

**THIRTY FIFTH  
ANNUAL REPORT  
1993 - 94**



**INDIAN INSTITUTE OF TECHNOLOGY  
MADRAS**

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MADRAS**

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## **THE VISITOR**

Dr. Shanker Dayal Sharma  
President of India

## **THE BOARD OF GOVERNORS**

Chairman  
Dr. M.S. Swaminathan

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

### **Members Nominee of State Governments**

Sri K. Pradeep Chandra  
Commr.&Director of Tech. Edn.  
Govt. of Andhra Pradesh

Dr.K.Ramachandran  
Director of Tech. Education  
Govt. of Kerala

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

Prof.V.Mahalingam  
Director of Tech. Education  
Govt. of Tamilnadu

### **Nominees of the IITs Council**

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

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

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

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

### **Nominees of the Senate**

Prof. P.S. Rao

Prof. R. Subramanian

### **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 and Science with nearly hundred 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 1993-94, the institute continues 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-graduates and post-graduates levels. At the under-graduate level, eight semester programme leading to the degree of Technology in 8 disciplines are offered. At the post-graduate level, a three semester - programme leading to the post graduate degree of technology in 37 disciplines are offered. Research programmes leading to award of MS and Ph.D degree are also offered.

### 1.1. Student Intake

In the year 1993-94, 884 students were admitted. This includes, 113 Ph.D, 67 M.S., 280 M.Tech, 75 M.Sc. and 349 B.Tech students. The number of women and SC/ST students admitted were 95 and 112 respectively.

### 1.2. Enrolment

The enrolment of students in the Academic year 1993-94 was 2764 which includes 157 SC/ST and 254 women students. This enrolment includes 582 Ph.D, 204 M.S., 517 M.Tech, 158 M.Sc., and 1303 B.Tech students/scholars.

### 1.3. New Courses Introduced

The Departments review the curriculum periodically so as to make them relevant to the current needs of Engineering, Technology and Science education. During the period of report, 31 new courses were introduced/updated.

## 2.. Faculty Development

### 2.1 Faculty Position

There are 162 Professors, 67 Associate Professors, 112 Assistant Professors and 11 Lecturers totalling 352 in different departments and centres of this Institute. During the period under report 21 faculty positions filled.

### 2.2. Grant of Sabbatical Leave

During the period under report 11 faculty members went on sabbatical leave for taking up various assignments.

### 2.3. Visits Abroad

42 Faculty members visited foreign countries for various academic activities.

### 2.4 Publications

During the period under report 915 papers were published by the faculty members of which 305 papers were in Mechanical Science, 59 papers in Electrical Science, 34 papers in Chemical Science, 74 papers in Building Science, 38 papers in Mathematical Science 76 papers in Physical Sciences and 329 papers in other subjects.

### 2.5 Faculty Attending Conference/Seminar

Faculty members are keen and take effective steps for interaction with other educational institutions. During the period under report 61 faculty members participated in various conferences, seminars and symposia conducted by other organisations/Universities.

