.L.Iyer
Failure Analysis	Tamilnad Petro-Products Ltd. Madras	0.15	Dr K.J.L. Iyer
Failure Analysis of air cooled exchanger finned tube	Tamilnad Petro-Products Ltd. and Madras Refineries Ltd.	0.13	Dr K.J.L. Iyer"
Failure Analysis of allen screw	-do-	0.12	Dr K.J.L. Iyer

4.11.15 Honours and Awards

Name of Faculty	Honours/Awards	Purpose
Prof K.A.Padmanabhan	Elected as Honorary Academician of the Bashkerian Academy of Science, Bashkeristan, Russian Federation. He is the first Foreign Academician elected to this body	
Prof.K.A.Padmanabhan	Appointed to the Editorial Board of the newly launched International Journal	Journal of Manufacturing and Processing Science' published from the USA
Dr.K.Prasad Rao	Govindaraj Memorial Award by Indian Institute of welding 1991	Best paper presented during NWS-90 at Bombay

4.11.16 Research Publications

1. R. Vasudevan and Manoj Kumar, Influence of Ultrasonic Vibration on the age hardening vibrations of 17-4 PH Marten-sitic steels -Scand. J. Met., 20, 1991, 183-189.
2. George Thomas and R. Vasudevan, Metallographic investigations of Ti - 6 Al - 4V Welds, Prak Metallurgy, 28, 1991, 171-178.
3. C. Ramakrishna Prasad, R. Somasundaram and R. Vasudevan, Corrosion Fatigue behaviour of some copper - based condenser tube materials, Prakt. Metallurgy, 1, 1991.
4. P.K. Balasubramanian, K.V. Nagarajan, S. Suresh, P. Kesavan Nair and R. Vasudevan, Effect of thermomechanical treatment on residual stress in AA2014 aluminium alloy forging, International Conf. on Aluminium, INCAL 91, (Org: Aluminium Association of India), Bangalore, Feb. 1991.
5. S. Suresh, V.P. Raghupathi, P. Kesavan Nair, R. Sivakumar and R. Vasudevan, Analysis of longitudinal distortion in construction materials welded under different conditions, National Welding Seminar, (Org : IIW) Madras, Oct. 1991.
6. P.B.S.N.V. Prasad, R. Vasudevan and S.K. Seshadri, The effect of ultrasonic agitation on residual stresses of electro deposits of nickel on mild steel, 3rd National Convention of electro- chemists, (Org: CECRI) Regional Research Laboratory, Bhopal, Sept. 18-19, 1991.
7. George Thomas and R. Vasudevan, Gas Tungsten Arc Welding of Ti- 6Al-4V thin sheets, Welding Journal (AWS) Jan 1992.
8. M.R. Sriraman, R. Vasudevan, P.K. Balasubramanian and K.V. Nagarajan, Some observations on fracture of materials under ultrasonic insonations, Proceedings of the international conference on Advances in Materials and Processes, ICAMPS 92 (Org: ASM International) Bombay, Feb. 1992.
9. P. Kesavan Nair and R. Vasudevan, Aluminium-Brass explosive welds, proceedings of the international conference on advances in materials and Processes, ICAMPS '92 (Org : ASM International), Bombay Feb. 1992.

10. V. Ganesan, Baldev Raj, and K.S. Raghavan, Embrittlement of structure joining correlation, Annual Technical Meeting, IIM Ranchi, Nov. 1991.
11. K.B.E. Rao, S.L.Mannan, K.S. Raghavan, Effects of Temperature on Low cycle fatigue.... Int. J. Fatigue.
12. H.Md. Roshan, Foundry Technology, The changing scenario, Indian Foundry Journal, Vol.37, Nr.2, pp 17-24, Feb.1991.
13. H.Md. Roshan, Needs and strategies for Modernisation and technology upgradation in Indian Foundry industry, Indian Foundry Journal, Vol.37, Nr.8, Aug 1991.
14. H.Md. Roshan, V.M.K. Sastri, and Rajiv Agarwal, Die temperature control in pressure die casting, AFS Transactions, Vol 96, paper 91-105, 1991.
15. C.S. Ramesh, S.K. Seshadri and K.J.L. Iyer, Wear resistant nickel- silicon nitride, ceramic, Trans 19, 1991 882 electrocomposite coatings.
16. C.S. Ramesh, S.K. Seshadri and K.J.L. Iyer, environment resistant Ni-Si₃N₄ Composite coatings Cer. Trans P985, 1991, Vol.19.
17. C.S. Ramesh, S.K. Seshadri and K.J.L. Iyer, Wear resistance of Ni- fly ash composite coating wear 145/1991/189.
18. T. Jayakumar, Baldev Raj, D.K. Bhattacharya, P. Rodriguez and O. Prabhakar, Effect of combined presence of M C phase on Acoustic Emission Generated during Tensile Deformation in a Ni - Base super alloy - SCRIPTA METALLURGICA at MATERIALIA, Vol. 25, Pg. 2733-2737, 1991.
19. R. Krishnakumar, R. Narasimhan and O. Prabhakar, Finite Element Analysis of dynamic crack growth under plane stress in a viscoplastic material - Engineering Fracture Mechanics, Vol.37, pp. 1071-1084, 1990.
20. R. Krishnakumar, R. Narasimhan and O. Prabhakar, Temperature rise in a viscoplastic material during dynamic crack growth, Int. J. of fracture, Vol.48, Pg. 23-40, 1991.
21. S. Sundaresan and K. Keshava Murthy, Microstructural changes in the welding of titanium alloys. Symposium on joining of materials, Dec 12-14, 1991, Tiruchirapalli, pp C3, 471-480.
22. S. Nazare and P. Venugopal-Processing and characterisation of Solid $\text{Ba}_2\text{Cu}_3\text{O}_x$ ceramic superconductors, powder metallurgy International, Vol 123, no.3., 1991, p 174-179.
23. C.S. Ramesh, S.K. Seshadri and K.J.L. Iyer, A survey of aspects of wear of metals, Indian J. Technology, 1991, vol 29, 179-185.
24. C.S. Ramesh, S.K. Seshadri and K.J.L. Iyer, Wear resistance of nickel-flyash composite coatings, Wear Vol.145, p 189-195, 1991.
25. C.S. Ramesh, S.K. Seshadri and K.J.L. Iyer, Corrosion studies on Nickel - silicon nitride composite coatings, Surface Engg., Vol7 (3), p 216-220, 1991.

26. C.S. Ramesh, S.K. Seshadri and K.J.L. Iyer, Characteristics of nickel-flyash electrocomposite coatings, plating Surf. Finish., p. 52-54, Oct. 1991.
27. S. Balathandan and S.K. Seshadri, Galvanic corrosion behaviour of electroformed composite/metallic material couples, J. Materials Sci. Lett., Vol.10, 1029-31, 1991.
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4.12 Ocean Engineering Centre

4.12.1 Introduction

Ocean Engineering Centre was established in 1977. Now Ph.D, M.S., M.Tech. and B.Tech. Programmes are being offered. The major areas of teaching and research of the Centre are:

- * Structural analysis, Design and Testing
- * Wave Hydrodynamics
- * Floating and Submerged Bodies
- * Marine Geotechniques
- * Materials in Ocean Environment
- * Ocean Energy
- * Naval Architecture

4.12.2 Details of Faculty

Name and Designation

Major area of specialisation

Professors

S.Narasimha Rao, Ph.D(IIT Madras) [Head]

C.Ganapathy, Ph.D(IIT Madras)

K.Muthukrishnaiah, Ph.D(IIT Madras)

M.R.Pranesh, Ph.D(IISc.)

V.S.Raju, Dr.Ing.(Karlsruhe)

M.Ravindran, Ph.D(IIT Madras)

C.P.Vendhan, Ph.D(IIT Kanpur)

Marine geotechnical engineering, Seabed soil characteristics under static and dynamic loads
Analysis and design of offshore and ship structures
Marine geotechnical engineering, Analysis and design of foundation for offshore and onshore structures

Structure-soil-wave interaction studies, Coastline studies, Behaviour of materials in ocean environment
Marine geotechnical engineering, Foundation design for onshore and marine structures, Ocean energy
Turbomachines, Pumps, Hydraulic turbines, Ocean energy

Computer aided analysis of ocean, Civil and aerospace structures, Dynamics of floating bodies and structures

Associate Professors

K.Ganesh Babu, Ph.D(IIT Madras)

V.G.Idichandy, Ph.D(IIT Madras)

R.Mahadevan, Ph.D(IISc.)

K.Rajagopalan, Ph.D(IIT Madras)

R.L.Roy Choudhury, Ph.D(IIT Madras)

V.Sundar, Ph.D(IIT Madras)

Analysis and design of ocean structures, Behaviour of materials in fatigue and in ocean environment
Experimental techniques, Instrumentation, Analysis and testing of structural models and prototypes
Physical oceanography, Ocean wave hydrodynamics
Computer aided analysis and design of ship, underwater and offshore structures, Reinforced and prestressed concrete structures

Ship motions and maneuvering, Ship propulsion and resistance Design of small crafts and fishing vessels
Wave-structure interaction, Coastal erosion and shore protection, Fluid flow problems

Assistant Professors

S.K.Bhattacharya, Ph.D(IIT Madras)

Computer aided structural analysis, Analysis of motion of floating bodies, Model studies
Modelling of coastal engineering problems,
Hydraulic instrumentation

J.S.Mani, Ph.D(IIT Madras)

Ship design, Ship structures, Computer Applications in ship design

P.Sambandan, M.S.(IIT Madras)

Geological oceanography, Engineering geology

SP.Subramanian, Ph.D(IIT Madras)

Computer aided analysis, design and experimental studies of coastal and offshore structures

R.Sundaravadivelu, Ph.D(IIT Madras)

Lecturers

Paul Mario Koola, Ph.D(IIT Madras)

Wave energy, Hydrodynamics, Oceanographic measurements

S.Neelamani, Ph.D(IIT Madras)

Experimental & theoretical hydrodynamics, Wave structure interaction, Wave energy, Fluid Mechanics

Senior Scientific Officers-I

S.Meenakshisundaram, Ph.D(IIT Madras)

Measuring techniques connected with ocean engineering studies, Wave force studies

R.Natarajan, M.S.(IIT Madras)

Ship design, Ship production and planning

Senior Scientific Officers-II

V.Ananthasubramanian, M.S.(IIT Madras)

Naval architecture, Ship model testing

V.Padmaraj, M.S.(MIT, USA)

Naval Architecture

C.K.Vijayan, B.SE.(Michigan)

Marine engines and Propulsion

4.12.3 Students on Roll

Programme	I Year		II Year		III Year		IV Year		V Year		Total		Total
	M	W	M	W	M	W	M	W	M	W	M	W	
Ph.D	2	-	6	2	3	1	3	1	19	2	33	6	39
M.S.	6	1	1	1	-	-	-	-	2	-	9	2	11
M.Tech	6	-	12	-	-	-	-	-	-	-	18	-	18
B.Tech	17	-	13	-	9	-	13	-	-	-	52	-	52
Total	31	1	32	3	12	1	16	1	21	2	112	8	120

4.12.4 Number of Scholarship/Fellowship holders

Programme	Institute	Others	Total
Ph.D	13	5	18
M.S.	9	-	9
M.Tech	1	-	1
Total	23	5	28

4.12.5 No.of Degrees Awarded

Programme	Number
Ph.D	7
M.S.	5
M.Tech	14
B.Tech	11
Total	37

4.12.6 New Facilities added and Major Equipment procured

- * 3 axis velocity probe (ultrasonic type)
- * Gyro-stabilized platform for motion measurements
- * Underwater camera with accessories

4.12.7 Short-term Courses/Workshops/Seminars/Symposia/Conferences Organised

Sl.No.	Title of course/Workshop Seminar/Symposia/Conf.	Period	Coordinator(s)
1.	Hydrodynamics and its Application to Ocean Engineering, (QIP)	June 91	Dr.S.Meenakshisundaram
2.	Marine Soil Mechanics and Foundations, (ONGC)	Sept. 91	Prof.K.Muthukrishnaiah Prof.V.S.Raju
3.	Coastal and Ocean Engineering, (CEP)	Nov. 91	Dr.S.Neelamani Dr.V. Sundar
4.	Marine Corrosion and Control, (CEP)	Jan. 92	Prof.M.R.Pranesh

4.12.8 Short term courses/workshops/seminars/symposia/conferences/training attended by the Faculty in recognised Academic Institutions and Public Sectors

Sl.No.	Name of Faculty	Title	Period/Duration
1.	Dr.S.Narasimha Rao	Geotech. Conf. Surat	16-20 Dec. 92
2.	Dr.M.R.Pranesh	National Seminar on Foundation Problems and Remedial Measures, Madras	21 Feb. 92
3.	Dr.K.Muthukrishnaiah	National Seminar on Foundation problems and Remedial Measures, Madras	21 Feb. 92
4.	Dr.R.L.Roy Choudhury	National Seminar on ion energy fishing at CIFT, Cochin	8-9 Aug. 91
5.	Dr.R.Mahadevan	Workshop on Mathematical Modelling and Computer Simulation, NAL Bangalore	25-26 June 91
6.	Dr.K.Ganesh Babu	National Seminar on Concrete Chemicals, Madras	24-25 Mar. 92
7.	Dr.S.Meenakshisundaram	Fourth Indian Conference in Ocean Engineering, NIO, Goa	4-6 Sept. 91
8.	Dr.S.Neelamani	-do-	-do-
9.	Dr.S.Neelamani	National Seminar on offshore structures, Andhra Univesity, Waltair	28-29 Feb. 92
10.	Sri R. Natarajan	Fourth Indian Conference on Ocean Engg. at NIO, Goa	4-6 Sept. 91
11.	Sri V.Ananthasubramanian	Computed Aided Design of Ships, IIT Kharagpur	1-5 Mar. 92
12.	Sri V.Padmaraj	-do-	-do-

4.12.9 Invited Lectures Delivered by the Faculty in Academic Institutions/Public Sectors

Sl.No.	Name of the Faculty	Topic of the Lecture	Delivered at	Date
1.	Dr.V.S. Raju	Foundation aspects	MECON, Ranchi	Dec.5, 91
		Inaugural address in INCODE 91	NIO, Goa	Sept.3-6, 91
		Civil Foundation for large structures	RESOT Trg. Centre MRL, Madras	Oct. 29, 91
		Workshop on Mathematical modelling in Ocean Engg.	NAL, Bangalore	June 26, 91
2.	Prof.M.R.Pranesh	Invited lecture	NRSA, Hyderabad	Feb.27, 92
		Curriculum Development in Civil Engg.	National Institute of Engineering, Mysore	May 91
3.	Dr.R.Mahadevan	Invited lecture	Jadavpur Univ.	Feb. 27, 92
4.	Dr.V.Sundar	Wave Dynamics	National Institute of Port Management, Madras	Mar 23-25, 92
5.	Dr.S. Meenakshisundaram	Invited lecture at Short term course on dynamics of offshore structures	IIT Bombay	Dec. 91
6.	Sri V.Ananthasubramanian	Invited lecture	REC, Calicut	May 29-30, 91

4.12.10 Visits abroad

Sl.No.	Name of Faculty	Country	Period	Purpose
1.	Dr.V.G.Idichandy	Malaysia	June-July 91	To advise establishment of marine technology laboratory at University of Technology
2.	Dr.SP. Subramanian	Germany	01.05.91-31.07.91	Under DAAD Reinvitation Prog.
3.	Dr.R.L.Roy Choudhury	Germany	14.05.91-14.07.91	Under GTZ Prog.
4.	Dr.M.Ravindran	Germany	03.06.91-31.07.91	Under GTZ Prog.
5.	Dr.C.Ganapathy	Germany	03.06.91-31.07.91	Under GTZ Prog.
6.	Dr.J.S.Mani	Germany	31.07.91-31.03.92	Under GTZ Prog.
7.	Dr.S.K.Bhattacharyya	Germany	01.07.91-28.02.92	Under GTZ Prog.
8.	Dr.V.Sundar	Germany	02.01.91-15.07.91	Post Doc. Fellowship of Min. of Sci. & Technology
9.	Dr.S.Narasimha Rao	Kauaalampur	10.08.91	Pile Talk Conf.

4.12.11 Distinguished visitors to the Centre (important Dignitaries above the level of Professor)

Sl.No.	Name of the Visitor and Occupation	Date of Visit	Purpose of Visit (Lecture/Discussion)
1.	Chinese Delegation	5 Dec. 91	Visit to the facilities at OEC
2.	Dr.Joao Mario Salomao Honourable Minister of Construction & Water Republic of Mozambique	24 Feb.92	Visit to the facilities at OEC
3.	President of Malta	4 Jan. 92	Visit to the facilities at OEC

4.	Prof.Dr.Ing. P.Halbach Technical University Clausthal, Germany	24Oct.-4 Nov.91	Lectures and discussion
5.	Prof.Dr.-Ing. Werner Richwien, University of Hannover, Germany	15-29 Feb. 92	Lecture and discussion
6.	Prof.Dr.Ing. W. Abicht, Univ. of Hamburg, Germany	29 Feb.- 21 Mar. 92	Lecture and discussion
7.	Prof.Dr.Ing. H.Kaldenhoff Univ. of Wuppertal Germany	5-21 Mar. 92	Lecture and discussion
8.	Prof.Dr.Ing.H.Soding Univ. of Hamburg	21 Feb.- 21 Mar. 92	Lecture and discussion

4.12.12 Sponsored Projects

Title	Period	Funding Agency	Amount (in Lakhs)	Coordinator(s)
Technology Cell for utilisation of mineral waters in DSVPT of high performance cements and concretes	2 years	MHRD, GOI	20.0	Dr.K. Ganesh Babu Prof.P.Srinivasa Rao (Civil Engg.)
Development of finite element analysis capability for vibration of plated structures and shells submerged in fluid incl. fluid structures interaction modelling	3 years	DAE	4.21	Prof.C.P.Vendhan Dr.S.K.Bhattacharyya
DOD-IIT Madras Cell for coastal ocean design and predictive system	3 years	DOD	36.6	Prof.V.S. Raju
Implementation of operational level storm surge model under CODAPS cell	3 years	DOD	2.5	Prof.V.S. Raju
Site specific studies on wave energy under CODAPS cell	3 years	DOD	2.5	Prof.V.S.Raju Prof.M.Ravindran Dr.S.Neelamani Dr.R.Parimelalagan
Development of numerical models for prediction or nearshore phenomena under CODAPS cell	3 years	DOD	9.0	Prof.V.S.Raju Dr.R.Mahadevan

4.12.13 Major Consultancy Assignments

Title	Organisation	Amount (Rs.)	Coordinator(s)
Improving the manoeuvring qualities of 45000T Bulker	Shipping Corporation of India, Bombay	2,00,000	Dr.R.L.Roy Choudhury Shri P. Sambandan
Detailed analysis, design and engg. including preparation of reports for multipurpose cargo berth	Paradip Port Trust	4,00,000	Prof.V.S.Raju
Design quality control and of floating platforms	Central Pollution Control Board, New Delhi	35,000	Prof.C.Ganapathy
Foundation consultancy and soil investigation	VAX Consultants, Madras	25,000	Prof.S.Narasimha Rao
Vibration measurements for L & T House	ECC Construction Group	25,000	Prof.V.S. Raju
Foundation consultancy	ESSAR Projects Ltd. Bombay	1,00,000	Prof.V.S. Raju
Foundation design and other related aspects	ESSAR Project Ltd. Visakapatnam	3,00,000	Prof.V.S. Raju
Strengthening of hanger shed	Airforce Station, Avadi	40,000	Prof.C. Ganapathy Prof.M.R. Pranesh

Advise and design of foundation	Garrison Engineer, Avadi	40,000	Prof.K. Muthukrishnaiah
Analysis and design of coal handling facility at Tuticorin	Cemindia, Calcutta	5,00,000	Prof.V.S. Raju
Resistance test and stability calculation	Gogha Shipyard	40,000	Dr.R.L.Roy Choudhury Sri.P.Sambandan
Analysis and Model studies of underwater bodies	DRDL, Hyderabad	9,00,000	Prof.M. Ravindran Prof.C.P. Vendhan Dr.V.G. Idichandy
Design of structure for wind farm at Muppanthal near Tirunelveli	Tamilnadu Newsprint & Papers Ltd. Trichy	1,00,000	Prof.V.S. Raju
Model testing of polymetric craft	Sri AMM Murugappa Chettiar Research Centre, Madras	29,000	Prof.M. Ravindran
Remedial Measures for heavy workshop	Madras Port Trust	50,000	Dr.K. Ganesh Babu

4.12.14 Honours and Awards

Name of Faculty	Honours/Awards	Purpose
Dr.J.S. Mani	Cash your idea Award 1991 by Central Board of Irrigation and Power	Design of Y-frame floating breakwater

4.12.15 Research Publications

1. S. Narasimha Rao, Y.V.S.N. Prasad and M.D. Shetty, "The behaviour of screw piles in Cohesive Soils", Soils and Foundations, Jl. of Japanese Society of Soil Mech. & Found. Engg., Vol.31, 1991, pp.35-50.
2. S.K. Bhattacharyya & C.P. Vendhan, "Wave propagation in semi- infinite plane anisotropic thin circular shells, Journal of Sound & Vibration, 1991, 149(1), pp.71-82.
3. B.H. Bharatkumar, R. Mahadevan and M.R. Pranesh, "Flume confinement effect on diffracted wave field around vertical cylinders", Ocean Egnieering, 1991, vol.18, pp.521-533.
4. R. Sundaravadivelu and K.S.S.R.CH. Varaprasad, "Design of single point sub-surface deep sea moorings", Ocean Engineering, Pergmon Press, 1991, Vol.18 No.5, pp.397-404.
5. R. Sundaravadivelu, M. Harikrishna Babu and R. Murugaganesh, "Experimental investigation on a single point buoy mooring system", Ocean Egnieering, Pergamon press, 1991, Vol.18, No.5, pp.405-417.
6. C. Kalyani, SP. Subramanian, and M.M. Ali, "Study of Seasonal Variability of Ocean Currents in the Arabian Sea Using Geosat Altimeter Data", International Journal of Offshore and Polar Engineering, Edinburgh.
7. C.G. Nandakumar and K. Rajagopalan, "Stability Analysis of subsea shells using constant meridional curvature finite element", Int. J.Computers & Structures, 1991, Vol.39, pp.249-256.
8. V.S.R. Murthy, C.L. Rao and K.Rajagopalan, "Minimum Weight optimization of offshore jackets", J.of Offshore Mechanics, 1991, Vol.113, pp.292-297.

9. S.Meenakshisundaram and C.K. Madheswaran,"Wave forces on a single and on a group of cylinders in response to two wave spectra of same significant wave height", Ocean Engineering, 1991, Vol.18, pp 297-315.
10. S. Neelamani, V. Sundar,"Interaction of Large vertical cylinders in random wave fields", Tenth Australian Conference on Coastal & Ocean Engineering, University of Auckland, Auckland, New Zealand, 1991, Vol.2-6.
11. S. Neelamani, B.H. Bharatkumar & R. Mahadevan,"Flume confinement effect on wave induced dynamic pressures on a single vertical cylinder", National Seminar on Offshore Structures, Andhra University, Visakhapatnam, 28-29 Feb.1992, pp C-15 to C- 23.
12. S. Neelamani,"A critical appraisal on establishing a water wave flume", National Seminar on Offshore Structures, Andhra University, 28-29 Feb.1992, pp C-25 to C-30.
13. M.S. Reddy and S. Neelamani,"Wave transmission and reflection characteristics of a partially immersed rigid vertical barrier", Ocean Engineering, 1991.
14. S. Neelamani and M.S. Reddy,"Performance characteristics of a rigid surface & submerged horizontal & partially immersed vertical plate as breakwater". Second caribbean Conference on fluid dynamics, University of West Indies, St. Augustine, Trinidad, West India, Jan.5-8, 1992.
15. V.G. Idichandy,"Instrumentation for Structural Integrity Monitoring of Offshore Jacket Platforms", reports in applied measurements (Germany), 1991, Vol.7 No.2 pp.35-38.
16. V.G. Idichandy,"Instrumentation for Monitoring Large structures" International conference on Bridge and Flyovers 1991, India Tata McGraw Hill, pp.277-283.
17. V.G. Idichandy and C. Ganapathy,"Influence of Marine growth and Deck Mass on the dynamic response of fixed offshore platforms. Fourth International conference on Ocean Engineering, INCOE-91, Goa, India, pp.323-328.
18. M. Santhanam, P. Sambandan and V.G.Idichandy," Instrumentation for tracking a self-propelled ship model" National symposium on Ocean Electronics 1991, Cochin.
19. J. S. Mani,"Design of Y-frame floating breakwater", Jl. of Waterway Port, Coastal and Ocean Engineering, 3-4, 1991 Vol.117 No.2, pp 105-119.
20. R. Natarajan,"Analysis of heaving motion of a moored offshore floating platform in regular seawaves",International symposium on hydro-and aerodynamics in marine engineering, Bulgaria, 28.10.91 to 1.11.91.
21. R. Natarajan,"Computer simulated side launching of an offshore supply vessel", Seventh international conference on computer applications in the automation of shipyard operation and ship design, Brasil, 10.9.91 to 13.9.91.
22. R. Natarajan,"Mooring analysis of a semisubmersible ", Fourth Indian conference on ocean engineering, N.I.O. GOA. India., 4.9.91 to 6.9.91.

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27. S. Narasimha Rao, K. Mallikarjuna Rao and K. Venkateswaralu, "Studies on pile cap contribution in pile groups", International conference - Pile Talk-91, Kaula Lampur, Malaysia, 1991, pp.115- 121.
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31. B.H. Bharatkumar, M.R. Pranesh and R. Mahadevan, "Sidewall effects on diffraction studies in flume - Proceedings, 4th INCOE 91, Goa, Sept. 1991, pp.409-415.
32. J.S. Mani and M.R. Pranesh, "Transverse draft coefficients for horizontal tubular members", Proceedings, 4th INCOE 91, Goa, Sept. 1991, pp.309-314.
33. S. Narasimha Rao, C.V. Prasad, G. Rajasekaran and V.Hanumantha Rao, "Performance of stone columns in soft marine clays", Proc. of Indian Geotechnical conf. Surat, Dec. 1991, pp.403-406.
34. S. Meenakshisundaram, "Probabilistic model for wave forces", at the Fourth Indian Conference on ocean engineering, held at, NIO, GOA, 4-6 Sep.1991.
35. Usha Natesan and SP. Subramanian, "Wind speed comparison of Arabian Sea and Bay of Bengal with the aid of satellite data", International offshore and polar engineering conference, Edinburgh, 11-16 August,91, p.23.

36. Usha Natesan and SP. Subramanian, "Pattern recognition of shoreline trend of south east coast of India", Fourth Indian Conference on ocean engg. Goa, 4-6, Sep.91, pp.417-418.
37. SP. Subramanian and R. Ramasamy, "Waste land utilisation in the vicinity of site proposed for Ennore satellite port near Madras", National symposium on remote sensing of environment and annual convention of Indian society of remote sensing (ISRS), Madras, 10-12, Dec. 91.
38. E.M.S. Nair, P.A.S. Moorthy, C. Ganapathy and N.G. Nair, "Effect of weld in crack growth of structural steel members", International symposium on fatigue and fracture in steel and concrete structure, Madras, Dec.19-21, 1991, pp.307-316.
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41. S.L. Sivarama Raju and C. Ganapathy, "Lattice type Articulated Tower for deep sea mooring", Proc. Fourth Indian conference in ocean engg. N.I.O. GOA, Sept. 1991, pp.377-382.
42. E.M.S. Nair, C. Ganapathy and N.G. Nair, "Residual life of welded joints in ocean structures", Proc. Fourth Indian conference in ocean engg. N.I.O. GOA, Sept.1991, pp.505-510.
43. Aji Varghese and C. Ganapathy, "transverse Strength of ships and floating structures", Proc. Fourth Indian conference in ocean engg. N.I.O. GOA, Sept.1991, pp.135-142.
44. M.R. Pranesh, "Curriculum for civil engg. education - An appraisal". paper presented at one day workshop conducted under ISTE, NIE chapter, May 19, 1991.
45. K. Muthukrishnaiah and V.S. Raju, "Dynamic soil-pile parameters", Proc. second international conf. on recent advance in geotechnical earthquake engg. and soil dynamics, St.Louis, Missouri(USA), March 11-15, 1991.
46. M. Ravindran and Paul Mario Koola, "Energy from sea waves- The Indian wave energy programme", current science journal, Vol.60, June 1991, pp.676-680.
47. S. Daniel Jacob and R. Mahadevan, "Directional ocean wave spectra from 'sar' imagery"., INCOE, GOA, Sep. 1991.
48. J.S. Mani, S. Vijayakumar and R. Mahadevan, "Diffraction of waves by submerged breakwaters", INCOE, GOA, Sep. 1991.
49. V. Subramanian and R. Mahadevan et al, "Storm surge simulation with two numerical schemes", INCOE, GOA, Sep. 1991.

50. T. Swaminathan and R. Mahadevan et al, "Estimation of extreme wave heights for Madras coastal region", INCOE, GOA, Sep. 1991.
51. V.S. Raju, M. Ravindran and Paul Mario Koola, "Energy from sea waves-the Indian wave energy programme", Third symposium on ocean energy utilisation, Jan. 22-23, 1991 JAMSTEC, Japan.
52. V.S.Raju and S. Neelamani, "Determination of wave forces on an oscillating water column type of wave energy caisson-A critical Appraisal", Fourth Indian conference on ocean engg. Sept. 4-6, 1991.
53. V.S. Raju and S. Seetharama Raju, "Lateral forces on piles due to seabed (Mud) movements", Fourth Indian conference on ocean engg., Sept. 4-6, 1991.
54. S. Seetharaman, V. Mustafa and C.P. Vendhan, "Linearised spectral analysis of offshore structures including static correction", Fourth Indian conference on ocean engg., Sept. 1991, NIO, GOA, pp.329-335.

4.12.16 Other relevant details

The Centre has 5 Scientific Officers, 1 non-teaching technical and 22 non-teaching non-technical staff.

Wave Energy Project: The Wave Energy Group at OEC, IIT Madras has been coordinating and implementing a project to convert wave energy to electricity. This project is sponsored by DOD, Govt. of India, started in 1983 as laboratory research and at present OEC, IIT Madras has successfully commissioned a 150 KW wave energy plant off Thiruvananthapuram coast in Kerala. At present trial runs are in progress. This multifunctional breakwater wave energy module is the 2nd of its kind in the world. Based on this a 2 MW wave energy plant is likely to come up shortly at the Thankasary harbour at Kollam, Kerala.

4.13 Physics Department

4.13.1 Introduction

The Department of PHYSICS was established in 1959. Now Ph.D., M.Tech. and M.Sc., programmes are being offered. The major areas of teaching and research of the Department are:

- | | |
|--|---|
| 1. Solid State Physics | 6. Photonics and Lasers |
| 2. Low Temperature Physics | 7. Applied Optics |
| 3. Thin Film Physics | 8. X-rays and Crystal Structure Analysis |
| 4. Microwave Physics | 9. Theoretical Physics (Atomic and Molecular Physics, Statistical Physics and Field Theory) |
| 5. Magnetic Resonance and Magnetic Materials | |

4.13.2 New Courses Introduced

The following new course was introduced during the period under report.

Course No.	Title	Structure	Faculty
PH 763	Non-linear Optical Processes and Devices	3 0 0 3	Y.V.G.S.Murty T.A. Prasada Rao

4.13.3 Details of Faculty

Name and Qualification

Major areas of Specialisation

Professors

V.Balakrishnan, Ph.D(Brandeis)	Theoretical and Statistical Physics
M.P.Kothiyal, Ph.D(IIT Madras)	Optical Instrumentation in Holography and Speckle Phenomenon
(Mrs.)Mahaseshasayee, Ph.D(RPI, NY)	X-ray Crystallography
Y.V.G.S.Murti, Ph.D(IIT Madras)	Solid State Physics, Photonics
C.K.Narayanawamy, Ph.D(Madras)	Spectroscopy and Optics
S.Radhakrishna, Ph.D(IIT Delhi)	Solid State Physics and Devices
K.V.S.Rama Rao, Ph.D(Andhra)	Magnetism and Magnetic Materials
R.Ramji Rao, Ph.D(IIT Madras)	Lattice Dynamics, Theoretical Physics
G.Rangarajan, Ph.D(IISc.)	Low Temperature Physics, Solid State Physics
S.B.S.Sastry, Ph.D(IIT Madras)	Solid State Physics, Cryogenics
R.S. Sirohi, Ph.D(IIT Delhi)	Modern Optics, Optical Instrumentation
B.M.Sivaram, Ph.D(Sussex)	Laser Physics, Quantum Electronics
V.Sivaramakrishnan, Ph.D(Bombay)	Solid State Physics, Thin Film Physics
J.Sobhanadri, Ph.D(Andhra)	Microwave Techniques, Dielectric and Magnetic Materials
K.Viswanatha Reddy, Ph.D(IIT Madras)	Diffusion, Electromigration and Magnetism

Associate Professors

20
V.Damodara Das, Ph.D(SPU, Vidyanagar)
V.R.K.Murthy, Ph.D(IIT Madras)
A.V.Narasimham, Ph.D(IIT Madras)
P.C.Deshmukh, Ph.D(IIT Madras)
S.Srinivasan, Ph.D(Nagpur)

Thin Film Science and Technology
Microwave Physics, Dielectrics
Theoretical Physics, Ultrasonics
Atomic and Molecular Physics
X-ray Crystallography, Educational Technology

Assistant Professors

16
B.S.V.S.R.Acharyulu, Ph.D(IIT Madras)
B.S.V.Gopalam, Ph.D(IIT Madras)
K.Hariharan, Ph.D(IIT Madras)
J.Majhi, Ph.D(IIT Madras)
V.S.Murty, Ph.D(IIT Madras)
T.S.Natarajan, Ph.D(IIT Madras)
T.A.Prasada Rao, Ph.D(Andhra)
V.Ramachandran, Ph.D(IIT Madras)
G.Sreenivasa Murthy, Ph.D(IIT Madras)
K.Srinivasan, Ph.D(IIT Madras)
Sriraman Srinivasan, Ph.D(IIT Madras)
A.Subrahmanyam, Ph.D(IIT Kharagpur)
B.Subrahmanyam, Ph.D(Andhra)
V.Venkateswara Rao, Ph.D(IIT Madras)

Solid State Physics, Electronics
Physics of Semiconductor devices
Solid State Physics, Solid State Ionics
Semiconductor Physics
Solid State Physics, Magnetic Resonance
Electronics and Instrumentation, Dielectrics
Lasers and Spectroscopy
Solid State Physics, Lattice Dynamics
X-ray Crystallography
Electro Optics, Dielectrics
Thin Film Physics, Magneto Optics
Semiconductor Physics
Condensed Matter Physics
Optical Instrumentation, Holography,
Image Processing
X-ray Crystallography
Field Theory and High Energy Physics

T.M.Vimala, Ph.D(IIT Madras)
S.Lakshmi Bala, Ph.D,

Chief Design Engineer

D.K.Sharma, Ph.D(IIT Madras)

Optical Instrumentation, Lens Design

Senior Scientific Officer Gr.I

V.Sankaranarayanan, Ph.D(IIT Madras)
Y.Syamasundara Rao, Ph.D(IIT Madras)

Low Temperature Physics
Dielectrics, Instrumentation

Senior Scientific Officer Gr.II

K.Sarangapani, M.Sc.(Madras)

Electronics and Instrumentation

4.13.4. Students on Roll

Programme	I Year		II Year		III Year		IV Year		V Year		Total		Total
	M	W	M	W	M	W	M	W	M	W	M	W	
Ph.D	8	2	7	2	6	5	11	5	13	5	45	19	64
M.Tech	5	-	5	-	-	-	-	-	-	-	10	-	10
M.Sc.	16	10	13	7	-	-	-	-	-	-	29	17	46
Total	29	12	25	9	6	5	11	5	13	5	84	36	120

4.13.5 Number of Scholarships / Fellowships holders

Programme	Institute	CSIR	Others	Total
Ph.D	33	9	22 (includes two external and one IIT Staff)	64
M.Sc.	6	-	-	6
Total	39	9	22	70

4.13.6 No. of Degrees Awarded

Programme	Number
Ph.D	9
M.Tech	6
M.Sc.	16
Total	31

4.13.7 Instruments/Equipments Designed and New Methods Developed

1. Vibrating Reed Apparatus to measure low frequency velocity and attenuation in materials.
2. A new method for measuring the electro-striction coefficients in crystals.
3. Capacitance-voltage measurement.
4. Contact potential difference set up.
5. Facilities to measure magnetostriction and magnetomechanical coupling coefficient

4.13.8 New Facilities added and Major Equipment procured

* Personal Computers

4.13.9 Short-term Courses / Workshops / Seminars / Symposia / Conferences organised

Sl. No.	Title of Course/Workshop/Seminars/Symposia/Conf.	Duration	Co-ordinator(s)
1.	Short term course on Current Developments in Microwave Materials for Electronic and Microwave Applications	17.6.91-29.6.91	Dr.J. Sobhanadri Dr. V.R.K.Murthy
2.	An Introductory Course on Neutrons as Probes of condensed matter sponsored by the Inter University Consortium for DAE facilities	10.6.91-21.6.91	Dr.K.V.S. Rama Rao
3.	One day Seminar on Current Directions in Physics Research	27.7.91	Dr.Y.V.G.S.Murti
4.	A course on Optical design and Computation	3.9.91-29.11.91	Dr. R.S. Sirohi Dr. M.P. Kothiyal
5.	Seminar on Holography and Fiber Optics	6.1.92-7.1.92	Dr. R.S. Sirohi
6.	Conference on the Physics and Technology of Semiconductor devices and Integrated Circuits	5.2.92-7.2.92	Dr. B.S.V.Gopalam

4.13.10 Short term courses/Workshops/ Seminars / Symposia / Conferences / Training attended by the Faculty in recognised Academic Institutions and Public Sectors.