### 2.6 Honours conferred on Faculty

- Prof E.G. Tulapurkara, Aerospace Engineering, Prof. V.Ramjee, Applied Mechanics and Sri Jacob George, M.S. Scholar, were awarded Dr.M.G. Deshpande Memorial Prize for the best paper submitted in the 20th Conferene on Fluidic Mechanics and Fluid Power held at Palghat during 15-17, Dec. 1993.
- Prof. T.V. Ramakrishna, Chemistry Department, was awarded Dr.S.Krishnamurthy award by Electro Chemical Society of India, for the best paper published during the year 1993.
- Prof. D.V. Ramana, Chemistry Department was awarded second prize in the 6th National Conference, IIP, Dehradun for the best paper presentation.
- Dr.C.S. Swamy, Chemistry Department awarded Air Products, USA (\$10,000) for the transfer of know-how for Decomposition of  $N_2O$  anionic clay materials.
- Prof. B. Viswanathan, Chemistry Department, was awarded Eminent Scientist award from Catalysis Soc. of India for the work in the field of catalysis.
- Dr.T.S.Chandra, Chemistry Department, was awarded Thannambikai award for the achievements of Physical handicap by the Pondichery Welfare Association for disabled.
- Dr.H. Suresh Rao, Civil Engineering Department, was awarded CBIP certificate of merit for best paper on Ground water.
- Dr.K.Srinivasan, Civil Engineering Department, was awarded CBIP medal for the best paper on Hydrology.
- Mr.K. Ananthanarayanan, was awarded Sri Arthur Ctoon Memorial prize for the best paper published in the Jl. of Institution of Engineers (India).
- Prof. V.V. Sastry, Electrical Engineering Department was awarded 9th Bimal Bose Award by IETE for his contribution in the field of Power Electronics.
- Dr. D. Malathy, Humanities Department was awarded Rokfeller Foundation Fellowship for the summer May-June 1993, Yale Univ., USA.
- Prof. V. Ganesan, Mechanical Engg. Department was awarded for the best paper presentation by the Institution of Engineers.
- Dr.P.S. Mehta, Mechanical Engineering Department, was awarded best paper award at XIII National Conference on IC Engines and Combustion, IISc., Bangalore.
- Dr. R. Raman, Mechanical Engineering Department, was awarded Sri R.N.Mookerjee Memorial prize of Institution of Engineers for best paper presentation.

- 16 \* Dr. J.S. Mani, Ocean Engineering Centre, was awarded a merit certificate for the best paper on Damping of waves by two rows of closely spaced piles, by the Institution of Engineers (I.E.E.).
- 17 \* Prof. R. Rajagopalan, Humanities and Soc. Sciences Department was awarded the First Prize (non-fiction) by the Children's Book Trust, New Delhi, in their Writers' competition for a book entitled 'The Secrets of Indus Valley' written by him.
- 18 \* Prof. R. Narayan, Chemistry Department, was awarded Dr. Rama Char Best Paper Award for a paper entitled Electrochemical Reduction of Substituted Nitrobenzenes from Molten Acetamide at 85°C written by him along with Dr. R. Saraswathi, Former Research Scholar of Chemistry Department.
- 19 \* Prof. V. Damodara Das, Physics Department, was awarded Hari Om Ashram Prerit H.C. Shah Research Endowment Prize for the research papers in the subject 'Solid State Physics' published during the five years period 1987-91 and Cash prize and Gold Medal amounting to Rs.5000/-

## 2.7 Short-term courses conducted

The faculty of various departments and centres of this Institute conducted 26 Short-term courses during the period under report.

## 2.8 Conference/Seminars/Symposia Conducted

A large number of conference, seminars, symposia, short term courses are regularly organised at this Institute. During the period under report 21 Seminars/Symposia/Workshop were conducted.

## 4. STUDENT FACILITIES

### 4.1 Student Council

The students council, an elected body from among the student 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 organized on voluntary basis by the student community. The publication of Focus, campus magazine of the students is one of the activities of the students' council.

### 4.2 Adhoc Grant for Research Scholars

To encourage the research scholars of M.S. and Ph.D programmes the Institute has been sanctioning adhoc grant for those who participate in International conference and present papers. During the period under report 4 scholars were sanctioned this grant. In the last 9 years, 55 scholars have benefitted under this scheme.

### 4.3 Thesis Preparation Grant

Research scholars have been sanctioned a sum of Rs.2500/- for preparation of thesis. During the period under report 29 Ph.D scholars benefitted in this scheme.

### 4.4 Award of Medals

In the academic year 1993-94, 43 students obtained medals and certificates for their outstanding academic performance in various disciplines.

### 4.5 Scholarship

During the period under report 39 Ph.D scholars, 28 MS scholars and 199 M.Tech students were given fellowship/scholarship. Institute merit-cum-means scholarship was given to 11 B.Tech. students. Institute merit scholarship was given to 19 M.Sc., students. In total 321 Ph.D, 116 M.S scholars and 367 M.Tech students got fellowship/scholarship. 58 M.Sc. students got institute merit scholarship and 58 B.Tech. students got Institute merit-cum-means scholarship.