Sl.No.	Name of the Faculty	Title	Period/Duration
1.	Dr.V.S. Murty	9th National Symposium on Radiation Physics, Osmania Univ., Hyderabad	27.11.91-29.11.91

2.	Dr.V.Damodara Das	6th International Workshop on the Physics of Semiconductor Devices, Solid State Physics Laboratory, New Delhi	2.12.91-6.12.91
3.	Shri M.Veerabhadra Rao	6th Annual Convention of Indian Association of Physics Teachers, American College, Gandhigram	19.11.91-21.11.91
4.	Dr.V.Balakrishnan	Workshop on Nonlinear Waves and Turbulence, Jawaharlal Nehru Univ. Delhi	23.12.91-29.12.91
5.	Dr.K.Viswanatha Reddy	VI International Workshop on the Physics of Semiconductor Devices, Solid State Physics Laboratory, Delhi	2.12.91-6.12.91
6.	Shri S.Sainathan	Short term course on Acoustooptic Interactions and its applications to real time signal processing, IIT Delhi	9.1.92-10.1.92
		Workshop on Statistical Physics of Disordered Solids, Glasses and Polymers, S.N.Bose National Centre for Basic Sciences	27.12.91-7.1.92
7.	Dr.R.S.Sirohi	Workshop on Contemporary Physics at DAVV, Indore	8.2.92-9.2.92
8.	Dr.A.V.Narasimham	Two week programme on Appreciation of Nuclear Science and Technology at BARC, Bombay	2.12.91-14.12.91
9.	Dr.V.Damodara Das	International Conference on Semiconductor Devices	Feb. 92

4.13.11 Invited Lectures delivered by the Faculty in Academic Institutions/Public Bodies

Sl.No.	Name of the Faculty	Topic of the Lecture	Delivered at	Date
1.	Dr.R.S.Sirohi	Methods of collimation	SSS Institute of Higher learning, Prasanthinilayam	26.12.92
2.	Dr.V.Ramachandran	Ultrasonic behaviour of $YBa_2Cu_3O_7$	IIT Delhi	8.12.1991
3.	Dr.S.B.S.Sastry	Thermoluminescence application	Baroda	Feb. 91
4.	Dr.K.V.S.Rama Rao	Magnetism & Magnetic Materials	Workshop on Materials Research, Indore	20.8.91

4.13.12 Visits abroad

Sl.No.	Name of the Faculty	Country Visited	Date	Purpose of Visit
1.	Dr.K.Viswanatha Reddy	France	May-June 91	Collaborative Research
2.	Dr.J.Majhi	U.K.	27.5.91-5.7.91	To visit Loughborough Univ. under HED Link Programme Sponsored by British Council
3.	Dr.A.Subrahmanyam	Germany	23.8.91-24.8.91	Availing Alexander Humboldt Fellowship

4.13.13 Distinguished visitors to the Department (Important Dignitaries above the level of Professors)

Sl.No.	Name of the Visitor	Date of Visit	Purpose of Visit(Lectures/Discussion)
1.	Dr.C.M.William Head of Applied Magnetics Group, Naval Research Laboratory, Washington, D.C. USA	15.3.92-16.3.92	Delivered lecture/Discussions

2.	Prof.W.Jeitschko, Director Inorganic Chemistry Institute, University of Munster, Germany	12.3.92	Delivered Lecture
3.	Prof.Martin D.Kruskal, Princeton University	27.1.92	Discussions
4.	Dr.Alfons Weber and Dr.B.Stephen Carienter, National Institute of Standards and Technology, (NIST), Washington	7.9.91-8.9.91	Discussion
5.	Prof.V.Ivanov Institute for General and Inorganic Chemistry, Soviet Academy of Sciences, Moscow, USSR	29.4.91	Delivered lectures
6.	Dr.K.D.Hinsch, Univ. of Oldenberg, Germany	21.11.91-9.1.92	Delivered lectures

4.13.14 Sponsored Projects

Title	Period	Funding Agency	Amount (in Lakhs)	Co-ordinator(s)
Location of Hydrogen positions in Lave Face compound of ErNi ₂ by Neutron diffraction	April 91-April 94	IUC-DAEF	1.000	Dr.K.V.S. Rama Rao
Study on the Heterojunctions of Indium Tin Oxide (ITO)/Silicon prepared by Spray Pyrolysis and Electron Beam Evaporation Technique	2 years	CSIR	1.614	Dr.A.Subrahmanyam
Fundamental Investigations on Hydrogenated Mixed Alloys of Rare Earth and Transition Metals	3 years	INDO-US	12.90	Dr.K.V.S.Rama Rao Dr.Y.V.G.S.Murti Dr.K.V.Reddy
Development of Confocal Scanning Microscope	3 years	CSIR	7.315	Dr.M.P.Kothiyal Dr.R.S.Sirohi
Ionization of atoms by electromagnetic radiation	2 years	MHRD	8.260	Dr.P.C.Deshmukh
Development and Characterization of temperature compensated dielectric for applications in Microwave chip devices	2 years	DRDO	5.665	Dr.V.R.K.Murthy
Study on Optical methods of thermal distortion measurement	3 years	ICSR/ISRO	9.050	Dr.R.S.Sirohi Dr.M.P.Kothiyal

4.13.15 Major Consultancy Assignments

Sl.No.	Title	Organisation	Amount (in Lakhs)	Co-ordinator(s)
1.	Development and supply of giant magnetostrictive rods for SONAR application	NPOL, Cochin	24.35	Dr.K.V.S.Rama Rao
2.	Fabrication of Nd: Laser	RBCI, Defence Lab. Jodhpur	14.00	Dr.T.A.Prasada Rao
3.	Development of CPU card and software using 8748 Controller	M/s.Sietex Controls Ltd.	0.125	Dr.T.S.Natarajan
4.	Fabrication and Testing of beam	IGCAR, Kalpakkam	0.003	Dr.V.Venkateswara Rao

4.13.16 Honours and Awards

Sl.No.	Name of the Faculty/Students	Honours/Awards
1.	Dr.K.V.S.Rama Rao	Senior Member, IEEE, U.S.A.
2.	Subrata Dutta, (II M.Sc Physics), B.Vijaya Bhaskar, (I M.Sc Physics)	I prize in the Science Quiz Contest for Post Graduate students, Conducted by the consortium of Science Associations

4.13.17 Research Publications

1. M.R.Murti and K.V.Reddy, Study of Phosphorous Diffusion in Silicon by Neutron Activation Analysis, Indian J.Pure and Appl Phys. 29, 1991, 51-54.
2. M.R.Murti and K.V.Reddy, Recombination Properties of Photogenerated Minority Carriers in Polycrystalline Silicon, J.Appl. Phys 70, 1991, 3683-3688.
3. Anjali Rastogi and K.V.Reddy, Self Diffusion in InSb Films, Proceedings of VIth International Workshop on Physics of Semiconductor Devices, 2-6 Dec. 1991, 448-450.
4. J.Sobhanadri, M.R.Murti and K.V.Reddy, Transient Photoconductivity and Laser Lifetime, Studies in Polycrystalline Silicon VIth International Workshop on Physics of Semiconductor Devices, 2-6 Dec. 1991.
5. K.V.Sriram, V.Parthiban, M.P.Kothiyal and R.S.Sirohi, Simulation of Wedge Plate Interferometer using Holo Optical Elements, J.of Optics Vol 20, 1991.
6. K.V.Sriram, M.P.Kothiyal and R.S.Sirohi, Measurement of focal length and radius of curvature using compensation of collimated beam, Opt. Laser Technol. 23, 1991, 241-246.
7. M.P.Kothiyal, K.V.Sriram and R.S.Sirohi, Setting Sensitivity on Talbot Interferometry, Opt. Laser Technol. 23, 1991,.
8. V.Kumar, G.Aravamudam and M.Seshasayee, Synthesis and Struture of Bisiido bis (Diisopropyldtc)Te(IV), J.Cryst.Space. Res. 21, 1991, 65-68.
9. R.Vijaya, Y.V.G.S.Murti, G.Sundararajan and T.A.Prasada Rao, Optical phase conjugation in iodine solutions, Proceedings of the 10th Optical Society of India Symposium on Optical Science and engineering, 1990, published as Kodaikanal Observatory Bulletins II, 1991.
10. R.D.Banhatti, Y.V.G.S.Murti and A.L.Laskar, A theoretical calculation on Schottky defects in AgCl, Phys. Stat. Solidi 164, 1991, 357.
11. R.Vijaya, Y.V.G.S.Murti, T.A.Prasada Rao and G.Sundararajan, Nonresonant third-order response of polyphenyl acetylene, J.Appl.Phys. 69, 1991, 3429.
12. K.R.Murali and Y.V.G.S.Murti, Bleaching of color centers in NaF crystals with Laser Pulses, Radiation Effects and Defects in Solids, 1991,.

13. C.V.Krishnamurthy and Y.V.G.S.Murti, Solid Solutions of alkali halide compounds -I: Configurational and vibrational contributions, Phys. Rev. B43, 1991, 14206.
14. C.V.Krishnamurthy and Y.V.G.S.Murti, Solid Solutions of alkali halide compounds -II: Physical properties and vacancy contributions, Phys.Rev. B43, 1991, 14219.
15. Radha D. Banhatti and Y.V.G.S.Murti, An Extended Polarizable Point Ion Model for Schottky Defects, Phys. Stat. Solidi 6, 166,1991, 15.
16. C.Vijayan and Y.V.G.S.Murti, Photothermal imaging by F₂ colour centre conversion in KCl doped with gadolineum, Optica and Laser Technology, 1991,.
17. Y.V.G.S.Murti, Photonic Materials, Proceedings of the IX International Course on Physics of Materials, ed. K.Srinivasan, Asian Physical, Society, 1991, 1-9.
18. R.Ramji Rao and A.Padmaja, Fourth-order elastic constants and second pressure derivatives of white tin, Can J.Physics, 69, 1991, 801,
19. L.S.Vaidhyanathan and G.Rangarajan, Intragrain Critical Current Density of the Superconducting compounds of the type (Pr_x Y_{1-x})Ba₂Cu₃O_{7-y} Cryogenics, 31, 1991, 913-917.
20. L.S.Vaidhyanathan, C.K.Subramaniam, G.Rangarajan, DC Magnetization Studies of (Pr_x Y_{1-x})Ba₂Cu₃O_{7-y}), Bull. Mat. Sci. 14, 1991, 931-935.
21. L.S.Vaidhyanathan, A.M.Niraimathi, P.Majumdar, G.Rangarajan M.Murdalidhar, D.Mangapathi, M.Nagabhushanam and V.Haribabu, Role of Lead on the growth of the High T_c Phase in the Bi_{2-x} Pb_x Sr₂ Ca₂ Cu₃ O_y systems, Bull. Mat. Sci. 14, 1991, 913 919.
22. A.V.Narasimham, Ultrasonic Absorption, Dispersion and Relaxation in CS₂, Ind. J.Pure and App. Physics, 29, 1991, 45- 47.
23. A.V.Narasimham, A simple understanding of Ultrasonic Relaxation Distribution in Organic Liquids, Physics Education 8, No.2, 1991, 96-102.
24. A.V.Narasimham, Ultrasonic Absorption and Relaxation in some liquids, Ind.J.Physics 65B, 1991, 312-318.
25. A.V.Narasimham and S.K.J.Al-Ami, Pressure variation of Ultrasonic absorption, Acoustica, 75, 1991, 276.
26. R.Kondepudi and S.Srinivasan, Collection parameters of luminescent solar concentrators using mixed dye solutions, Indian Journal of pure and Applied Phsics, 29, 1991, 438-442.
27. V.Kishan Kumar, B.S.V.S.R.Acharyulu and S.B.S.Sastry, Eu²⁺ Luminescence in Alkali Sulphate Lattices, J.Material Science 26, 1991, 1067-1072.
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52. P.J.Masalkar, V.V.Rao and R.S.Sirohi, Fabrication of Gradient - Index lens by Ion-Exchange in Glass, *Kodaikanal Observatory Bulletins, V.II* 57-61, 1991.
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4.13.18 (b) Conference Presentations

1. K.V.Reddy, Grain Boundary Diffusion and Electromigration in Metallic Films, International Conference on Diffusion and Defects in Solids, 26 June-4 July, 1991, USSR.
2. F.Beniére, M.Beniére, K.V.Reddy and S.K.Sen, Heterodiffusion in Ionic Crystals, International Conference on Diffusion and Defects in Solids, 26 June - 4 July, 1991, USSR.
3. R.Vijaya, Y.V.G.S.Murti, G.Sundararajan and T.A.Prasada Rao, Third order optical response of pure and doped polyphenyl acetylene: a wavelength dependence study, International Conference on Frontiers of Polymer Research, New Delhi, January 1991.
4. V.Damodara Das, S.Aruna and K.S.Raju, Orientations of Microcrystallites in Vacuum-Deposited Thin Films of the Ternary Semiconductor Se₁₀Sb₁₀Te₈₀-An Electron Diffraction Study, International Conference on Metallurgical Coatings and Thin Films, San Diego, California, U.S.A. April 1991.
5. V.Damodara Das, S.Aruna and K.S.Raju, Evaluation of the Nature of Scattering Index U_g from the Thermoelectric Power - Thickness Data in the case of the Ternary Semiconductor Se(10) Sb (10)Te(80) Thin Films, Spring Meeting of the Materials Research Society, Anaheim, California, U.S.A. April 1991.
6. V.Damodara Das, Photoelectrodes for Solar Energy Conversion Current Directions in Physics Research - A One Day Seminar, IIT., Madras, July 1991.
7. V.Balakrishnan, G.Nicolis and C.Nicolis, Invariant Distributions for Noisy, Fully Chaotic 1D Maps Workshop on Nonlinear Waves & Turbulence, 23-29 Dec. 1991, held at JNU, New Delhi.
8. T.Dhaya, K.V.Sriram, M.P.Kothiyal and R.S.Sirohi, Setting Sensitivity for three different types of binary dual field gratings in Optical testing using Talbot interferometry :A comparative evaluation, National Symp. on Instrumentation, Cochin Nov.26-28 1991,.
9. S.Patnaik and M.Seshasayee, Ionic Conductivity Studies on AgI - Ag₂O-V₂O₅ systems, International Conference on disordered materials, Indore, Jan. 1991.
10. S.Patnaik and M.Seshasayee, Ionic Conductivity and Structure Studies on Superionic Glass AgI-Ag₂O-CrO₃, National Seminar on Crystallography, Jaipur.
11. M.Seshasayee and K.Muruganandam, Molecular dynamics studies on Li₂ - SiS₂ systems, National Seminar on Crystallography, Jaipur.
12. R.Vijaya, Y.V.G.S.Murti and K.R.Murali, Resonant third order nonlinearity in Styryl 9, Proc. International Conference on Quantum Optics, Hyderabad, January 1991.

13. R.Vijaya, Y.V.G.S.Murti, G.Sundararajan and T.A.Prasada Rao, Third order optical response of pure and doped polyphenyl actelyne: a wavelength dependence study, International Conference on Frontiers of Polymer Research, New Delhi, January 1991.
14. R.Vijaya, Y.V.G.S.Murti, K.R.Murali and T.A.Prasada Rao, Resonant Third Order Optical Nonlinearity in Styryl 9, International Conference on Quantum Optics, University of Hyderabad, Hyderabad 1991,.
15. B.N.Lakshminarasappa, N.Devaraj and Y.V.G.S.Murti, Thermoluminescence of X-irradiated NaBr Crystals, National Seminar on Thermoluminescence and its applications, Baroda 1991,.
16. P.J.Masalkar, Supriya Seshadri, R.S.Sirohi and V.V.Rao, Fabrication of single mode waveguide devices by inverse ion exchange in glass, International Conference on Emerging Optoelectronics Technologies, I.I.Sc.,Bangalore Dec. 1991.
17. John Philip and T.A.Prasada Rao, Transient Birefringence in nematic liquid Crystals, Proc. International Conference FACSS XVII at Anaheim U.S.A. Oct. 1991.
18. John Philip and T.A.Prasada Rao, Temperature dependence of third order nonlinear susceptibility in nematic liquid crystals, Proc. Solid State Phy. Sym: Varanasi, Dec. 1991.
19. P.R.Ajit Kumar, G.A.Ramadas and V.Ramachandran, A vibrating reed apparatus to measure the sound velocity and attenuation in high T_c superconductors, DAE Symposium, Varanasi Dec. 1991.
20. M.V.Rao, G.Sreenivasa Murthy and K.Sarangapani, Rural based Physics Education - A three pronged approach, Sixth annual convention of Indian Association of Physics Teachers, Madurai and Gandhigram Nov. 1991.
21. K.Hariharan, C.Sangamithra and Mary Sukeshini, New Solid Electrolyte System: $\text{CuI} - \text{Ag}_2\text{O} - \text{MOO}_3$, International Conference on Solid State Ionics, SSI.8 Lake Louise, Canada Oct. 1991.
22. V.Subramaniam and J.Sobhanadri, Microwave Photo conductivity of Zn_3P_2 Semiconductor Fibre, Physics of Semiconductors, New Delhi. 1991.
23. Prita Nair, Mridula Joshi, B.M.Sivaram and J.P.Raina, Characteristics of Erbium Doped Fibre Lasers, International Conference on Emerging Opto Electronic Technologies, Bangalore 1991.
24. K.Elankumaran, G.Markandeyulu and K.V.S.Rama Rao, Investigation of Magnetic Properties of MnCo_xSb Solid State Physics Symposium, Banaras Hindu University, Dec. 21-24, 1991.

25. K.R.Dhilsha and K.V.S.Rama Rao, Investigation of Magnetic Properties of $Tb_{0.27}Dy_{0.73}Fe_{2-x}Co_x$ system, Solid State Physics Symposium, Banaras Hindu University, Dec. 21-24, 1991.
26. M.Senthil Kumar, K.V.Reddy and K.V.S.Rama Rao, Effect of Ni on the Magnetic Properties of $Ho_{0.85}Tb_{0.15}Fe_2$, Solid State Physics Symposium, Banaras Hindu University, Dec. 21-24, 1991.
27. R.Ramesh and K.V.S.Rama Rao, Hydrogen Absorption Studies on $Zr_{0.4}Ho_{0.6}Co_2$, Solid State Physics Symposium, Banaras Hindu University, Dec. 21-24, 1991.
28. B.Anusuya, V.S.Murty and K.V.S.Rama Rao, ESR Study of γ - Irradiated H_5IO_6 , Solid State Physics Symposium, Banaras Hindu University, Dec. 21-24, 1991.
29. A.M.Niraimathi, L.S.Vaidyanathan and G.Rangarajan, Magnetic behaviour of $NdBa_2Cu_{3-x}Ga_xO_{7-y}$, Solid State Physics Symposium, Banaras Hindu University, Dec. 21-24, 1991.
30. Anasuya Ranganathan, T.S.Natarajan, G.Rangarajan, S.Venkatachalam and P.T.Manoharan, Electrical transport in some polymetallo phthalocyanines, Int. Conf. on the Physics and Technology of Semiconductor Devices and Integrated Circuits, IIT, Madras, Feb.5-7 1992.
31. G.Rangarajan, Narayani Senthilkumaran, N.P.Raju, E.Gmelin and R.K.Kremer, Electrical, magnetic and thermal properties of ternary $A_2B_2O_7$ pyrochlores - a family of magnetic semiconductors, Int. Conf. on the Physics and Technology of Semiconductor Devices and Integrated Circuits, IIT, Madras, Feb. 5-7 1992.

4.13.19 Any other Relevant Details

The Department has Three Senior Scientific Officers Thirty one non-teaching technical and Twenty one non-teaching non technical staff.

4.14 Centre for Bio-Sciences and Bio-Technology

4.14.1 Introduction

The Bio-Sciences and Bio-Technology Centre was established in 1982. The centre now offers Ph.D. Programme.

4.14.2 Faculty Position

Name and Qualification

Major Areas of Specialisation

Professors

A.Baradarajan, Ph.D(IIT Madras) [Head]

Immobilized cell/enzyme reactors and modelling and kinetics of biosystems

Megha Singh, Ph.D (Corolina)

Bio-medical Engineering, Blood Rheology

R.Nagarajan, Ph.D(IIT Madras)

Computer applications in biosystems

C.A.Sastry, Ph.D(Bombay)

Environmental Engg, Bio-Chemical Engineering

Assistant Professors

(Mrs.) T.S. Chandra, Ph.D(IISc)

Microbiology and Fermentation

K.Lalitha, Ph.D(Mysore)

Biochemistry and Enzyme technology

T.Panda, Ph.D(IIT Delhi)

Process Development for industrial enzymes, protoplast fusion tech. and bioenergy

S.K.Rakshit, Ph.D(IIT Delhi)

Bioreactor optimization & downstream processing

T.Swaminathan, Ph.D(IIT Kanpur)

Environmental biotechnology and membrane processes

4.14.3 Visit of Faculty Members to other Institutions

S.No.	Name of Faculty	Place Visited	Purpose of visit	Date
1.	Dr.A.Baradarajan	Technical University, Hannover	Visiting Scientist under BMFT Indo-German programme	May-August 1991
2.	Dr.T.Panda	Invited by the Centre for Biotechnology Madurai Kamaraj University, Tamil Nadu	To deliver lecture to M.Sc (Biotechnology)	1991

4.14.4 Particulars of participation in Seminars/Symposia/Short Term Courses

Sl.No.	Name of Faculty	Title	Period/Duration
1.	A.Baradarajan	Presented a paper in International Meeting on Chemical Engineering and Biotechnology, Frankfurt, Germany	June 91

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|----------------------------------|--|---|-----------------|
| 2. | A. Baradarajan | Studies on fat-splitting of rice bran oil microbial enzyme in recycle continuous reactor, (P.Padmini and S.K.Rakshit) Indo-Swiss Seminar on Biotechnology Industrial Applications of Biotechnology, Bangalore | 1991 |
| 3. | A.Baradarajan | Studies on static mixers (K.Balu and M.Satyanarayana) AICHEM'91 - International Meeting on Chemical Engineering and Biotechnology Congress, Frankfurt, FRG | 9-15 June 91 |
| 4. | A. Baradarajan | (V.S.Ready and S.N.R.Rao) Diffusion coefficient of starch hydrolysis and glucose in co-immobilized and free calcium alginate beads, Western, Bonaventure, Los Angeles | 17-22 Nov. 1991 |
| 5. | A. Baradarajan | Chaired 3 technical sessions on Biotechnology, CHEMCON, Anna University | Dec. 91 |
| National Conferences | | | |
| 1. | T. Panda | 'Will biofuels fill the oil vacuum?' in Proc. National Seminar on Energy (The Energy and Fuel Users' Association of India) Seminar on "Energy Options for the 90's, Madras | 1991 |
| 2. | J. Anjani Kumari and T. Panda | Studies on intergeneric hybridization of <i>T.reesei</i> and <i>S.cerevisiae</i> : Comparative analysis of protoplast generation in two genus 31st Annual Conference of Association of Microbiologists of India, TANU, Coimbatore | 1991 |
| 3. | P.S.R.Babu and T.Panda | Characterization and performance of immobilized whole cell of <i>E.coli</i> containing penicillin amidase 31st Annual Conference of Association of Microbiologists of India, TANU, Coimbatore | 1991 |
| 4. | P.S.R.Babu and T. Panda | Improved process for the immobilization and stabilization of whole <i>E.coli</i> containing penicillin amidase, Proc.Indo-Swiss Seminar on Biotechnology, IVRI, Bangalore, Abst. No. 27 | 1991 |
| 5. | D.Subba Rao and T. Panda | Production of gluconic acid by <i>A.niger</i> , Comparative analysis of calcium gluconate and sodium gluconate methods, AFST (I) IX Convention on 'Application of Biotechnology on the Development of food processing Industries' | June 1991. |
| 6. | P.S.R.Babu and T. Panda | Biosynthesis of penicillin amidase in <i>E.coli</i> by chemostat culture mode CHEMCON'91, Anna Univ. Madras, Abst. for presentation, pp.208-209, | 1991 |
| 7. | K.Theodore and T.Panda | Production of extracellular enzymes from <i>T.harzianum</i> and their role on protoplasting of <i>T.reesei</i> mycelium, <i>ibid</i> - Abst. for presentation, pp.198-199 | 1991 |
| 8. | J.Anjani Kumari and T.Panda | Kinetics of regeneration of <i>T.reesei</i> and <i>Saccharomyces</i> sp. protoplasts, <i>ibid</i> - Abst. for presentation, p.185 | 1991 |
| 9. | D.Subba Rao and T. Panda | Comparative analysis of gluconic acid production using various treated cane molasses, <i>ibid</i> - Abst. for presentation, pp.201-202 | 1991 |
| International Conferences | | | |
| 1. | A.Venkataraman, J.Anjani Kumari, P.S.R.Babu and T. Panda | Critical analysis of process development on in-vitro growth of chick-embryo in Animal Cell Culture and Production of Biologicals (Proc. 3rd Annual Meeting of JAACT), Kyoto, Japan, Eds. Dordrecht, London, pp.47-52 | 1991. |
| 2. | A.Venkataraman and T.Panda | Studies on physiological aspect of in-vitro development of chick-embryo, <i>ibid</i> - Kyoto, Japan, pp.245-249 | 1991. |

3.	T.Panda and V.S.Bisaria	Stabilities of cellulase and xylanase from the mixed culture of <i>T.reesei</i> and <i>A.wentii</i> towards environmental parameters, 6th Intl. Symp. in Wood and Pulping Chemistry, APPITA, Melbourne, Australia	30 April to 4 May 1991.
4.	C.I.Mathai, J.Prakash and T.Panda	Kinetic analysis on role of condensed tannin in biosynthesis of volatile fatty acids by mixed culture, <i>ibid</i>	1991
5.	J.Anjani Kumari and T. Panda	Improved direct conversion of agropolymers by intergeneric fused protoplasts, analysis of reversion of <i>T.reesei</i> protoplasts, symp. on cellulose and ligno-cellulosics chemistry, Chinese Academy sciences, Guangzhou, China, pp.151-154	May 1991
6.	J.Anjani Kumari and T.Panda	Problems associated with the efficient separation of protoplasts from parent cells/mycelium, Int. Seminar on Downstream Processing in Biotechnology, Process Engineering Design and Development Institute, Calcutta, India, Abst. No.OP6 p.35	1991.
1.	S.K. Rakshit	Presented a paper in International Seminar on Downstream Processing in Biotechnology in Calcutta	Dec. 1991

4.14.5 Visitors to the Centre

S.No.	Name of the Visitor	Place
1.	Prof. R.N. Mukerjee	Jadavpur University, Calcutta
2.	Prof. N. Blakebrou	United Kingdom
3.	Mr. G. Ghosh	NRDC, New Delhi

4.14.6 List of Publications

Dr. A. Baradarajan

1. Studies on the effect of additives on biomethanation - T.V. Ananthan Babu, H. Prabhu, S.K. Rakshit and A. Baradarajan - *Research and Industry*, Vol.36, 45-48, 1991.
2. Studies on RTD and continuous cultures (single cell protein) in cylindrical and a tapered reactors - M.K. Gowtham, S.K. Rakshit, K. Krishnaiah and A. Baradarajan - *Bioprocess Engineering* - 7 (1991), 41-46.
3. Studies on biomethanation of water-hyacinth H.J. Prabhu, S.K. Rakshit and A. Baradarajan - *Research and Industry*, 36, 99- 101, 1991.
4. Direct conversion of starch hydrolysate to ethanol using a co- immobilizate of amyloglucosidase and *saccharomyces cerevisiae* in batch stirred tank reactor - N. Chitra and A. Baradarajan - *Bioprocess Engg.* 7(1992), 265-267, 1991.

Dr. T. Panda

1. P.S.R. Babu and T. Panda : Role of phenylacetic acid in biosynthesis of penicillin amidase in *E.coli* : *Bioprocess Engineering (FRG)*, 6(1/2), 71-74, 1991.
2. P.S.R. Babu and T. Panda : Effect of recycling of fermentation broth for the production of penicillin amidase : *Process Biochemistry (U.K)*, 26, 7-14, 1991.

3. P.S.R. Babu and T. Panda : Studies on improved techniques for immobilising and stabilizing penicillin amidase associated with E.coli cells : Enzyme and Microbial Technology(USA), 13, 676-682, 1991.
4. P.S.R. Babu and T. Panda : Immobilization of whole E.coli containing penicillin amidase using cross-linking agents and fillers : Biotechnology Techniques (UK), 5(3), 227-232, 1991.

Dr. S.K. Rakshit

1. Optimal control strategy for the enhanced production of cellulase enzyme using the new mutant Trichoderma reesei E-12. S.K. Rakshit and V. Sahai - Bioprocess Engineering. Vol.6, 101- 107, 1991.
2. Studies on RTD and Continuous culture (SCP) in Cylindrical and tapered reactors. M.K. Gowthaman, S.K. Rakshit, K. Krishnaiah and A. Baradarajan - Bioprocess Engineering, Vol.6, P.41-46, 1991.
3. Studies on the effect additives on biomethanation. T.V. Ananda Babu, H.J. Prabhu, S.K. Rakshit and A. Baradarajan. Research ad Industry, Vol.36, No.1, P.45-48, March, 1991.
4. Studies on biomethanation of water-hyacyynth H.J. Prabhu, S.K. Rakshit and A. Baradarajan - Research and Industry, Vol.36, P.99-101, June 1991.
5. An investigation into the application of reverse miscelles for enzyme concentration by extraction. S.K. Rakshit, R. Ramprasad and S.B. Naronha - International seminar on Downstream processing in Biotechnology, Dec. 19-21, Calcutta, India.
6. Aqueous two phase extractive fermentation for the production of ethanol using Zymomonas mobilis. S.K. Rakshit and IVKS. Sastry, Technical Session of the IChE Annual Meeting (CHEMCON), December 1991.
7. Treatment of uranium contaminated waste by complexation and ultrafiltration. C. Ananda Babu, Bharat Ayengar, M.S. Ananth, S.K. Rakshit and R.V. Amalraj. Conference on integrated membrane processes, IICT, Hyderabad, February, 1992.

Dr. K. Lalitha

1. K. Lalitha and Shanthi Krishnan - Isolation of a rod shaped methanogen growing on methanol and 2-propanol. Archives of Microbiology, 1991, Vol.155, p.405-409.
2. Shanthi Krishnan and K. Lalitha - Features of a novel methanogenic isolate KL, 16th Annual Symposium in Chemistry, Department of Chemistry, IIT, Madras, Feb. 23-24, 1991.
3. K. Lalitha, K.R. Swaminathan, V.P. Shanthi and R. Padma Bai - Biomethanation of tannery waste, 16th Annual Symposium in Chemistry, Department of Chemistry, IIT, Madras, Feb. 23-24, 1991.

4. K. Lalitha and K. Easwari - Metabolic significance of selenium during germination of *Phaseolus aureus*, 16th Annual Symposium in Chemistry, Department of Chemistry, IIT, Madras, Feb. 23-24, 1991.
5. K. Lalitha, P. Rani and R. Padma Bai - Effect of selenium on mitochondrial metabolism - a comparative study, Procs. & Abs. of Diamond Jubilee Symposium of Soc. Biol. Chem. (India), Calcutta, 1991, Abst. 162.
6. K. Lalitha, K.R. Swaminathan and R. Padma Bai - Biomethanation studies on tannery waste in batch digestors. Proc. & Abs. of Diamond Jubilee Symposium of Soc. Biol. Chem. (India), Calcutta, 1991, Abst. 202.

4.15 Regional Sophisticated Instrumentation Centre

4.15.1 Introduction

The Regional Sophisticated Instrumentation Centre was established in 1974-75. Now Ph.D., programmes are being offered. The major areas of teaching and research of the Centre are:

- * Molecular Spectroscopy
- * Quantum Chemistry and Instrumentation
- * Exchange interactions in magnetic materials by abinitio methods

4.15.2 Details of Faculty

Name and Qualification	Major Areas of Specialisation
Professors	
Dr.P.T.Manoharan, Ph.D(Columbia)	Theoretical Chemistry and Magnetic Resonance Spectroscopy
Dr.Surjit Singh, Ph.D(IIT Kanpur)	Molecular Spectroscopy and General Physical Chemistry
Dr.S.Subramanian, Ph.D(Leicester)[Head]	Magnetic Resonance Spectroscopy and Theoretical Chemistry
Dr.T.K.K.Srinivasan, Ph.D(Banaras)	Molecular Spectroscopy

4.15.3 Students on Roll

Programme	I Year		II Year		III Year		IV Year		Total
	M	W	M	W	M	W	M	W	
Ph.D	3	1	4	-	2	1	1	-	12

4.15.4 Number of Scholarship/Fellowship holders

Programme	Institute	Number CSIR	Others	Total
Ph.D	6	5	1	12

4.15.5 Number of Degrees Awarded

Ph.D	6
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4.15.6 Instruments/Equipment Designed and Developed

In-Process gauge for high speed grading - for M/s. Pilot Engines, Madras

4.15.7 New Facilities added and Major Equipment procured

1. Laser Raman (Dilor Z24) Spectrometer
2. ENRAF NONIUS - CAD4 Computer Controlled XRD

4.15.8 Invited Lectures Delivered by the Faculty in Academic Institutions/Public Bodies

Sl.No.	Name of the Faculty	Topic of the Lecture	Delivered at	Date		
1.	Dr.P.T.Manoharan	Low Dimension Dithiolenes	Monash University, Melbourne, Australia	June 1991		
			Univ. of New South Wales, Sydney	June 1991		
			Univ. of Sydney, Sydney	June 1991		
			Latrobe Univ. Melbourne, Australia	June 1991		
			Australian National Univ. Canberra, Australia	June 1991		
		Exchange interaction in Dimers of Dithiolenes	Latrobe Univ. Melbourne Australia	June 1991		
			Univ. of Melbourne, Melbourne	June 1991		
			Univ. of New South Wales, Sydney	June 1991		
			Univ. of Sydney, Sydney	June 1991		
			Australian National Univ. Canberra	June 1991		
		Low Dimension Dithiolenes	Dr.Surjit Singh	NMR Spectroscopy	Univ. of Western Aus. Perth	June 1991
					Univ. of Western Aus. Perth	June 1991
					Univ. of Malaya Kualalumpore	Jan 27, 1992
					University of Bochum, Germany	May 1991
Cooperativity Effect and Stretching Force Constants	Dr.S. Subramanian	O-H Stretching force constants for water adsorbed on MgO	University of Munich, Germany	June 1991		
			Raman Spectra and Intermolecular Interactions	University of Essen, Germany	July 1991	
				Institute of Polar Studies Bremerhaven, Germany	Aug. 1991	
			Force constants and molecular interactions	University of Marbuy, Germany	April 1991	
				Interactions of CH ₃ CN via, CH ₃ group	University of Linz, Switzerland	June 1991
			Cooperativity Effect and stretching force constants	Indo Hungarian Symposium, INSA, New Delhi	Feb. 1992	
			2D NMR	Dr.S. Subramanian	ESCA & AUGER	NEHU Shillong
IUC Indore	13-15 Jan. 1992					
MGR Medical Univ. Madras	16.3.1992					
Inter Disicipline Research in Medicine	Dr.S. Subramanian	Inter Disicipline Research in Medicine				

4.15.9 Visits Abroad

Sl.No.	Name of the Faculty	Country Visited	Date	Purpose of visit
1.	Dr.P.T. Manoharan	Australia Malaysia	22.1.91-21.1.92 26,27.1.92	Sabbatical leave Lecture
2.	Dr.Surjit Singh	Germany	24.9.91-5.10.92	Sabbatical leave
3.	Dr.S. Subramanian	USA	16.5.91-12.7.91	Professional visit
4.	Dr.T.K.K.Srinivasan	Germany	30.9.91-29.9.92	Sabbatical leave

4.15.10 Distinguished visitors to the Department (Important Dignitries above the level of Professor)

Sl.No.	Name of the Visitor & Occupation	Date of visit	Purpose of visit (Lecture/Discussion)
1.	Dr.Krishnakumar California University, Davis, USA	4.9.91	Seminar Talk
2.	Dr.Gopal A. Krishan National Heart, Lung and Blood Institute NIH, USA	9.12.91-13.12.91	Lectures in Pharmacology
3.	Dr.J. Chandrasekhar Indian Institute of Science, Bangalore	4.02.92	Lecture
4.	Dr.H. Kleeberg University of Margurg and Trifolio GmbH Germany	10.02.92	Lecture

4.15.11 Sponsored Projects

Title	Period	Funding Agency	Amount (Rs. in Lakhs)	Co-ordinator(s)
Construction of a pulsed FT EPR Spectrometer	3 Years	DST	71.7	Dr.P.T. Manoharan Dr.S. Subramanian

4.15.12 Major Consultancy Assignments

Routine consultancy on Analytical and Research Spectroscopy

4.15.13 Research Publications

1. M.V. Anusuya, T.S. Natarajan, G., Rangarajan, S. Venkatachalam and P.T. Manoharan, Transport and magnetic properties of sheet polymetalophthalocynine (poly M Pcs) M = Cu, Ni) - Solid State Commun. 77, 661 (1992) 95 pages.
2. A.P. Koley, S. Purohit, L.S. Prasad, P.T. Manoharan and S. Ghosh, Studies on Gold(II) complexes with hard and soft donor ligands: Complexes with o-methylthioniline and 1,2-di (o- aminophenylthio)ethane - Inorg. Chem. 31, 305 (1992) [7 pages].
3. A. Raghunathan, T.S. Natarajan, G. Rangarajan, S. Venkatachalam and P.T. Manoharan, S.P.I.E. (1992) - accepted for publication. Electrical Transport in some Poly Metallo Phthalocyanins.

4. A.P. Koley, R. Nirmala, L.S. Prasad, S. Ghosh and P.T. Manoharan, Inorg. Chem. 32, (1992) - accepted for publication. Studies of Gold (II) complexes with Hard and Soft ligands; Part III complexes with N(2-pyridylmethyl)-mercaptoaniline.
5. A.P. Koley, L.S. Prasad, P.T. Manoharan and S. Ghosh, Inorg. Chim. Acta (1992) - accepted for publication. Studies on Gold(II) complexes with hard and soft donor ligands, Part IV, A reactivity study in solution using ESR spectroscopy.
6. P.K. Mandal, B. Sinha, P.T. Manoharan and S. Ramasesha, Chem. Phys. Lett, (1992) - accepted for publication. Theoret. Studies of the spin states of macrocyclic Aza-amido binuclear copper (II) complexes.
7. J. Sheila Annie and P.T. Manoharan, Spectrochim. Acta (B) (1992) - accepted for publication. EPR spin flip transitions in some metal Dithiolenes.
8. M.C. Shivaglal and Surjit Singh, Effect of hydrogen bonding and cooperativity on stretching force constants of formamide, Intt. J. Quant.Chem (in press).
9. P. Mohandas, M.C. Shivaglal and Surjit Singh, Effect of Self Association on N-H stretching force constants of Ammonia, Pramana (Submitted).
10. E. Knozinger and Surjit Singh, O-H stretching force constants in complexes of water with F-, Cl-, Li+ ions and LiF, LiCl ion pairs by 6-31 G abinitio, M.O. calculations, Spectrochim Acta (in press).
11. S.V. Santhanamariappan, L. Gomathi and S. Subramanian, Structural changes in the complexation of Benzo-crown ethers-NOESY and variable Temperature ¹³C NMR study, Magn. Reson. in Chem. 29, 656 1991.
12. C.S. Gopinath and S. Subramanian, Photemission Studies on Bi_{1.8} Pb₄, Ca_{2.2} - Sr₂ Cu₃O_y, Physica C, 176, 331, 1991.
13. C.S. Gopinath, R. Nirmala and S. Subramanian, WHMO Calculations on CUO Clusters of YBa₂ Cu₃O_{7-x}: Correlation between T_c, Structure oxygen stoichiometry and highest occupied MO energy, Physica C, 177, 27, 1991.

4.15.14 Any other Relevant Details

The Department/Centre has 3 Scientific Officers 15 non-teaching technical and 6 non-teaching non-technical staff.