## **5 Facility for SC/ST Students**

During the period under report 2 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 32 students enjoyed this facility during the period under report. Further 51 students got tuition fee exemption.

### **4.7 Student 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 2 students got benefitted.

### **4.8 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 discipline. During the period under report 208 students were selected by well known organisations before they actually leave the campus after completing the course.

## **5. Degrees Awarded**

30th Convocation was held on 30th July, 1993. Sri K.L. Chugh Chairman, ITC Limited, Calcutta, delivered the Convocation Address. 751 candidates were awarded various degrees. With this the total number of candidates who were awarded degrees so far by this Institute is 16,931.

## **6. Industrial Consultancy & Sponsored Research Programmes**

### **6.1 Sponsored Projects**

During the period under report 52 sponsored projects to the value of Rs.502.60 Lakhs were obtained. As on 31.03.1994, 150 projects amounting to Rs.10.0 crores were taken up.

### **6.2 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 taken up in 1993-94 was Rs.373.08 lakhs.

### **6.3 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. 26 faculties were retained as consultants by various industries from all over the country and availed this expertise.

### **6.4 Research Based Industrial Consultancy**

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 1993-94 more than fifteen companies entered into an agreement for pursuing projects under this programme.

## **6.5 Industrial Associateship Scheme**

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

- \* Technology Appreciation Programmes (TAP)
- \* Technology Requirement Programmes (TRP)
- \* Library and Information Services
- \* Short term courses
- \* Get-together Programmes

During the period under report 6 Technology Appreciation Programmes were organised.

## **7. 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 other facilities available at the Institute.

The Centre for Continuing Education during the period under report conducted several summer/winter schools for teachers of Engineering Institutions.

During the period under report 17 Ph.D. scholars and 19 M.Tech. scholars were admitted under QIP programme. So far 221 faculty members have been awarded Ph.D. degree and 300 faculty members awarded M.Tech. degree.

During the year 1993-94, 13 continuing education programmes were conducted and about 350 participants attended these programmes. Many industries are coming forward to make use of the expertise of the IIT faculty through these programmes.

## **8. Hostel**

The strength of students in 12 hostels was 2010 which includes 1816 men and 194 women students.

## **9. Finance**

The non-plan revised estimate and budget estimate for 1993-94 were Rs.2594.00 lakhs and Rs.2822.15 lakhs respectively. The plan revised estimate and budget estimate were Rs.300.00 lakhs and Rs.334.30 lakhs respectively.

## **10. Library**

The Central Library has acquired 2,18,643 volumes of books, journals and periodicals as on 31-3-1994. During the period under report 1,57,200 readers visited the library.

## **11. Building Programme**

During the period under report, 13 items of works were completed costing Rs.82.71 lakhs which include construction of a laboratory buildings for Structural Dynamics and Supersonic combustion facility.

## 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 the activities of these Institutes. The Minister for Human Resource Development of the Government of India is the Chairman of the Council. The list of the members of the Council is given in Annexure 1. 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 approves and controls curriculum, courses, examination and declaration of 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 Annexure II. The Buildings and Works Committee advises the Institute on matters relating to buildings and works activity. The constitution of this committee is also given in Annexure II.

In addition the Board of Academic Research, Board of Academic Courses, Board of Students and Board of Industrial Consultacny and Sponsored Research are appointed by the Senate to help in the efficient administration of academic and research activities of the Institute. The composition of these boards together with a list of other officers are also listed in Annexure II.