4.16 Centre for Systems and Devices

4.16.1 Introduction

The Centre was established in 1971. The major areas of research of the Centre are:

- * Digital Signal Processing
- * Electromagnetics and Antennas
- * Microprocessor based System Design
- * Semiconductor Devices

4.16.2 Details of Faculty

Name and Qualification

Major Areas of Specialisation

Professors

Dr. K.Radhakrishna Rao, Ph.D(IIT Kanpur)
Dr. M.S.Narasimhan, Ph.D(IIT Bombay)

Analog and Digital Circuits
Antenna Engineering

Principal Scientific Officer

Dr. P.R.Vaya, Ph.D(IIT Madras)

Semiconductor and Opto- electronic Devices

Senior Scientific Officer Gr-I

Dr. K.M.M.Prabhu, Ph.D(IIT Madras)

Digital Signal Processing

Senior Design Engineers

V.N. Shukla, M.S.(IIT Madras)
Mrs. Ranjana Shukla, M.S.(IIT Madras)

Microprocessor based Control Systems
Microprocessor based System Design

Senior Scientific Officer Gr.II

Dr. K.Ponnuraju, Ph.D(IIT Madras)

Semiconductor Electronics

4.16.3 Students on Roll

Programme	I Year		II Year		III Year		IV Year		V Year		Total		
	M	W	M	W	M	W	M	W	M	W	M	W	Total
Ph.D	-	-	1	-	1	-	-	-	2	-	4	-	4
M.S.	1	-	-	-	-	-	-	-	1	-	2	-	2
Total	1	-	1	-	1	-	-	-	3	-	6	-	6

4.16.4 Number of Scholarship/Fellowship holders

Programme	Institute	Number CSIR	Others	Total
Ph.D	1	-	3	4
M.S.	1	-	-	1
Total	2	-	3	5

4.16.5 No. of Degrees Awarded

Programme	Number
Ph.D	1
M.S.	1
Total	2

4.16.6 New Facilities added and Major Equipment procured

- * Philips Digital Storage Oscilloscope model PM3350 with Assyst Signal Processing Software - GPIB Interfacing
- * Arihant - AT 386 PC with EGA colour monitor, logitech and Scan Optical Mouse
- * RF Generator - 600W (13.65MHz)

4.16.7 Short-term Courses/Workshops/Seminars/Symposia/Conferences organised

Title of course/Workshop/Seminar/Symposia/Conf.	Period	Co-ordinator(s)
Conference on the Physics and Technology of Semiconductor Devices and Integrated Circuits	15-17 Feb. 92	B.S.V.Gopalam P.R.Vaya and K.N.Bhat

4.16.8 Short term courses/Workshops/Seminars/Symposia/Conferences/ Training attended by the Faculty in recognised Academic Institutions and Public Sectors

Sl.No.	Name of Faculty	Title	Period/Duration
1.	P.R.Vaya	NASCODE-III, USA	8-12 April 91
2.	P.R.Vaya	Workshop on Solid State Material (Uni. of Malaya)	9-14 Aug. 91

4.16.9 Invited Lectures Delivered by the Faculty In Academic Institutions/Public Bodies

Sl.No.	Name of the Faculty	Topic of the Lecture	Delivered at	Date
1.	P.R.Vaya	HWE & MBE	Univ. of Montreal	18-24 April 91
2.	P.R.Vaya	MBE	Univ. of Malaya	9-14 Aug. 91
3.	Mrs Ranjana Shukla	Electronics Based Control of Continuous Process	"GRASSIM", Mavoor Calicut	29 Feb. 92

4.16.10 Visits abroad

Sl.No.	Name of the Faculty	Country Visited	Date	Purpose of Visit
1.	P.R.Vaya	USA	14-17 April 91	To present a Paper
2.	P.R.Vaya	Canada	18-24 April 91	To deliver Seminars
3.	P.R.Vaya	Malaysia	9-14 Aug. 91	For Invited talk

4.16.11 Distinguished visitors to the Department (Important Dignitaries above the level of Professor)

Name of the Visitor and Occupation	Date of Visit	Purpose of visit(Lecture/Discussion)
Prof. P.Bhattacharya, Director, SDL, University of Michigan, USA	8-13 Jan. 92	Under TOKTEN Programme

4.16.12 Sponsored Projects

Sl.No.	Title	Period	Funding Agency	Amount (Rs. in Lakhs)	Co-ordinator(s)
1.	Research Invest. on NF-FF & FF-NF Transformations	1987-91	DRDO	10.80	M.S.Narasimhan
2.	Applicability of Modern Spectral Estimation Algorithms to Improve the Performance of MTI Surveillance Systems	1987-92	DRDO	12.97	K.M.M.Prabhu
3.	Man Power Dev.	1991	MHRD	-	P.R.Vaya K.Ponnuraju
4.	SIN - GaAs Surfaces	1991-92	DAE	1.70	P.R. Vaya K.Ponnuraju

4.16.13 Major Consultancy Assignments

Sl.No.	Title	Organisation	Amount	Co-ordinator(s)
1.	LEDS	Litton Displays, Madras	-	P.R.Vaya
2.	Laser Current Driver	Scientific Approach, Bombay	-	P.R.Vaya
3.	IR Detector	Plexi Plast, Madras	-	P.R.Vaya
4.	Intelligent Bar Code Reader	Srinidhi Farms (P) Ltd., Electronics Dvn., Madras	Rs.3200/- per year	Ranjana Shukla

4.16.14 List of Research Publications

1. A.Das, S.K.Das and M.S.Narasimhan, 'Radiation Characteristics of Wrapround Microstrip Structures', IEEE Trans. Antennas & Propagation, Vol.39, July 1991, 1031-1034.
2. K.M.M.Prabhu and N.Anupindi, 'Prefolding in FHT Algorithms', Electron. Lett., Vol.27, 23 May 1991, 940-941.

3. V.S.Subramaniam and K.M.M.Prabhu, 'Novel Phase Meter using Narrow pulse Switched Capacitor Phase Shifter', Electron. Lett., Vol.28, 12 March 1992, 589-591.
4. K.M.M.Prabhu and K.Bhoopathy Bagan, 'Computer Simulation Study of MTI using FFT and Nonlinear Processors', Proc. of the IEEE Intl. Conf. on ASSP held at San Francisco, Calif.,USA, March 23-26, 1992.
5. V.Jayan, L.P.Lailamoni, K..Thomas, J.Majhi and P.R.Vaya, 'Thickness Dependent Photofield Effect Studies on a Si:H Thin Films ', Thin Solid Films 198, 1991, 1-8.
6. K.Ponnuraju, S.Karthik, V.Venkataraman and P.R.Vaya,'The Study of Structural, Electrical and Optical Properties of MBE grown GaAs Thin Films', Ind. J. Pure & Appl. Phy. 29, 1991, 488-491.

4.17 Materials Science Research Centre

4.17.1 Introduction

The MSRC was established in 1975. The major areas of teaching and research of the Department are:

1. Ternary Superconductors (Low T_c and High T_c : Synthesis, Characterization and study of T_c , H_{c2} , and other parameters - Efforts to correlate T_c with known structure-related properties - Studies on improvement of T_c of copper oxides and search for non-copper oxide high T_c superconductors.
2. Layered Transition Metal Dichalcogenides and Intercalation compounds.

Synthesis, crystal growth and characterization and measurement of physical properties including T_c ; Study of electrochemical properties including intercalation and application as battery cathode materials.

3. Perovskite Mixed Oxides

Formulation, synthesis and characterization of new and novel rare earth containing perovskite mixed oxides - crystal growth by flux techniques - Study of electrical and magnetic properties - Search for magnetic and semiconductor-to-metal transitions. Application in solar energy conversion.

4. Pyrochlore Mixed Oxides

Formulation, synthesis, characterization of new and novel rare earth-transition metal pyrochlore mixed oxides - Study of their electrical and magnetic properties correlations - Applications in solar energy conversion and as battery separators.

5. Solar Energy Conversion/Storage using Semiconductors in Photoelectrochemical (PEC) Cells.

Electrolyte solar cells for solar energy conversion employing chalcogenide and pnictide semiconductor electrodes (anode and cathode)- Formulation and study of new electrolytes with known electrodes. Solar energy storage as hydrogen through photoassisted electrolysis of water employing pure and mixed (perovskite, pyrochlore, spinel and scheelite type) oxide anodes. Study of Metal-cluster compounds of the type $A_2Mo_3O_8$, $LiLnMo_3O_8$ (Ln = rare earth) $GaMo_4S_8$, $ZnMo_2Re_2S_8$ and related materials for PEC Conversion

6. Fast Ion Conductors

Fundamental studies on ion mobility and structure- property correlations in fast ion conductors (oxides and chalcogenides) based on the layer and channel-type: Nasicon and Lisicon.

7. Nuclear Waste Disposal (initiated)

Study of crystalline mixed oxide systems with a view to fix radioactive ions for nuclear waste disposal applications.

4.17.2 Details of Faculty

Name of Faculty

Major area of specialisation

Professor

G.V. Subba Rao, Ph.D(IIT Kanpur),
FRSC (Lond), C.Chem., FAIC (USA), F.I.A.Sc., (Ind.), [Head]

Materials Science and Solid State Chemistry,
High T_c ternary Superconductors, Solar Energy
Conversion and storage using PEC cells, R&D of
new materials for nuclear waste disposal, Fast ion
conductors based on Nasicon and others

Assistant Professor

Dr. U.V. Varadaraju, Ph.D(IISc.)

High T_c Superconducting materials, High
temperature oxide and phosphate based ceramics,
Magnetic materials

4.17.3 Students on Roll

Programme	I Year		II Year		III Year		IV Year		V Year		Total		
	M	W	M	W	M	W	M	W	M	W	M	W	Total
Ph.D	-	-	1	2	2	1	-	1	-	-	3	4	7

4.17.4 Number of Scholarship/Fellowship holders

Programme	Institute	Number CSIR	Others	Total
Ph.D	5	-	2	7

4.17.5 New Facilities added and major equipments procured

- * Twin-jet Electropolisher
- * Superconducting Materials Property Meas. System
- * VGA Monitor with VGA Card
- * N.M.R. Spares (Modulator & Amplifier etc.)
- * Vacuum Meter with accessories
- * TG/DTA Spares
- * Constant Current Voltage Source with accessories
- * Impedance Analyser (Hewlett Packard), Function Generator
- * Mossbauer Spectrometer
- * Far IR Spectrometer
- * Bruker BH-15 Hall effect field regulator and Magnetometer

4.17.6 Short-term courses/Workshops/Seminars/Symposia/Conferences/ Training attended by the Faculty in recognised Academic Institutions and Public Sectors

Sl.No.	Name of Faculty	Title	Period/Duration
1.	G.V. Subba Rao	Materials Discussion Meeting, BHU, Varanasi	20 July 91
		Workshop on Materials, S.V. University, Tirupati	29 July- 1 Aug. 91
		Materials Workshop, Marthawada Univ. Aurangabad	23-29 Aug. 91
		DAE Symposium, BHU, Varanasi	21,22 Dec. 91
		MRSI Symposium, IISc. Bangalore	8-11 Feb. 92
		Indo-USA Workshop on Materials, NPL, Delhi	22-25 Mar. 92
2.	U.V. Varadaraju	Indo-Japanese Workshop on Materials, IISc. Bangalore	20 Oct. 91
		Workshop on Modern Materials, Osmania Univ., Hyderabad	16 Dec. 91

4.17.7 Invited Lectures delivered by the Faculty in Academic Institutions/Public Bodies

Name of the Faculty	Topic of the Lecture	Delivered at	Date
G.V. Subba Rao	Photoelectro-Chemistry	Queen Mary's College, Madras	10.01.92
	Modern Materials and Applications	Univ. of Bombay	12.07.91
	Modern Materials and Applications	NCL, Pune	05.03.92
	Survey of Prop. of Oxides Materials	Inst.of Math. Sci. Madras	16.03.92

4.17.8 Visits Abroad

Name of the Faculty	Country visited	Date	Purpose of visit
G.V.Subba Rao	Kulalumpur, Malaysia	Aug. 91	Intl. Workshop
	Paris, France	Oct. 91	Intl. Conference
	Germany	Oct.91-Nov. 91	Indo-GTZ Program

4.17.9 Distinguished visitors to the Department

Sl.No.	Visitors Name	Date of Visit	Purpose of visit
1.	Dr. V.A.Ivanov, Kurnakov Inst. of Chem, U ^S SR	26,27 Apr.91	To deliver Lecture
2.	Dr. U.Balachandran, Argonne Natl. Lab. USA	2 Aug. 91	-do-
3.	Prof. R.K. Singh, Barkathullah Univ. Bhopal	22 Nov. 91	-do-
4.	Dr. A.S.Rao, David Taylor Res. Inst. USA	23 Nov. 91	-do-
5.	Dr. A.Niku Lari, IITT Inst., France	10 Dec. 91	-do-
6.	Dr. M.A.Subramanian, Dupont Chemicals, USA	Jan. 92	-do-
7.	Dr. H.U.Schilling, GTZ Department Germany	Jan. 92	-do-,
8.	Prof. R.Srinivasan, Director, IUC, Indore	Feb. 92	-do-

9.	Prof. W.Jeitschko, Germany	Mar. 92	To deliver Lecture
10.	Dr. C.K.Mathews, IGCAR, Kalpakkam	Mar. 92	-do-
11.	Prof. P.Ganguly, Head, NCL, Pune	Mar. 92	-do-
12.	Dr. Krishnan, Director, CNRS, France	Mar. 92	-do-

4.17.10 Sponsored Projects

Title	Period	Funding Agency	Amount (Rs. in Lakhs)	Co-ordinators
PMB Superconductivity	1991-1992	PMB	50.0	Prof.G.V.Subba Rao Dr. U.V.Varadaraju

4.17.11 Honours and Awards

Name	Designation	Honours/Awards
G.V.Subba Rao	Professor	FNA (India)

4.17.12 Research Publications

1. M.A. Subramanian and G.V. Subba Rao, Synthesis and Electrical Properties of Mixed Oxides of the type, $\text{LnB}_3/4\text{B}_1/4\text{O}_3$ (Ln = Rare Earth or Y; B = Fe, Co, Ni; B = Mo, W, Re), J.Solid State Chem., 31, 329-335, 1980.
2. M.A. Subramanian, G. Aravamudan and G.V.Subba Rao, Solid State Studies on Rare Earth Mixed Oxide Pyrochlores, $\text{Er}_2(\text{V}_{1-x}\text{Fe}_x)_4/3\text{W}_{2/3}\text{O}_7$, Bull. Mater. Sci.(India), 2, 201-206, 1980.
3. B. Lakshmi Brinda, U.V.Varadaraju and G.V.Subba Rao, Studies on Li-doped $\text{Ca}_{0.85}\text{Sr}_{0.15}\text{CuO}_2$; The prototype of cuprate family of oxide superconductors, Bull. Mat. Sci. (India), 14, 315-320, 1991.
4. H.Krishnan, R.Srinivasan, V.Sankaranarayanan, C.K.Subramanian and G.V. Subba Rao, Fluctuation induced excess conductivity in the compounds, $\text{Ca}(\text{REBa})\text{Cu}_3\text{O}_7$, (RE= Ln and Sm), Bull. Mater. Sci. (India), 14, 747-752, 1991.
5. B. Srinivas and G.V. Subba Rao, Synthesis of high T_c superconductors in Solid State Materials, Eds.R.Radhakrishnan and A. Daud, Narora Publ., New Delhi. pp.325-334, 1991.
6. K.A.Thomas, U.V.Varadaraju, G.V.Subba Rao, C.V.Tomy and S.K.Malik, Superconductivity studies on Ti-Th-Sr-Ca-Cu-O system, Bull. Mater. Sci (India), 14, 321-325, 1991.
7. B.Lakshmi Brinda, U.V.Varadaraju and G.V.Subba Rao, Studies on pure and doped $\text{La}_{2-x}\text{A}_x\text{CaCu}_2\text{O}_{6-s}$ (A=Ba, Sr), in Supercond. Materials, Phys. & Applic. (ICMAS-91), Eds., B. Raveau, K. Wasa and R. Suryanarayanan, IITT Int. Publ., France, pp.53-58, 1991.

4.18 Fibre Reinforced Plastics Research Centre

4.18.1 Introduction

Fibre Reinforced Plastics (FRP) Research Centre was established in 1974 with a view to take up inter-disciplinary research and man-power training in the area of composites technology. The centre offers elective courses at MS and PhD programmes for students registered through various departments. The major areas of teaching and research of the centre are:

1. Development of Composite materials
2. Manufacturing technology of polymers, metal and ceramic matrix composites
3. Theory of composite materials
4. Analysis of composite structures
5. Composite product design
6. Testing and quality control

4.18.2 New Courses Introduced

The following new courses was introduced during this year:

Course No.	Title	Structure	Faculty
CH 674	Polymers and Composites	3 0 0 3	Dr. BJC.Babu Dr. R.Subramaniam

(Six elective courses were offered by the faculty during the year)

4.18.3 Details of Faculty

Name and Qualification

Major Areas of specialisation

Chief Design Engineer

Dr. N.G. Nair, Ph.D(IIT Kanpur)
Dr. S.K.Malhotra, Ph.D(IIT Madras)

Composites Technology,, Structural Engg.
Design and Development of composite products,
Processing machinery/testing of raw materials and
products

Senior Design Engineer

Dr. B.J.C.Babu, Ph.D(IIT Madras)

Engg. Mechanics, Design and development of FRP
processing equipment, Structural analysis and
design, dynamics of structures, Experimental stress
analysis

4.18.4 Students on Roll

Programme	I Year		II Year		III Year		IV Year		V Year		Total		Total
	M	W	M	W	M	W	M	W	M	W	M	W	
Ph.D	4	-	1	-	-	-	-	-	2	1	7	1	8
M.S.	1	-	1	-	1	-	-	-	1	-	4	-	4
Total	5	-	2	-	1	-	-	-	3	1	11	1	12

All are registered through departments

4.18.5 Number of Scholarship/Fellowship Holders

Programme	Institute	Number		Total
		CSIR	Others	
Ph.D	7	-	1	8
M.S.	2	-	1	3
Total	9	-	2	11

All registration through departments only

4.18.6 Number of Degrees Awarded

M.S.	1
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4.18.7 New Facilities added and Major Equipment Procured

- * A Vacuum sintering furnace of Rs. 21 lakhs that can operate upto 2200 deg. C. was procured for ceramic and matrix composite work
- * A single screw extruder for fibre filled thermoplastics materials Rs. 4.50 lakhs

4.18.8 Short Term Course/Workshop/Seminar/Symposia/Conference Organised

S.No.	Coordinator(s)	Title of course	Period
1.	Dr.N.G.Nair	Design and Manufacture of FRP chemical equipment	One week 16.9.91-21.9.91
2.	Dr.B.J.C.Babu	Fibre Reinforced Thermoplastics	Six days 11.11.91-16.11.91

4.18.9 Invited Lectures delivered by the Faculty in Academic Institutions/Public bodies

S.No.	Name of faculty	Topic of the Lecture	Delivered at	Date
1.	Dr. B.J.C.Babu	Engineering plastics & FRP	National Productivity Council, Madras	4.10.91
2.	Dr. B.J.C.Babu	Reinforced Plastics	Sri Krishnadevaraya Univ., Anantapur, AP	24.10.91

4.18.10 Major Consultancy Assignments

Title	Organization	Amount (in Lakhs)	Coordinator(s)
Development of composite drive lines for HML model 2021 loader and ambassador car (New Model)	Hindustan Motors Ltd.	2.65	Dr. B.J.C.Babu

4.18.11 Honours and Awards

Name of faculty	Honours/awards	Purpose
Dr KAV Pandalai, Retd. Professor, FRP Research Centre	NRDC Invention Award	Design of all composite heat shield of agni missile work carried out at the centre by the faculty team

4.18.12 Research Publications

1. T.C. Ramesh, N. Ganesan, S. Swarnamani and BJC Babu, Finite Element and experimental studies on an orthotropic disc, VI international Conf. on Composite structures, 9th-11th Sept. 1991, Paisely College, Scotland, 1991.
2. V. Ramamurthy, P. Seshu and BJC Babu, Theoretical and experimental analysis of composites blades, Composite structures (accepted for publication)
3. P. Seshu, V. Ramamurthy and BJC Babu, Theoretical and experimental investigations on composite moulding, J. Strain analysis (accepted for publication)

4.18.13 Any other Relevant Details

The Centre has two Technical Officers, Five non-teaching technical and one non teaching non technical staff.

4.19 Central Electronics Centre

4.19.1 Introduction

This Centre was established in 1971 to take care of maintenance of wide variety of electronic equipment available in the Institute. To facilitate this job, the need for conducting special training programme, the first of its kind in this country was started in the same year. Since then, conducting such programmes has become one of the important activities of this Centre. After the training programmes, the technicians are engaged in all the departments of the Institute to take care of the maintenance of electronic equipment. Because of the spurt in the number of sophisticated electronic equipment in various departments and number of sponsored projects, training programme has nowadays become compulsory.

4.19.2 New Course started

Eighth Apprentice Training Programme of one year duration was started on 28.10.991.

4.19.3 New facilities added and major equipment procured

No new equipment was procured however electronic spares worth DM 20,000/- was received from Germany as part of the Indo-German Project.

4.19.4 Major Consultancy Assignments

Sl.No.	Title of Assignment	Organisation	Amount	Co-ordinator(s)
1.	Oscilloscope	K.G.Hospital	4,000.00	M. Kumaravel
2.	Seismograph	Hindustan Motors	5,000.00	V.K.Ranganathan
3.	UPS System	Trinity Hospital	2,000.00	M.V.Srinivasan
4.	Thyristor Cont. Unit	Padmavathi Metal	4,500.00	M. Kumaravel

4.19.5 Short Term Courses Organised

Sl.No.	Topic	Date
1.	Course on HRD for CEC staff	October 1991
2.	Refresher Course for MC staff	December 1991
3.	Orientation Programme for Research Scholars	December 1991
4.	Short Term Course on "PC Based Measurements and Control in Industrial Applications"	January 1992
5.	Data base for equipment maintenance	March 1992

4.19.6 Any other Relevant Details

The centre has 14 Technical, 2 Administrative and 4 Others (including Project staff)

4.20 Centre for Industrial Consultancy and Sponsored Research

4.20.1 Introduction

The Centre for Industrial Consultancy and Sponsored Research is responsible for providing administrative support for consultancy and sponsored research projects sanctioned to the Institute and also for promoting industrial and liaison activities of the Institute. These are:

- * Sponsoredd Research programmes
- * Plan schemes
- * Consultancy programmes
- * Collaborative research with foreign companies
- * Industrial associateship scheme
- * ISRO-IITM cell joint projects
- * Entrepreneurship Development programmes
- * Technology transfers
- * Patents, etc.

4.20.2 Sponsored Research

Around 140 projects with a total sanction of about Rs. 12 crores for a 3-year period are handled by the Centre. Out of this 49 projects totalling to Rs. 5.43 crores are received during 1991-92 alone.

4.20.3 Plan Schemes

The Centre also provides administrative support for plan schemes of ministry of human resources development sanctioned to the Institute in the emerging areas and processes of technology such as CAD-CAM, VLSI, Telematics, Fibre optic communication, environmental engg. etc.

4.20.4 Consultancy Programmes

The consultancy programmes showed a growth of about Rs. 110 lakhs during the year 91-92 increasing from Rs. 95 lakhs in the previous year to Rs. 205 lakhs.

4.20.5 Collaborative Research Projects

The projects sanctioned in the year 1989-90 under Indo-German agreement for development of the facilities in catalysis, Material sciences, electronics and production engineering were cotinued. Also projects under Indo-USSR and Indo-EEC and National Science Foundation of USA were continued.

4.20.6 Industrial Associateship Scheme

The response from the Industry towards this scheme has been highly encouraging, with the membership increasing from 191 in the previous year to 201 during 1991-92. Six technology appreciation programmes were organized on various topics.

Programmes on Technology requirements on industrial electronics and finite element techniques were organized.

Abstracts of M.Tech, M.S. and Ph.D. programmes were published for the benefit of the Associates.

4.20.7 ISRO-IITM Cell Joint Projects

This is a joint research activity sponsored by the Indian Space Research Organization where research projects of interest to ISRO are being taken. New projects were taken during the year and also short-term courses were conducted in the areas of interest to ISRO. A one-day seminar was organized jointly with ISRO to identify projects of relevance to ISRO.

5. CENTRAL SERVICES

5.1 Central Workshop

The various units of Central Workshop are Carpentry and Pattern making Fitter's and Tool maker's shop, Machine shop, gear shop and gear testing, instrument shop, electrical shop, foundry and heat treatment, welding shop, automobile repair, electroplating shop, design cell and stores.

Some of the special facilities available are gear cutting, gear grinding and testing (spur and bevel gears), jig grinding, copy milling manufactures of precision scales, precision instrument repairing calibration of pressure gauges and dynamic balancing of rotors etc.

Central Workshop undertook fabrication of components, gadgets apparatus etc. required by the various Departments for research and development projects in addition to the regular training programme for the B.Tech and M.Sc. students (600 students).

For giving training in advanced machines like CNC machines, Central Workshop procured 3 CNC Lathes (Trainer) at a cost of Rs. 10,00,000/- in the year 1992.

Advanced workshop course was conducted during the Summer April - May 1991 to the B.Tech students. The following are the details of works during the period under report:

No. of Work Orders completed : 612

No. of students trained in the Advanced
Workshop Training during Summer Term Course : 28

During the above period several works of Industrial Consultancy and Sponsored Research works were also undertaken and completed. In addition to the above Institute buses and vehicles were maintained.

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

5.2 Central Glass Blowing Section

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

This section has a range of modern glass working equipments largely procured from the Federal Republic of Germany as a component of the collaborative programme and these include Horizontal cum vertical lathe, Universal lathe, Forming lathe and High Vacuum Systems. It is also well equipped with a good number of sophisticated burners drilling and cutting machines, grinding and polishing equipments and such other tools necessary for fashioning out a variety of glass apparatus and instruments. Though the services of the section are utilised by the student

community and researchers of different departments, its contribution in specialised area like Cryogenic Glass Systems, high vacuum system is quiet significant in recent years. The section has adequate facilities for Quartz Working and has developed high level of expertise in this area.

As part of industrial consultancy programme this section has to its credit the following specified works:

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

The service regarding glass apparatus repair work and fabrication of precision glass instruments, sophisticated glass systems of this section is fully utilized by the departments. This centre also procuring new tools to help in the fabrication of most sophisticated equipments for R and D of the departments.

5.3 Central Photographic Section

This Section with the staff strength of five experienced technical personnel caters to the need of various departments/ centres of the Institute. It is mainly involved in Slide Preparations, Photo-taking of research activities of the faculty members and research workers. It also undertakes development, enlarging and printing and helps various IC and SR activities. It covers the different Institute functions such as Convocation, Sports-meet, Seminars, Symposia, etc. Around 600 work orders were executed during the year under report.

5.4 Central Gas Supplies Unit

The Central Gas Supplies Unit is administered by a Professor. It procures the following industrial gases and special gases from various manufacturers/suppliers and issues to various Departments/Laboratories of the Institute:

Industrial gases

1. Oxygen
2. Nitrogen
3. Dissolved Acetylene
4. Argon
5. Hydrogen

Special gases

1. High Pure Argon
2. High Pure Oxygen
3. High Pure Nitrogen
4. Zero Air

5.5 Central Supplies Unit

The Central Supplies Unit is administered by a Warden. It procures under the Milk Supply Scheme, the milk from the nearby villages and from T.C.M.P.F. Ltd., distributes to the student hostels, the residents of the campus and the staff of the Institute reside around the campus. Under the Provision Supply Scheme, the Unit procures the items of major consumption to hostels from the wholesale suppliers and distributes them, thus reducing the overall mess rates of hostel inmates.

5.6 Centre For Continuing Education

The Centre for Continuing Education was established in June 1986, by merging together the different units connected with Continuing Education activities, Quality Improvement Programmes and Curriculum Development work at the Institute, so that all these activities might be organised in an optimal manner under a single agency. As Continuing Education has been given considerable importance in the National Policy on Education 1986, the Institute is seeking to emphasize this aspect of engineering education.

The principal activities include organization of Short-Term Programmes for personnel from Industries and R&D Establishments, in response to identified needs; preparation of resource materials in the form of modules for use by working professionals under sponsorship from the Continuing Education Project, MHRD; and the publication of "reader-friendly" books on topics in Science and Engineering by eminent scientists and technologists in the country for the benefit of students and the public.

IIT Madras Series in Science and Engineering:

Under this series the following three books were published:

'Understanding Combustion' by Prof.H.S. Mukunda, Indian Institute of Science, Bangalore.

'The Frontier Between Physics and Astronomy', by Prof. J.V.Narlikar, Inter University Centre for Astronomy and Astrophysics, Pune.

'Catalysis' by Prof. J.C. Kuriacose, Indian Institute of Technology, Madras.

Continuing Education Programmes:

A total of 16 Continuing Education Programmes were conducted and 372 participants attended these programmes, during 1991-92. The scheme is proving quite successful as many industries come forward to make use of the expertise of the IIT Madras faculty.

Continuing Education Modules:

During 1991-92, 10 modules were completed; 47 more modules are under various stages of preparation. On the basis of the completed modules, it is intended to organize Continuing Education Programmes for working professionals. These modules are in great demand by the industries.

Quality Improvement Programmes:

During 1991-92, 16 Ph.D Scholars and 19 M.Tech scholars were admitted to QIP programme. 39 Ph.D Scholars and 19 M.Tech scholars were on rolls under QIP. Over the past 21 years, 255 teachers completed their M.Tech courses and 205 teachers completed their Ph.D programmes. Under QIP, 5 Summer/Winter Schools were conducted during 1991-92, mainly for teachers of Engineering Institutions, but also involving few participants from Industry.

Curriculum Development Cells:

There are two Curriculum Development Cells in our Institute; one is Aerospace Engineering and the other in Electrical Engineering.

Recently the Ministry proposed the establishment of an Overall Curriculum Development Cell and steps are under way to do so.

Book Writing Scheme:

This scheme was started with a view to encourage faculty members of this Institute to write books. A total of 21 books were published under this scheme since 1986.

Educational Technology Cell:

This cell was started in 1987 for the production of print and non-print forms of resource materials, to be used for improving the quality of engineering education in the country. A grant of Rs.65 lakhs from the Department of Education, Ministry of HRD, Government of India was used to create the necessary infrastructure (video equipment, a studio and a class room) to facilitate the production of Educational Video films in-house. The ET Cell recently conducted an ISTE Summer School on 'Awareness Programme for Utilisation of Educational Television Facilities' for the benefit of Teachers of Engineering Colleges and Polytechnics. The Cell commenced its activities in 1990 by setting up a studio and a class room with all the necessary equipment to facilitate the production of educational video films in-house. A few faculty members came forward to prepare instructional packages using the ETC facilities. Already 7 video programmes were completed utilising the ETC facilities.

5.7 Central Library

The Central Library has added a number of new facilities and information services during the reporting period 1991-92. The details are as follows:

1. Library Automation:

Circulation: A computer based circulation system which was commissioned earlier has been provided with additional facilities to generate number of useful reports. Now complete system is available in UNIX Operating System.

Acquisition: While the MS-DOS version of acquisition system is working very satisfactorily, the work relating to UNIX version is at the completion stage and would be ready by May 92.

Serials control: Serials control system is running under DOS and would be changed to UNIX soon.

Open Public Access Catalogue (OPAC): Data extraction from CD-ROM has been started for back log of books. A data base of periodicals holdings of Central Library is being created.

2. INFOLINE Information Retrieval Service:

"INFOLINE", a new online information access and retrieval service has been introduced and was inaugurated by Prof. N.V.C. Swamy, Director, IIT on 14.11.91. The facility has a high speed telecommunication link through the Videsh Sanchar Nigam's Gateway Packet Switching Service to access more than 400 Industrial database through DIALOG Information Service in USA. The service has been found very useful and has become very popular within a very short span of time to faculty, research scholars and project leaders. The service has also been used by Industrial Associates of IIT.

3. CD-ROM Information Retrieval Service:

In addition to the already acquired CD-ROM database of OCLC, INSPEC Database is being subscribed with retrospective coverage from 1989 onwards. This new CD-ROM covers Physics, Electronics, Electrical and Computing areas. We can search literature in these areas without any limitations and inhibitions.

4. Expansion of Xerox copying service:

Our Quick Copying Service has been augmented by providing additional copying machines in new locations.

The service has been extended to include on Sundays and other Institute holidays.

5. INFODESK:

A new INFODESK has been started in the Library from 1.4.92 to provide reference and reader-assignment services and serve as a main focal point of contact for the UNIX.

6. Library Orientation:

The Library conducts orientation programmes for the benefit of new members, visitors etc. to familiarize themselves with the resources and services of the library.

7. Physical Verification of Books:

Library undertook complete verification of books, bound volumes and other publications available in the Main Library and in the Departmental Libraries. It was expected to bring the complete report of this exercise by 30 June 1992.

8. Teleordering of books:

The present cumbersome and time consuming manual method of book ordering is being replaced by teleordering, a quick and easy way of book ordering by means of International identification code for books such as ISBN (International Standard Book Number).

9. Media Research Centre:

The existing audio-visual materials have been shifted to the new and spacious MRC in the 1st floor of the Library. The MRC is equipped with TV, VCR, 16 mm projector with all necessary items like screen etc. In addition to the regular screening of video cassettes available in MRC, arrangements have been made to procure video cassettes from Anna University, British Council Library, National Aeronautical Laboratory, Bangalore and other institutions. A catalogue of 16 mm motion films has been made available in MRC.

10. Book Bank:

The Book Bank of this Central Library since its inception 12 years back has been catering to the needs of the students. As per the recommendations of two review meetings held, the Book Bank service was augmented by way of enriching the collection both for Weaker section and General section increasing number of tickets that weaker section students can avail.

11. Reorganizing Document collections:

i) *Reference Section:* The Reference Library was reorganised to facilitate easy consultation and browsing of reference books.

ii) *Technical Standards:* With a special grant provided by IC & SR, the Standards Library in the 5th floor was reorganized. A number of new Indian, British, American and German

Standards were procured. The standards have been arranged numberwise in new pamphlet-boxes for easy retrieval.

12. Library Binding:

Quite a good number of old and damaged volumes were completely rebound and shelved with the help of outside binding contractors. About 2000 theses were also bound as they had only flexible covers.

13. A.C. Facilities in the Library:

Room airconditioners have been installed in the readers' cubicles in all the 5 book stacks. Separate airconditioners are being installed in the ground and 1st floor reading halls.

14. Shifting of JMPS Secretariat to Library:

The Secretariat of the "Journal of Mathematical and Physical Sciences" (JMPS), a publication of the Institute has been shifted to the Library as a part of its printing Reprographic and Publication Division. The Library is providing secretarial and other assistance, to the Chief Editor in the matters relating to its printing, distribution, accounting etc.

15. Extension of Lift to Vth Stack:

The work of extending the lift in the Library upto Vth Stack is in the completion stage. The equipments supplied by M/s. OTIS Elevator Co. Ltd., are being installed.

16. Resource Sharing Library Network in Madras:

In view of the continuous increase in the prices of Journals and books and also due to the devaluation of the Indian rupee, it has been proposed to optimize the existing resources available in the major Libraries in Madras and form a Resource Sharing Network for promoting mutual Library cooperation. The Central Library took an initiative by holding 3 meetings with the Librarians, Chairmen of Library Advisory Committees of the various institutions in Madras. A Memorandum of Understanding (MOU) is being worked out for realizing the basic objectives of Library Networking. As a first step towards this the union catalogue of current journals received in 8 major Libraries in Madras was compiled by the Central Library.

17. Aerospace Information Panel:

The Central Library is now represented in the Aerospace Information Panel (AIP) of the Aeronautical Research Development Board, Ministry of Defence, Govt. of India. The AIP is providing 50% of the cost of FAX machine for the Central Library to speed up interlibrary communications for getting reprints of articles, books on loan etc.

A project proposal for purchase of 39 video cassettes on Fluid Dynamics produced by MIT, Boston at a total cost of Rs.2.00 lakhs was also sent. Another proposal for purchase of CD-ROM Database of Dissertations from University Microfilms International, USA, is being sent to the Panel.

18. 37th All India Library Conference:

The 37th All India Library Conference was organised in IIT, Madras in collaboration with Department of Library Science, University of Madras and Madras Library Association from 4-7, December 1991.

His Excellency the Governor of Tamil Nadu inaugurated the conference. More than 250 delegates attended the 4 day conference and 66 papers were presented. The Director-in-charge of IIT presided over the function.

19. National Library Week Celebrations:

National Library Week, organized by the Central Library was inaugurated by Prof. N.V.C. Swamy, Director, IIT on 14.11.91 in the Central Lecture Theatre. Apart from arranging number of lectures on this occasion, 4 new library publications were also released. An exhibition of cartoons about Library Service was arranged on this occasion.

20. Get-together of Library Booksellers:

A "Library Get-together of Library Booksellers" was held on 5.8.91. Representatives from about 40 booksellers on our approved panel, Members of Library Advisory Committee and the Library staff took part in this meeting.

21. Training Programme on SQL and Integra SQL - RDBMS:

A training programme was conducted on SQL and Integra RDBMS by M/s. Coromandel Software Engineering, Madras from 19-21 August, 1991 for the benefit of library staff. 30 staff members attended the programme.

22. Training Programme on On-line Information Retrieval:

For the benefit of the Central Library staff a 2-day training programme was conducted on on-line Information Retrieval through International Database.

23. New Bulletin of the Central Library:

"Library Focus", a new news bulletin of the Central Library was started with an idea of bringing to the notice of the users about the new facilities and services of the Library.

24. Library Publications:

New additions to the Library (fortnightly)
Know Your Library: A Guide
Library Focus
Catalogue of Motion Films
Catalogue of Current Periodicals

25. Participation in Seminars/Conferences, etc.:

Sri T.Krishnaswamy and Sri V. Baskara Rao, Senior Professional Assistants, attended the INFOTEK Workshop on "Use of Personal computers and CDS/ISIS in Library and Information Environment" held at National Institute of Port Management (NIPM), Madras, from 7-12 October 1991.

Sri R.Vengan and Sri N. Koteswara Rao, Dy. Librarians attended a one-day Seminar on "Trends in Informatics" organized by the Madras Library Association on 23rd August 1991.

Sri P.N.Swamy and Sri C.R. Sekar, Senior Professional Assistants attended a Training Course organized by IIT, Kanpur under the auspices of the Indian Society for Technical Education during 8-20 July 1991.

Mr. C.C. Tom attended a 2-day Seminar on "DIALOG Information Retrieval System" organized by M/s Informatics (India) Pvt. Ltd. in Bangalore during 14-15 Jan. 1992.

Mr. I.R.N. Goudar attended a 3-day Seminar on Library Net-working organized by the National Centre Software Technology, Bombay during 22-24 January 1992.

Mr. M.N.Seetharaman, Librarian attended a meeting of the Aeronautical Research and Development Board in Bangalore on 6.1.92. He is a Member of the Aerospace Information Panel representing IIT Central Library.