### 2.2 Staff Position

During the year 352 Faculty, 35 Scientific Officers, 52 Officers and 1538 supporting staff were in position. 2 new appointments for higher positions were made. 25 Faculty/Officers retired from their services, 3 resigned, 2 expired and 2 visiting faculty were relieved. During the period under report 21 faculty and other staff were on long leave. The details of them are given below:

#### Faculty/Officers appointed during the year

S.No.	Name	Designation	Date of Appointment/ Selection
1.	Dr.G.Markandeyulu Physics Dept.	Asst.Professor	07.04.1993
2.	Dr.(Mrs.) R.Usha Mathematics Dept	Asst.Professor	08.04.1993
3.	Dr.C.Vijayan Physics Dept.	Asst.Professor	28.04.1993
4.	Dr.Amitava Das Gupta Electrical Engg. Dept.	Asst.Professor	11.05.1993
5.	Dr.Nandita Das Gupta Electrical Engg. Dept.	Asst.Professor	11.05.1993
6.	Dr.S.A.Choudum Mathematics Dept.	Asst.Professor	17.05.1993

S.No.	Name	Designation	Date of Appointment/ Selection
7.	Dr.G.Venkatathnam Mechanical Engg. Dept.	Asst.Professor	21.05.1993
8.	Dr.P.Sreenivasa Kumar Computer Sci.&Engg.	Asst.Professor	21.06.1993
9.	Dr.Shan Somayagi Civil Engg.	Visiting Professor	21.06.1993 (On contract for 1 year)
10.	Dr.K.Shankara Rao Electrical Engg.	Visiting Professor	02.07.1993 (On contract for 1 year)
11.	Dr.K.Rajagopal Civil Engg.	Asst.Professor	08.07.1993
12.	Dr.T.Sundararajan Mechanical Engg.	Asso.Professor	12.07.1993
13.	Dr.(Miss)Vinitha Vasudevan Electrical Engg.	Lecturer	14.07.1993 (On contract for 2 years)
14.	Dr.Chakravarthy Mathiazhagan Electrical Engg.	Lecturer	15.07.1993
15.	Mrs.Zoya Abraham Humanities & Soc.Sci.	Part-Time Faculty in German Language	19.07.1993 (For two semesters)
16.	Dr.C.F.Starme Applied Mech.	Visiting Professor	05.08.1993 (For ten months)
17.	Dr.R.Pitchai Civil Engg.	Visiting Professor	16.08.1993 (On contract for 3 years)
18.	Dr.Koshy Varghese Civil Engg.	Lecturer	27.09.1993
19.	Dr.S.Rama Prabhu Physics Dept.	Asst.Professor	06.10.1993
20.	Dr.S.Karmalkar Electrical Engg.	Asst.Professor	05.11.1993 (On his rejoining from EOL)
21.	Dr.G.Srinivasan H.S.S.	Asst.Professor	08.11.1993 (For 2 years)
22.	Dr.T.Pradeep Chemistry	Visiting Faculty	01.12.1993 (For 1 year)
23.	Dr.R.Aravind Electrical Engg.	Visiting Faculty	30.12.1993 (For 1 year)
24.	Dr.M.Prakash Maiya Mechanical Engg.	Asst.Professor	24.02.1994
25.	Dr.S.Rajeev Civil Engg.	Asst.Professor	24.02.1994
26.	Dr.Sukhendu Das Comp. Sci. Engg.	Asst.Professor	24.02.1994
27.	Dr.S.Neelamani Ocean Engg. Centre	Asst.Professor	24.02.1994
28.	Dr.Paul Maria Koola Ocean Engg. Centre	Asst.Professor	24.02.1994

Faculty Officers who have retired/resigned during the year

S.No.	Name	Designation	Date of Retirement	Remarks
1.	Sri P.Ravikumar CSE Dept.	Asst.Sys.Engr.	02.04.93	On Resignation
2.	Sri G.M.Nagarathinam Internal Audit	Superintendent	01.04.93	Vol. Retirement
3.	Dr.Sumathi Khangaonkar Institute Hospital	Anaesthetist-cum- Medical Officer	08.04.93	Vol.Retirement
4.	Mrs.Birgit Schindler Hum. Soc. Sciences	Lecturer in German Language	31.05.93	On completion of tenure
5.	Sri M.Kathiresan Computer Centre	Asst.Sys.Engr.	03.06.93	On resignation
6.	Dr.G.Aravamudan Chemistry	Professor	30.06.93	On expiry of re- employment tenure