Sri R.K. Sankaran, Smt. Tapti Datta, Smt. Lalitha Rajendran and Smt. Saroja Subramaniam participated in the 37th All India Library Conference held in IIT, Madras from 4 to 7 December 1991 as delegates from the Central Library.

26. Lectures:

Mr. I.R.N. Goudar gave an invited lecture on "User-Librarian Interaction" in the one day seminar on "Information Use Pattern in College Libraries" in Meenakshi College for Women, Madras on 18.12.91.

On the Invitation, Mr. I.R.N. Goudar delivered two Special Lectures on 10.3.92 at the Department of Library and Information Science, Madras University, Madras. The topics were:-

"On-line Information Retrieval from International Databases".

"CD-ROM Technology and its Application for Information Storage and Retrieval".

27. Invited Assignments:

Sri C.R. Sekar, Sr. Professional Assistant was invited by the Indira Gandhi National Open University (IGNOU), New Delhi, to serve as a Counsellor for the students of the Bachelor's Degree Course in Library Science.

28. Library and Information Service Statistics:

The following statistics reflect the overall performance of the Library and Information Services during the year under report.

1. Membership:

Institute Members (Staff & Students)	4,800
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1.a) Outside Members:

Individuals	87
Corporate	8
Industrial Associateship	201
Consultation Permits	650

2. Collection Development - Acquisition of Publications:

Books	3,789
Theses	108
Pamphlets and Reports	1,527
Microfilms/Fische	5
Book-bank (General) (Total)	2,422
Book-bank (Weaker Section) (Total)	5,708
Current Periodicals by Subscriptions	860
Current Periodicals by Exchange/Gift	100

Back Volumes of Periodicals	2,658
Total Accessions at the end of March 1992 (Books & Journals)	2,04,792
3. Library and Information Services - Circulation:	
Number of Readers visited	1,12,715
Number of Volumes issued	1,52,924
Number of Volumes issued through Book Bank (General)	2,740
Number of Volumes issued through Book Bank (Weaker Section)	1,575
Overdue & other charges collected	Rs.3,72,955
Reservation for Books:	
Registered	8,410
Fulfilled	6,735
Department Loans:	
Department Loan	7,119
Permanent Loan	4,214
Inter-Library Loans:	
Borrowed from other Libraries	370
Loaned to other Libraries	245
Literature Search:	
Computer-based literature searches through DIALOG and CD-ROM databases	9
Reprint Service:	
From International Sources, i.e., British Library, Canadian Institute of Scientific Information, INSDOC, etc.	45
Translation services	13
4. Audio-Visual Service:	
Number of Audio Cassettes	69
Number of Video Cassettes	140
Number of Motion Films	160
Number of Audio programmes conducted	45
Number of persons attended	341
5. Reprographic Service:	
Number of Xerox copies supplied	7,00,000
DTP output	12,906
Number of copies printed on Rotaprinter	7,64,596
6. Binding:	
Number of Books and Journals bound (Internal)	1,145
Number of Miscellaneous Publications bound (Internal)	3,870
Number of Books & Journals bound through external binders	5,325
7. Visitors to the Library:	
Students from Library School (about 30 students per group)	8 Groups
Other Visitors	7 VIPs

6. STUDENT AMENITIES AND ACTIVITIES

6.1 Hostel

All the students admitted to IIT Madras, are required to reside in the campus. There are about 2396 single room accommodation, distributed in 11 men's hostels and 1 ladies' hostel.

Each hostel is administered by a Warden and an Assistant Warden. The Warden is assisted by a Hostel Council constituting student Secretaries and Assistant Warden in day-to-day functioning of the hostel. The Hostel Management is a centrally administered body and is overall in-charge of functioning of all the Hostels and Central Supplies Unit. There are 294 hostel staff and they are responsible to the Management through the respective Wardens of the hostels. The Chairman, Council of Wardens is the Chairman of the Hostel Management. He is assisted by an Assistant Registrar and other supporting staff.

During the period under report, the following officers were in position:

Chairman, Council of Wardens and
Hostel Management
Assistant Registrar

Dr. P.A. Aswathanarayana
Professor of Applied Mechanics
Sri K. Ramaswamy

Names of the Hostel

Warden

Alakananda

Dr.O.V. Krishnaiah Chetty
Professor of Mechanical Engg.

Brahmaputra

Dr. B.S. Thandaveswara
Associate Professor of Civil Engg.

Cauvery

Dr. P.A. Aswathanarayana
Professor of Applied Mechanics

Ganga

Dr. T.T. Narendran
Associate Professor of Hum. and Soc. Sciences

Godavari

Dr. N. Sivaprasad
Assistant Professor of Mechanical Engineering

Jamuna

Dr. L.S. Ganesh
Assistant Professor of Hum. and Soc. Sciences

Krishna

Dr. M. Ravindran
Professor of Ocean Engg.

Mandakini

Dr. V.G. Idichandy
Associate Professor of Ocean Engineering

Narmada

Dr. S.D. Pathak
Associate Professor of Metallurgical Engg.

Saraswathi	Dr. S.K. Rakshit Assistant Professor of Chemical Engg.
Sarayu	Dr. R. Malathy Assistant Professor of Hum. and Soc. Sciences
Tapti	Dr. K. Ramakoteswara Rao Assistant Professor of Mechanical Engineering
C.S.U.	Dr. P. Srinivasa Rao Associate Professor of Mechanical Engineering

6.2 Medical Facilities

Medical facilities are provided to the students in the well equipped Institute Hospital. Advises are given on a wide range of health problems to the students. The details of medical facilities available are given in the Chapter, Campus Amenities.

6.3 Gymkhana

Inter IIT Sports Meet:

This year, our sports Contingent did well in the Inter IIT Sports Meet held at IIT, Kharagpur from 17th to 21st December 1991. We had high hopes of regaining the General Championship till the last day of the meet. The defeat of the Hockey and Foot Ball Team in the last day shattered our hopes and placed us in the second place in the Inter IIT Meet. We won gold in Tennis and in Cricket, silver in Volley ball and Football, Bronze in Hockey, Basketball, Athletics and Weight lifting. Girls contingent won gold in Badminton and Silver in Basketball.

Sportsfest 1991:

The Sportsfest 1991 Inter-Collegiate level Tournaments open to city colleges for both men and women was organised and conducted by the Institute Gymkhana successfully. The greatness of the tournament was that there was no protest in any games. Our institute teams performed creditably and gained rich match experiences for the Inter IIT Meet. IIT Madras won the Silver in Badminton and Basketball, and in Hockey, Football and Table Tennis Teams reached the semi finals.

All India Gerhard Fischer and Kokila Rajaiah Inter-Collegiate Flood Light Basket Ball Tournaments:

The Gerhard Fischer and Kokila Rajaiah Basket Ball Tournaments for men and women attracted 21 and 10 teams respectively. P.S.G. Arts College, Coimbatore won the Gerhard Fisher Trophy and Jamia Millia College, Delhi was the runner up in the men section. St. Marys Hr. Sec. School, Chengalpet has won the Kokila Rajaiah trophy and Sarada College, Salem was the runners up.

All India Philips and Trinity Volley Ball Tournaments:

The Philips and Trinity Volley Ball Tournaments for men and women attracted 12 and 7 Collegiate teams respectively. St. Joseph's College, Tiruchi won the All India Philips Trophy and Annamalai University was the runner up in the men's section. Quaide Milleth Govt. College Madras won the Trinity Shield and Ethiraj College, Madras was the runner up, in the women's section.

Highlights of the year

Cricket:

IIT Madras won the Bicentenary cricket beating Anna University in their Bicentenary Cricket Tournament 1992. The credit goes to Mr. Arun Sriram, Captain who led the team to first ever victory of IIT cricket Team in an outside tournament. Mr. G.V. Raman was declared as the man of the finals.

Institute Open Bridge Tournament 1992:

Institute Gymkhana conducted Open Bridge Tournament from 10th to 12th April 1992. Mahalakshmi club won the trophy. Prof. G. Aravamudan and Dr. Subburama Reddy won the II place in Pair Event.

Table Tennis:

Our Table Tennis team took part in the Inter University South Zone Championship held at Madras and finished third. The team also qualified for All India Inter University Championship held at Ahmedabad. This was one of the major achievements of men students in the sports activities at the Inter University Level.

Skating:

This year IIT Madras was chosen as the venue for the Tamil Nadu Skating Championship. IIT skating hockey team won the championship. Mr. I. Arvind won many medals in the State Skating Meet.

Inter Hostel Events:

This year also the events for General Championship for Schroeter Cup were keenly contested. Ganga, Godavari, Alakananda and Narmada were close in the beginning, later Ganga showed more enthusiasm and determination and took a comfortable lead and won the Schroeter cup.

Tournaments among the students and campus members:

In order to secure maximum participation from the students staff and their wards and to improve skills and techniques, the following competitions were also conducted by the Institute Gymkhana.

Annual road race	6-a-side football (72 teams)
Open cycle race	Skating hockey
3-a-side volleyball (38 teams)	Institute ball badminton tournament
6-a-side hockey (42 teams)	9-a-side cricket

This year Institute Gymkhana conducted staff and students interaction sports in the following games.

Badminton	Bridge
Ball badminton	Volleyball
Cricket	Tennis

National Sports Organisation:

The National Sports Organisation was started in the year 1972, by the Government of India in order to promote sports in the country.

Every year students are admitted to N.S.O. by virtue of their abilities in the following events that are included under the N.S.O. programme.

- | | |
|----------------|-------------------|
| * Athletics | * Ball Badminton |
| * Chess | * Football |
| * Table Tennis | * Volleyball |
| * Badminton | * Basket ball |
| * Cricket | * Hockey |
| * Tennis | * Weight lifting. |

This year 188 men and 21 women were admitted for the N.S.O. Programme. In the end of the Academic Year 10 days coaching programme was held under this scheme to test the abilities of the N.S.O. students to issue Merit Certificates to each student after the camp.

Cultural Events

SPIC MACAY:

SPIC MACAY Cultural Programme was conducted on 30.8.92, 18.10.91 and 30.10.92 at C.L.T. Mr. Ustad Farid Ubbin Bagar and Mr. Ustad Bismillah Khan gave performances on Shanai and Mrs. Bharati Sivaji gave a Dance recital.

Out-Station Festival:

The students of this Institute participated in the following out-station cultural festivals during the year 1991-92 and won several prizes.

- * VIBRATIONS'91 of I.I.Sc., Bangalore
- * OASIS'91 at the Birla Institute of Technology and Science at Pilani.
- * HARMONY' 91 at Coimbatore Institute of Technology

A Cultural programme of music JAN ECSTASY was successfully conducted by the students of IIT and "SHRADHA" a youth organisation of the campus, during January, 1992.

Apart from this, various Intra Murual Competitions such as Classical Music, Quiz, Jam, Pot pourri, Skit, Extempore, Elocution, Dump Charades, Debate and Crossword were conducted this year. A large number of students participated in all the events.

Mardi Gras'92:

MARDI GRAS'92 an inter collegiate cultural festival was held from 10th January to 15th January 1992. Around 200 out-station students participated. The following Professional Shows were conducted apart from regular competitions

- | | |
|---|-------------------------|
| 1. Mr. T.N. Krishnan | - Violin |
| 2. Mr. Gangai Amaren | - Light Music |
| 3. Divya | - Jazz Fusion concert |
| 4. Pt. Shivkumar Sharma/
Zakir Hussain | - Santoor and
-Tabla |

Competitions were held in Indian Light Music, Elocution, Dumb Charades, Pot Pourri, Extempore, Dramatics, Western Music, Debate, Movie, Quiz, Jam, Audio Visual Quiz, Festival of Dresses, Creative writing, Skits, Nostalgia, Triplex and Crossword.

6.4 4(TN) Air Sqn (Tech)

The Air Wing NCC unit is functioning at IIT Madras from 16 Sept. 1965, to provide NCC training, exclusively to the student population of the Institute. Regular IAF Officers and airmen are posted to this unit and the strength is augmented by part time officers and other supporting staff drawn from the Institute. NCC syllabus includes drill, weapon training, civil defence, health/hygiene, leadership training, history of airport, principles of flight, air armaments, Radio/Radar aids, Avionics and instrumentation. The training is imparted by a team comprising Air Force elements and the Institute part time officers.

The organisation of the unit is as follows:

Commanding Officer	: Wing Commander M. Murugesan
Part Time NCC Officers	: Plt Officer A. Mani Dr. Neelamani (Caretaker Officer)

During the year under report, 120 Cadets from the first year B.Tech were enrolled and during the month of January 1992, 3 cadets were discharged from the unit for want of attendance. In addition to the regular NCC training, the following activities were carried out.

- * Range firing practice on rifle, revolver and 12 bore gun.
- * One blood donation camp at Red Cross Society, Madras by the eligible cadets.
- * Pledging of eyes for donation by volunteer cadets.
- * A cycle expedition was undertaken by the cadets from Madras to Pondicherry and back during the month of December 1991.

The 4(TN) Air Sqn (Tech) NCC located within the IIT campus helps to instill a sense of discipline, comradeship, a spirit of adventure and leadership capability in the life of IIT students.

6.5 National Service Activities

1. Spoken Tamil and Spoken Hindi Classes were conducted for the benefit of students and staff from 12.8.91 onwards. Twice a week classes were held for about 8 weeks. The classes were handled by qualified teachers from Vanavani Matriculation Higher Secondary School IIT Madras. About 20 people attended the spoken Tamil Classes and about 25 people attended spoken Hindi Classes.
2. Sri T.K.V. Desikachar, Managing Trustee, Krishnamacharya Yoga Mandiram, Madras gave a talk on 'Yoga for you' on 31.07.91 at the Central lecture theatre. At the end of the talk a Video film on yoga was shown. About 100 people attended the above talk.
3. A Yoga camp for boys and girls of age group 15 to 25 years was conducted by the Krishnamacharya Yoga Mandiram in HSB- 132 twice a week for 4 weeks in the month of August 1991. 30 people participated in the above camp.
4. A basic course in First Aid was conducted by St. John's Ambulance Association in MSB 242 from 6.00 to 7.00 p.m. for 8 days (31.08.91 to 07.09.91). 11 people attended the above course.
5. A visit to Sivananda Orphanage at Kattankolathur and SOS children's village at Tambaram was arranged on 28.09.91. 15 persons participated in the above visit.

6. A magazine called "Sathvika" containing the activities of NSS and other related topics was brought out in April 1991.
7. South Madras Arivoli movement under adult literacy programme conducted a "Street Play" by voluntary artists in front of the CLT on 31.07.91 at 7.30 pm. It was well attended by over 150 people. About 10 IIT students took active part in imparting literacy for about 200 people in the villages surrounding the IIT Campus. A procession was arranged by them on 25.08.91 in Taramani Village for the School Children to propagate literacy and the children were given chocolates at the end of the procession. About 400 notebooks were prepared from used computer sheets and distributed among the learners under adult literacy programme.
8. Painting and Oratorical contests were conducted among the campus children on the theme "Illiteracy in India" and prizes were distributed among them on 15.08.91.
9. About 5 volunteers went to Vanavani Matriculation School daily to coach the poor children between 5.00 and 6.30 pm. since 26.08.91.
10. About 109 volunteers regularly went to St. Louis School for the Deaf and Blind, Adyar every Wednesday and Thursday to read to the blind children.
11. N.S.S. Committee met on 06.11.91 and adopted the draft proposal for introduction of N.S.S. for I year B.Tech students from the academic year 92-93 onwards.
12. Basic Course in First Aid was conducted for the benefit of Security Personnel of I.I.T. Madras. Sri K.J. Suriya Narayana, Hony. Secretary, St. John's Ambulance Association, Madras-4 conducted the classes between 11.11.91 and 28.11.91. 94 persons were benefited by the above course.
13. Competitive sports for schools in Velacheri and Taramani were conducted on 04.01.92. Six schools took part in 20 sports events. 60 prizes worth of Rs. 1200/- were distributed among the school children.
14. Prof. P. Sankaran, Elec. Engg. Dept. conducted classes on Bhagavat Gita every Thursday since 09.01.92. About 25 students and staff attended the classes.
15. National Youth Day was celebrated on 24.01.92 by arranging a talk on "Swami Vivekananda-The Patriot-Saint" by Prof. N.V.C. Swami, Director, IIT Madras. About 300 people attended.
16. A visit to Udavum Karangal at Arumbakkam, Mathuravoil, and Thiruverkadu was arranged on 15.03.92. 35 students and staff took part in the above visit.

6.6 Student Welfare Fund

During the year 1991-92, M/s D. Uthayachandran, Ph.D. research scholar, Department of Chemical Engineering; Bisnu Pada Tikader, B.Tech., Department of Mech. Engg., K.V. Prasanth, Ph.D. research scholar, Department of Mech. Engg. and Vibhu Rastogi, B.Tech., Dept. of Computer Science & Engineering were given loan of Rs. 1,000/- Rs. 2,000/-, Rs. 5,000/- and Rs. 8,000/- respectively. Sri D. Uthayachandran, Ph.D. research scholar, Department of Chemical Engineering refunded Rs. 500/- during the year.

6.7 Guidance & Counselling Unit

1. A Campus information booklet was prepared for all the fresh students and were made available to all of them.

2. The first year B.Tech students were distributed to various student counsellors and faculty counsellors for individual attention.
3. The first year students with their parents or guardians were received by the student counsellors at the railway station and helped to settle down in their stay quickly.
4. A get-together of all the counsellors and the parents and guardians was arranged to make the first year students feel at home.
5. Student problems were solved by the counsellors by applying individual attention.
6. The unit attended very few emotional counselling since such problem more during this year.
7. The unit arranged instruction classes by senior students to the needy first year students who wanted guidance in subjects like Mathematics, Physics and Chemistry.
8. It helped the Medical Officers and the first year students to get the blood grouping.
9. The unit had a get-together with the outgoing student counsellors, incoming ones, faculty counsellors, the Dean (Students) and the Medical Officer at the farewell day of the year and discussed the possibilities of improving the service.

6.8 Weaker Section & Foreign Students

As per Government of India orders 22.5% of the seats are reserved for SC and ST students. For B.Tech. programme they are admitted through the Joint Entrance Examination with a relaxation. These students have to get only 2/3 of the marks obtained by the last student of the general category to get qualified for admission. 25 SC/ST students joined the B.Tech degree course during the academic year 1991-92. Students admitted against SC/ST reservation quota are given the following benefits:-

1. Travelling allowance (IInd Class train fare/ordinary bus fare) from the place of residence to Madras to join the B.Tech degree course.
2. Free tuition.
3. Free lodging and free messing (basic menu) and pocket allowance of Rs.70/= p.m. irrespective of their parent's/guardian's income to the students admitted during 1990-91 and earlier years.

As per Govt. of India revised orders, with effect from 1st January, 1991, free lodging, free messing (basic menu) and pocket allowance of Rs.70/= p.m. was limited to the students whose parent's/guardian's income is Rs.24,000/= net per annum or below. The revised regulation is applicable to the students joined during the academic year 1991-92.

4. Exclusive use of Weaker Section (SC/ST) Book bank. The students are issued 12 tickets in addition to the 5 tickets as issued to the general students. Against Book Bank 12 tickets, books are issued on long term i.e. upto the end of the semester.
5. Drawing instrument (Mini-drafter) free of cost.

6. Help in getting placement.
7. Financial help for needy students through part-time job through Guidance and Counselling Unit, if available.
8. Complete grant of about Rs. 40,000/- has been used to purchase books of Weaker Section Students' Book Bank.

A few students who had lot of backlogs had been helped to shift to other hostels at their own request.

Preparatory Course for B.Tech:

A preparatory course of one academic year was started during the year 1983-84 exclusively for SC/ST Students. Selection for this course is made from the SC/ST students who did not get admission through Joint Entrance Examination. After successfully completing the preparatory course at IIT, they will be eligible to join B.Tech degree course and they are not required to write JEE again. 30 SC/ST students joined the Preparatory Course at IIT, Madras during the year 1991-92 and they would be distributed to all IITs.