S.No.	Name	Designation	Date of Retirement	Remarks
7.	Dr.N.Subramanian Chemical Engg.	Professor	30.06.93	On expiry of re-employment tenure
8.	Dr.R.Radhakrishnan Civil Engg.	Professor	30.06.93	On expiry of re-employment tenure
9.	Dr.M.Ramanujam Chemical Engg.	Professor	30.06.93	On expiry of re-employment tenure
10.	Dr.K.A.Damodaran Aerospace	Professor	30.06.93	On expiry of re-employment tenure
11.	Dr.B.V.A.Rao Appl. Mechs.	Professor	30.06.93	On expiry of re-employment tenure
12.	Dr.H.C.Radhakrishna Mech. Engg.	Professor	30.06.93	On expiry of re-employment tenure
13.	Dr.B.S.V.S.R.Acharyulu Physics	Asst.Professor	30.06.93	On expiry of re-employment tenure
14.	Dr.Sridhar Jagannathan Ocean Engg. Centre	Visiting Faculty	30.04.93	Left the Institute before the expiry of term of appointment
15.	Sri P.Aruljothi Mech. Engg.	Sr.Tech.Asst.	19.07.93	Vol.Retirement
16.	Dr.V.Mahadeva Ayyar Chemistry	Professor	31.07.93	Retired on Superannuation
17.	Dr.R.Parimelalagan Elec. Engg.	Asso.Professor	01.08.93	Vol.Retirement
18.	Dr.N.G.Karanth Chem. Engg.	Professor	20.08.93	Resigned
19.	Sri T.N.Krishnamoorthi C.G.B.S.	Sr.Tech.Asst(SG)	01.09.93	Vol.Retirement
20.	Dr.B.J.C.Babu FRP Res. Centre	Sr.Design Engr	26.09.93	Resigned
21.	Dr.G.V.R.Chandramouli RSIC	S.S.O.	25.11.93	On expiry of contract period
22.	Dr.V.G.K.Murti Elec. Engg.	Professor	30.11.93	Retired on Super-annuation & Re-employed upto 30.6.94
23.	Dr.R.Nagarajan Computer Science	Professor	30.11.93	Retired on Super annuation & Re-employed upto 30.6.94
24.	Dr.R.S.Srinivasan App. Mechs.	Professor	31.12.93	Retired on Superannuation & Re-employed upto 30.6.94
25.	Dr.K.R.Parthasarathy Mathematics	Professor	31.12.93	Retired on Superannuation & Re-employed upto 30.6.94
26.	Dr.K.V.Thiagarajan Mech. Engg.	Asst.Professor	31.01.94	Retired and Re-employed upto 30.6.94
27.	Shri S.Ramakrishnan Accounts Section	Asst.F & A O	31.12.93	Retired on Superannuation
28.	Shri N.Swaminathan Accounts	Superintendent	31.01.94	Retired on Superannuation
29.	Shri Samuel Simon Accounts	Superintendent	31.1.94	Retired on Superannuation
30.	Shri D.Padmaraj Chemistry	Superintendent	31.1.94	Retired on Superannuation
31.	Shri L.M.Jagadish	Superintendent	17.02.94	Vol.Retirement
32.	Dr.M.A.Parameswaran Mech. Engg.	Professor	31.01.94	Retired on Super annuation & Re-employed upto 30.6.94
33.	Shri B.Nagaraja Rao Administration	Asst.Registrar	28.02.94	Retired on Superannuation
34.	Shri N.Sethuraman Academic Section	Superintendent	28.02.94	Vol.Retirement
35.	Dr.C.K.Narayanaswamy Physics	Professor	28.02.94	Retired on Super annuation & Re-employed upto 30.6.94



**Faculty/Officers who were on long leave**

S.No.	Name	Designation	Duration	Nature of leave
1.	Dr.K.Hariharan Physics	Asst.Professor	1 Year 6.5.93-5.5.94	Sabbatical Leave
2.	Dr.V.M.Krishna Sastri Mech. Engg.	Professor	1 Year 11.6.93-10.6.94	Sabbatical Leave
3.	Dr.H.Md.Roshan Metallurgy	Professor	2 Years 30.6.93-29.6.95	EOL
4.	Dr.A.Kuppurajulu Elec. Engg.	Professor	11.05.92-20.05.93	Sabbatical Leave
5.	Dr.C.Ganapathy OEC	Professor	8.6.92-2.6.93	Sabbatical Leave
6.	Dr.J.Majhi Physics	Asso.Professor	2 Years 12.7.93-11.7.95	EOL
7.	Dr.S.P.Venkatesan Mechanical	Professor	12.7.93-28.1.94	Sabbatical Leave
8.	Dr.S.V.Raghavan CSE	Asso.Professor	2.8.93-28.1.94	Earned Leave
9.	Dr.S.K.Rakshit Chem.Engg.	Asst.Professor	3 Months 17.9.93-16.12.93	On Deputation
10.	Dr.A.V.Krishna Rao HSS	Professor	1 Year 1.10.93-30.9.94	Sabbatical Leave
11.	Dr.B.Nagalingam Mech. Engg.	Professor	1.4.93-28.2.94	Sabbatical Leave
12.	Dr.V.G.Idichandy OEC	Asso.Professor	2 Years 12.10.93-11.10.95	EOL
13.	Dr.(Mrs.)Geetha Ramakrishnan RSIC	Sr.Tech.Asst.	1 Year 29.10.93-28.10.94	EOL
14.	Dr.K.K.Balasubramanian Chemistry	Professor	1 Year 1.12.93-30.11.94	Sabbatical Leave
15.	Dr.T.K.Bose Aerospace	Professor	1.6.93-15.7.94	Sabbatical Leave and Earned Leave
16.	Dr.K.Prasad Rao Metallurgy	Asso.Professor	3.1.94-3.7.94	Earned Leave & Summer Vacation
17.	Dr.Ravi Mittal CSE	Asst.Professor	4.1.94-15.12.94	Special Leave
18.	Dr.S.Mohan Civil Engg.	Asst.Professor	1 Year 10.1.94-9.1.95	Sabbatical Leave
19.	Dr.Tapobrata Panda Chem.Engg.	Asso.Professor	1 Year, 31.1.94-30.1.95	Sabbatical Leave
20.	Dr.R.Krishna Kumar Mech.Engg.	Asst.Professor	28.2.94-15.12.94	Special Leave
21.	Dr.K.Bhaskar Aerospace	Asst.Professor	15.3.94-14.9.94	On duty

**2.3 Meetings of the Bodies:****Board of Governors:**

Four meetings of the Board of Governors were held on 19.4.93, 29.7.93, 8.11.93 and 24.2.94.

**Finance Committee:**

One meeting of the Finance Committee was held on 5.11.93.

**Senate:**

Four meetings of the Senate were held on 08.05.93, 24.7.93, 30.10.93, and 28.01.94.

### **Board of Academic Research:**

Four meetings of the Board of Academic Research were held on 03.05.93, 19.07.93, 18.10.93 and 19.01.94.

### **Board of Academic Courses:**

Four meetings of the Board of Academic Courses were held on 16.04.93, 12.07.93, 1.10.93 and 17.01.94.

### **Board of Students:**

One meeting of the Board of Students was held on 10-1.94.

### **Board of Industrial Consultancy and Sponsored Research:**

Five meetings of the Board of Industrial Consultancy and Sponsored Research were held on 5.4.93, 30.7.93, 21.9.93, 7.12.93 and 4.2.94.

### **Building and Works Committee:**

Two meetings of the Building and Works Committee were held on 7.12.93 and 21.3.94.