M.Tech:

22.5% of the seats are reserved for the students of SC/ST community. At present these students are admitted through GATE examination. 45 SC/ST students were admitted to M.Tech degree course during the academic year 1991-92. Students admitted against SC/ST reservation quota are given the following benefits:

1. **Exclusive use of Weaker Section (SC/ST) Book bank.** The students are issued 12 tickets in addition to the 5 tickets as issued to the general students. Against Book Bank 12 tickets, books are issued on long term i.e. upto the end of the semester.
2. Help in getting placements.
3. Financial help for needy students through part-time jobs through Guidance and Counselling unit.
4. Scholarship as given to all students.

Foreign Students:

B.Tech:

During the academic year 1991-92, 16 foreign students joined the B.Tech degree course. Foreign students are also permitted to use the Weaker Section Students (SC/ST) Book Bank. 4 Book Bank tickets are issued to each student in addition to the 5 tickets issued to all students. Against Book Bank 4 tickets, books are issued on long term i.e. upto the end of the semester. The details of nationality of the 16 foreign students are as follows:

Bangladesh 5
 Sri Lankan 7
 Malaysian 2
 Mauritian 1
 Napalese 1

Ph.D.:

Two foreign students (one from Egypt and other from Iran joined Ph.D. programme during the year 1991-92.

General:

During the year 1991-92 meetings were held on the following days.

23rd August, 1991	: Foreign students meeting
26th August, 1991	: Weaker Section Students Meeting
22nd January, 1992	: Foreign students and Weaker section students meeting

Besides these meetings, many academically weaker and foreign students had meetings with Adviser to help the students to do better in the academic programmes. One B.Tech. student belonging to weaker section has obtained financial aid to pursue higher education in U.S.A.

Adviser:

Prof. P.A Aswathanarayana was the Adviser, Weaker Section (SC/ST) and Foreign students during the period under report.

6.9 Placement of Students

During the period under report, the Placement Office was able to arrange placements for 287 students of the Institute. The branch-wise details of placement made are given below:

Branch	No. of students registered for placement	No. placed			No. got more than one job
		OC	SC/ST	Total	
I. B.Tech					
Aerospace Engineering	15	13	-	13	1
Chemical Engineering	32	18	-	18	3
Civil Engineering	23	13	-	13	-
Computer Science	30	19	3	22	1
Electrical & Electronics	29	24	-	24	4
Electronics & Communication	41	28	4	32	6
Mechanical Engineering	62	44	2	46	9
Metallurgical Engineering	23	13	-	13	1
Naval Architecture	13	2	-	2	-
Total I	268	174	9	183	25
II. M.Tech					
Aerospace Engineering	3	-	-	-	-
Applied Mechanics	7	4	-	4	-
Chemical Engineering	4	2	-	2	1
Civil Engineering	23	-	2	2	-
Computer Science	21	16	3	19	2
Electrical Engineering	17	11	1	12	5
Industrial Management	19	13	1	14	1
Industrial Metallurgy	4	-	-	-	-
Mechanical Engineering	35	13	3	16	6
Ocean Engineering	4	-	-	-	-
Solid State Technology	2	-	-	-	-
Total II	139	59	10	69	15

Branch	No. of students registered for placement	No. placed			No. got more than one job
		OC	SC/ST	Total	
III. M.S.					
Civil Engineering	9	4	-	4	-
Computer Science	5	4	-	4	1
Electrical Engineering	6	1	-	1	1
Industrial Management	2	1	-	1	-
Ocean Engineering	5	3	-	3	-
Mechanical Engineering	10	5	-	5	-
Total III	37	18	-	18	2

IV Besides the above, the following have also been placed:

M.Sc.	: Physics	3
	: Chemistry	2
	: Mathematics	11
Ph.D.	: Industrial Management	1
	: Electrical Engg.	1

7. FINANCIAL ASSISTANCE TO STUDENTS

Financial Assistance is extended to the meritorious students who are pursuing Engineering, Technology and Science education in this Institute in the form of Scholarship and Fellowships. The details of Scholarship and Fellowship sanctioned to the students of different programmes during 1990-91 are as follows:

7.1 B.Tech.

The SC/ST students admitted in B.Tech. programme upto the academic year 1991-92 were sanctioned the concession of free messing plus Rs.70/- p.m. out of pocket expenses irrespective of their parent income besides the exemption from payment of tuition fees and hostel rent. As on 31.3.92, 56 students were benefited. The year-wise details of such students are given in Table 7.1.

The Merit-cum-means scholarship of Rs.300/- p.m. were sanctioned to the 25% of the students admitted in B.Tech. programme besides the exemption from payment of tuition fees. During the period under report 66 students got benefited. The year-wise details of such students are given in Table 7.1.

In addition to the above the Institute sanctioned a notional prize of Rs.100/- to the top ranking 22 B.Tech. students in JEE.

Table 7.1

Year	Merit-cum-means scholarship	Free messing (basic menu) and pocket allowance concession to SC/ST students
I	16	3
II	15	15
III	18	20
IV	17	18
Total	66	56

7.2 M.Tech.

The students who joined M.Tech. programme admitted through GATE were awarded Rs.1800/- per month scholarship. Scholarship at Rs.1000/- p.m. will be renewed, for the students where the CGPA in the first semester fall short of 6.5. During the period under report 212 fresh scholarships and 130 renewed scholarships were given, the department-wise details of which are given below:

Table 7.2

Discipline	No. of scholarships awarded	
	Fresh	Renewal
Aerospace Engineering	6	3
Applied Mechanics	9	7
Chemical Engineering	21	4
Civil Engineering	30	21
Computer Science and Engg.	32	21
Electrical Engineering	35	15
Industrial Management	19	18
Mechanical Engineering	42	30
Metallurgical Engineering	12	4
Ocean Engineering	2	5
Solid State Technology	4	2
Total	212	130

7.3 M.Sc.

The students admitted in M.Sc. programme were sanctioned merit scholarship of Rs.300/- p.m. Exemption from payment of tuition fee of Rs.200/- per annum were also given to certain students. During the period under report 31 students got benefitted. The department-wise details of such awards are given below:

Table 7.3

Course	Year	No. of merit scholarships awarded	No. of freeships of Rs.200/- per session awarded
Chemistry	I	7	4
	II	6	3
Mathematics	I	7	3
	II	5	2
Physics	I	7	3
	II	4	2
Total		36	17

7.4 M.S.

The scholars admitted in M.S. programme through GATE or equivalent examination are given Rs.1800/- p.m. for three years. During the period under report 141 students received this fellowship. The department-wise details of the fellowship awarded and renewed are given below:

Table 7.4

Department	No. of scholarships awarded	
	Fresh	Renewal
Aerospace Engineering	2	2
Applied Mechanics	4	12
Chemical Engineering	3	3
Civil Engineering	8	15
Computer Science and Engg.	11	13
Electrical Engineering	10	10
Humanities and Soc. Sciences	2	6
Mechanical Engineering	10	17
Metallurgical Engineering	3	2
Ocean Engineering	6	2
Total	59	82

7.5 Ph.D

The scholars who are admitted for Ph.D. full-time programme in the Engineering fields are sanctioned Rs.2400/- for the first two years and Rs.2500/- for another 3 years per month based on progress. The scholars who are admitted for Ph.D full-time in the Science fields are sanctioned Rs. 1800/- p.m. for the first two years and for another three years Rs. 2100/- p.m. If they possess M.Tech, they will get as per Engg. norms. During the period under report 294 students obtained fellowship. The department-wise details of the fellowships awarded and renewed are given below:

Table 7.5

Department	No. of scholarships awarded	
	Fresh	Renewal
Aerospace Engineering	4	3
Applied Mechanics	7	11
Chemical Engineering	7	20
Chemistry	14	39
Civil Engineering	7	23
Computer Science and Engg.	5	9
Electrical Engineering	4	6
Humanities and Soc. Sciences	5	11
Mathematics	4	16
Mechanical Engineering	11	30
Metallurgical Engineering	7	9
Ocean Engineering	5	7
Physics	7	23
Total	87	207

8. CAMPUS AMENITIES

8.1 Staff Quarters

The Institute as on 31-03-92 had 896 quarters.

8.2 Guest House

There are two Guest Houses in the Campus viz. VIP Guest House and Taramani Guest House which are having six suites and 30 rooms respectively.

8.3 Hospital

The Institute Hospital consisting of 36 Beds, renders medical facilities to students and staff. Hospital offers outpatient and in-patient services for Medical, Surgical, Obstetric, Gynaecological, Pediatric, ENT and Ophthalmic treatment.

The following are the Officers in the Hospital:

Dr. A. Ganesan, M.D.	Chief Medical Officer
Dr. N.A. Jayavelan, M.B.B.S.	Resident Medical Officer
Dr. Sumathi Khangaonkar, M.B.B.S.D.A.	Medical Officer
Dr. Lalithakumari, M.B.B.S., D.G.O.	Medical Officer
Dr. S.Aruna, B.Sc., M.B.B.S.	Medical Officer
Dr. C.Sridevi, M.D., D.ch.	Medical Officer
Dr. R. Shyamala, M.B.B.S.	Jr. Medical Officer
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)
Dr. S. Devaji Rao, M.S. MNAMS, FICS	Consultant Surgeon (Part-time)
Dr. S. Rathanamala, M.B.B.S., D.O.	Eye Specialist (Part-time)
Dr. C.R. Chandrasekhar, M.D.	Psychiatrist (Part-time)
Dr. R. Rajkumar, M.D. DPM	Psychiatrist (Part-time)
Dr. Asha, M.B.B.S.	Junior Medical Officer
Dr. Sadana Saraswathi	Junior Medical Officer
Sri L. Palaniappan	Lay Secretary

Two ambulances are available at Hospital and are being used round the clock. One Medical Officer is posted for call duty and is available for all the 24 hours of a day to attend the emergency cases in the Hospital.

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

Immunization for children is being carried out against Polio, diphtheria, tetanus and whooping cough. Family Planning Operations were also conducted at this Hospital besides counselling.

The Statistics on the activities of the Hospital between 1.4.91 and 31.3.92 are as follows:

1.	Total No.of outpatients	92828
2.	Total No.of inpatients	570
3.	Emergencies attended	3056
4.	Dressings	19119
5.	Injections	18431
6.	Deliveries	11
7.	Pathology	
	Urine	4380
	Motion	3285
	Blood	5847
8.	Bio-Chemistry	
	Blood Sugar	2924
	Urea	218
9.	Operations	
	General surgery	69
	ENT operations	49
	Eye operations	38
	Gynaec operations	2
	Minor Operations in Surgeon's room	86
	Obstetric Procedures	
	I.U.D.	9
	O.P. Cycles	4
	Nirodh	Pcs 50
	ECG	403
	Vaginal Dauches	30

8.4 State Bank of India

State Bank of India Main Branch is functioning in the campus with two extension counters - one at shopping centre and the other near Narmada Hostel.

8.5 Post Office

There is a post office in the campus opposite to State Bank of India to cater to the needs of the staff, students and residents of the campus.

8.6 Schools

Vanavani Matriculation Higher Secondary School administered by IIT employees Educational Society is functioning in the campus besides a Central School. These schools are offering courses from L.K.G. to XII Standards.

8.7 Open Air Theatre

The Open-Air Theatre is utilised for screening Films by Film Club during week end.

8.8 Student Activities Centre

This building is utilised for indoor games of the students as well as for conduct of important functions such as Convocation etc.

8.9 Cafeteria

There are two Canteens - namely Akshaya and Modern Cafe, in the campus to cater to the needs of staff and students.

8.10 Bus Services

The Institute is having Omni Buses which provides transport facility to the staff, students and residents of the campus.

8.11 Campus News

The Campus News is published every Friday highlighting the important events of the Institute.

9. FINANCE AND ACCOUNTS

The financial year of the Institute corresponds with that of Government of India i.e. 1st April to 31st March. The accounts of the Institute are annually audited by the Accountant General, Tamil Nadu & Pondicherry, Madras on behalf of the Comptroller and Auditor General of India.

The Finance Committee of the Institute in its meeting held on 28.10.91 recommended the non-plan revised estimate 1991-92 and Budget Estimate 1992-93 for Rs.1,837.09 lakhs and Rs.17,143.00 lakhs respectively.

The general view of the revised estimate approved for 1991-92 and budget estimate 1992-93 presented to the Finance Committee is given below:

Head	Budget Estimates for 1991-92		Revised Estimates	Budget Estimates
	(as proposed)	(as allocated by the Board of Governors)	1991-92 as per Finance Committee	1992-93 (as proposed)
	Rs. in Lakhs			
Non-Plan				
Recurring	2,173.01	1,876.00	2,081.69	2,265.11
Non-Recurring	50.00	20.00	20.00	55.00
Total Non-Plan	2,223.01	1,896.00	2,101.69	2,320.11
Plan				
Recurring	29.00	21.70	29.00	45.00
Non-Recurring	479.97	278.30	291.00	814.11
		+ 49.22	+ 49.22	
Total Plan	508.97	300.00	320.00	859.11
		+ 49.22	+ 49.22	
Income	238.50	248.50	264.60	314.79

* Letter of Credit established as on 31.3.91.

Audit

The audit report of the institute has been separately placed on the tables of Parliament with the due certificates of Accountant General of Tamilnadu and Pondicherry. The accounts of the Institute for the year 1990-91 was audited by the AG between July 91 to September 1991. The audited report for the year ended 31st March 1991 was sent to Department of Education, Ministry of Human Resource Development, Government of India, on 14-2-92 for placing the same in the Parliament.

The salient features of the 1991-92 accounts are given below:

Item	Rs. in Lakhs
I. Receipts:	
1. Opening Balance	1225.77
2. Grant from GOI	2100.07
3. Institute Receipt:	
Fees, etc.	10.19
Application Fees	62.32
Income from Vehicles	6.81
Income from Buildings	25.57
Other receipts	174.03

	278.92
4. Recovery of Advances	45.09
5. Deposits	1014.49
Total Receipts	4664.34
 II. Payments:	
a. Capital Account:	
1. Buildings and Constructions	119.85
2. Furniture, equipment and fittings	18.86
Departments	19.00
Research Centres & Central Services	9.50
Others	0.44

	167.65
3. Library	108.01
4. Others	7.52
Total (a)	388.16
 b. Revenue Account:	
1. Academic Departments/Centres:	
Pay & Allowances of Tech. Staff	438.24
Pay & Allowances of Non-Teaching Staff	76.88
Department expenses	112.73
Library including staff salary	28.86
Central Workshop including staff salary	46.31
Indo-German Projects payment	0.44
Research Centres including staff salary	24.27
CEC pay and allowances	5.16
AC Unit pay and allowances	3.55
Centres, Central Services working expenses	13.05
Rural Development Research Activities	1.32
Indo-German Project	2.50
Institute Scholarship	160.39
Other items	60.40
NCC, NSS and NSO: Pay & allowances & others	2.40
 2. Central Administration:	
Pay & Allowances	131.99
Hostel	52.29
Stores Pay & Allowances	10.29
Security & Fire fighting	5.88
Lawns & Garden	2.16
Service & Maintenance	
(Telephone, Power, Water, Furniture repair & Maintenance, Oil, Petrol, etc.)	108.52
Medical Dispensary	23.88

Atheletics and Gymkhana	11.95	
Other expenses	2.84	
	-----	349.80
3. Works and Maintenance		
Pay & allowances and other expenses		168.61
4. General Expenses:		
Postage, Liveries, Stationery, Printing, etc.		30.25
Travelling		5.39
Leave Salary, Reimbursement of stamp duty, Sundries, etc.		4.52
PF/Gratuity/Pension		164.04
Advances		49.30
Refund of Deposits		1149.25
5. Closing Balance		
		1282.52
Total Payments (b)		4276.18
Grand Total (a + b)		4664.34

LIST OF MEMBERS OF COUNCIL OF IITS

Name of the Representing Organisation	Name and Address
1. Ex-officio - Chairman	Shri.Arjun Singh Ministry of Human Resources Development Government of India.
2. Chairman of each Institute Ex-officio Kharagpur	Shri Russi H.Mody Managing Director Tata Iron & Steel Co., Jamshedpur, Bihar-831 001.
Bombay	Dr.D.V. Kapur 405, Aradhana Apartments Sector- XVIII, R.K.Puram New Delhi-110 066.
Madras	Dr. M.S. Swaminathan (Chairman, Board of Governors IIT Madras) Chairman, M.S.Swaminathan Research Foundation 14 II Main Road, Kotturpuram Madras - 600 085.
Kanpur	Dr. Subrate Ganguly (Chairman, Board of Governors IIT Kanpur) Executive Vice Chairman & Managing Director The Associated Cement Co. Ltd. Cement House 121, Maharshi Karve Road Bombay-400 020.
Delhi	Shri V. Krishnamurthy (Ex-Chairman, Steel Authority of India Ltd.) AB-12, Pandora Road New Delhi-110 003.
3. Director of each Institute Ex-officio Kharagpur	Prof. K.L. Chopra Director IIT Kharagpur-721 302.
Bombay	Prof. B. Nag Director IIT Bombay-400 076.
Madras	Prof. N.V.C. Swamy Director IIT Madras-600036.
Kanpur	Prof. M.P. Kapoor Director IIT Kanpur-208 016.
Delhi	Prof.N.C. Nigam Director IIT New Delhi - 110 016
4. Chairman, University Grants Commission, Ex-officio	Prof. Rami Reddy Chairman, University Grants Commission, Bahadur Shah Zafar Marg, New Delhi-110 002

- | | | |
|-----|---|---|
| 5. | Director-General, Council of Scientific and Industrial Research, Ex-officio | Dr. A.P. Mitra
Director-General
CSIR, Rafi Marg
New Delhi-110 001. |
| 6. | Chairman, Indian Institute of Science, Bangalore, Ex-officio | Dr. Raja Ramanna
Chairman
Indian Institute of Science, Bangalore - 560 012. |
| 7. | Director, Indian Institute of Science, Bangalore, Ex-officio | Dr. C.N.R. Rao
Director
Indian Institute of Science, Bangalore - 560 012. |
| 8. | Three Nominees of the Central Government
To represent the Ministry concerned with Education

To represent the Ministry of Finance

To represent any other Ministry | Prof. S.K. Shrivastava
Joint Education Adviser(T)
Min. of Human Resource Dev.
Dept. of Education New Delhi-110 001.

Shri S.K. Ray
Dy. Financial Adviser in the absence of
Financial Adviser
Min. of Human Res. Dev., New Delhi-110 001.

Prof. C.N.R. Rao
Member Education (Technical) Planning
Commission Yojana Bhavan, New Delhi-110 001 |
| 9. | Nominee of the All India Council for Tech. Education | Shri Anil Bordia
Education Secretary
Min. of Human Res. Dev., New Delhi-110 001. |
| 10. | Nominees of the visitor (Minimum - Three) (Maximum - Five) | Dr. M. Santappa
Tamil Nadu Pollution Control Board
25, Radhakrishnan Salai, Madras 600 004

Dr. V.S. Arunachalam
Scientific Adviser to the Minister of Defence
South Block
New Delhi-110011.

Shri Ajit Singh
Director Sci. Tech Centre
131, Kandivli Industrial Estate
Bombay-400 067.

Dr. V.R. Gowariker
Secretary
Min. of Science & Tech.
New Mehrauli Road New Delhi. |
| 11. | Three Members of Parliament (Two from Lok Sabha and one from Rajya Sabha) | Shri. Indrajit Gupta
Member of Parliament Lok Sabha
41, Western Court New Delhi.

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