**DIRECTOR**  
**N.V.C. SWAMY**

#### **Deans**

Academic Courses	C.R.Muthukrishnan
Academic Research	V.M.Krishna Sastri (Till 31.5.93)
	C.S.Krishnamoorthy (From 01.6.93)
Administration	Y. Narayana Rao
Industrial Consultancy and Sponsored Research	V.S. Raju
Students	N. Venkatrayulu

#### **Heads of Departments**

Aerospace Engineering	S. Krishnan
Applied Mechanics	K.M. Patil
Chemical Engineering	M.S. Ananth
Chemistry	T.V.Ramakrishnan
Civil Engineering	C.S.Krishnamoorthy (Till 10.6.93)
	N.Rajagopalan (From 11.6.93)
	(Mrs.) Kamala Krithivasan
Computer Science & Engg.	K.Radhakrishna Rao
Electrical Engineering	Dipak Choudhury
Humanities & Social Sciences	U.N. Srivasatava (Till 14.10.93)
Mathematics	S.N. Majhi (From 15.10.93)
	V.Radhakrishnan (Till 2.5.93)
Mechanical Engineering	R.Natarajan (From 3.5.93)
	K.J.L. Iyer
Metallurgical Engineering	S. Narasimha Rao
Ocean Engineering Centre	K.V.S. Rama Rao
Physics	

## Heads of Centres

Computer Centre	C.R.Muthukrishnan
Central Electronics Centre	T.N. Ranganathan
Fibre Reinforced Plastics Centre	N.G. Nair
Materials Science & Res. Centre	K.V.S.Rama Rao
Regional Sophisticated Instrumentation Centre	P.T.Manoharan

## Central Administration

Registrar	V.Shanmugam
Deputy Registrar	K.Panchalan
Finance & Accounts Officer	R. Kannan
Stores & Purchase Officer	A.Thirunavukkarasu
Secretary (SG) to Director	V.V. Natarajan
Secretary to Director	G.Natarajan
Assistant Registrar (SG)	G.R.Raghunatha Rao (Academic)
	K.Sekar (Administration)
Assistant Registrar	B.Nagaraja Rao (Administration) Retd. on 28.2.94.
	R.N.Sankaran (Audit)
	K.R.Raghavan (IC & SR)
	K.Ramaswamy (Hostel)
	K.Rangarajan (Administration)
Assistant Finance & Accounts Officers	V.Ramamurthy
	G.Sreenivasulu
	R.Esakkimuthu
Assistant Stores & Purchase Officer(SG)	M.C. James
	M.Manickam
Training and Placement-cum- Public Relations Officer	A.K.Pattabiraman
Security Officer	G.Selvamani

## Centre for Continuing Education

Chairman	Dr.V.Kalyanaraman
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## Central Glass Blowing Section

Head	Dr.C.S.Venkatachalam
------	----------------------

## Central Photographic Section

Convenor	Dr.S.Santhakumar
----------	------------------

## Central Gas Supplies Unit

Head	Dr.R.Ramaswamy
------	----------------

## Airconditioning Unit

Head	Dr.K.A.Bhaskaran
Senior Maintenance Engineer	Shri K.Parthasarathy
Technical Officer	Shri S.Krishna Samy

## Sports Activities

Adviser	Dr.S.S.Gokhale
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## Cultural Activities

Adviser	Dr.A.K.Kolar
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### **National Cadet Corps**

Officer Com.-4(TN)Air Sqn (Tech )N.C.C.

B.P. Lohani

### **Training & Placement**

Adviser

Dr.A.Venkatesh

### **Foreign & Weaker Section Students**

Adviser

Dr.R.Raman

### **Vigilance**

Vigilance Officer

Dr.Nainan P. Kurian

### **Guidance & Counselling**

Head

Dr.B.Viswanathan

### **Journal of Mathematical and Physical Sciences**

Editor-in-Chief

Dr.G.Subramanian

**N.S.S.**

Co-ordinator

Dr.K.V.Gopalakrishnan

### **Engineering Unit**

Institute Engineer  
Executive Engineers

N. Malayalam  
C. Ganesan  
D. Ramanathan  
M. Doorvasalu Reddy  
A.Angamuthu  
J.C.Jinadass  
S.K.Pati  
K.Ramakrishnan  
A.Sardar Jhan  
S.Swaminathan  
R. M. Parameswaran  
John D. Britto  
P. Manickavasagam

Assistant Engineer (SG)  
Assistant Engineers

Horticultural Superintendent (SG)

### 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 streams/specialisations, M.Sc., programme in 3 disciplines and B.Tech programme in 8 disciplines during the year under report.

#### 3.2 Admissions 1993-94

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 is done by written test and/or interview.

The number of students and scholars admitted to various courses during 1993-94 are given in Table 1.

**TABLE - 1**

Sl.No.	Department	B.Tech	M.Tech	M.Sc	M.S	Ph.D.	Total
1.	Aerospace Engg.	23	2	-	2	5	32
2.	Applied Mechanics	-	14	-	8	6	28
3.	Chemical Engg.	49	20	-	3	12	84
4.	Chemistry	-	-	26	-	23	49
5.	Civil Engg.	46	30	-	10	10	96
6.	Computer Sci.Engg	27	46	-	10	4	87
7.	Electrical Engg.	72	41	-	9	6	128
8.	Hum. & Soc.Sciences	-	26	-	4	4	34
9.	Mathematics	-	-	28	-	3	31
10.	Mechanical Engg.	80	77	-	18	18	193
11.	Metallurgical Engg.	31	8	-	1	6	46
12.	Naval Architecture	21	-	-	-	-	21
13.	Ocean Engg. Centre	-	3	-	2	7	12
14.	Physics	-	13	21	-	9	43
	<b>Total</b>	<b>349</b>	<b>280</b>	<b>75</b>	<b>67</b>	<b>113</b>	<b>884</b>

The total 884 includes the following:

Foreign Nationals .. 14	QIP Scholars (Ph.D & M.Tech.) .. 30
Scheduled Castes .. 97	Sponsored Candidates (M.Tech.& MS) .. 37
Scheduled Tribes .. 15	External Registration (MS & Ph.D) .. 9
Women .. 95	Project Staff (MS & Ph.D) .. 26

## Students/Scholars Enrolment

The total number of students on roll in various programmes of the Institute in the academic year 1993-94 are given in Table 2.

**TABLE - 2**

S.No.	Department	B.Tech	M.Tech	M.Sc.	M.S.	Ph.D.	Total
1.	Aerospace Engg.	81	12	-	8	16	117
2.	Applied Mechanics	-	26	-	20	33	79
3.	Chemical Engg.	174	39	-	8	53	274
4.	Chemistry	-	-	-	47	119	166
5.	Civil Engg.	153	64	-	26	49	292
6.	Computer Sci Engg	111	82	-	36	26	255
7.	Electrical Engg.	297	79	-	35	31	442
8.	Hum.& Soc.Sciences	-	40	-	11	24	75
9.	Mathematics	-	-	56	-	29	85
10.	Mechanical Engg.	309	133	-	39	80	561
11.	Metallurgical Engg.	110	13	-	8	34	165
12.	Naval Architecture	68	-	-	-	-	68
13.	Ocean Engg. Centre	-	10	-	13	30	53
14.	Physics	-	19	55	-	58	132
	Total	1303	517	158	204	582	2764

The total 2764 includes the following:

Foreign Nationals	55	External Registration (MS & Ph.D)	18
Scheduled Castes	143	Project Staff (MS & Ph.D)	88
Scheduled Tribes	14	Defence (M.Tech.)	32
Women	254	CSIR (Ph.D.)	44
QIP Scholars	84	Handicapped	2
Sponsored Candidates	56	Institute staff (MS & Ph.D)	24

### 3.4 Convocation

30th Convocation was held on 30.7.93. Sri K L Chugh, Chairman, ITC Ltd, Calcutta, delivered the Convocation Address. 751 candidates were awarded various degrees. 516 candidates received degrees in person. The details of programme/department wise degree awarded are given in the following Table-3.

**TABLE - 3**

Sl.No.	Department	B.Tech	M.Tech	M.Sc.	M.S.	Ph.D.	Total
1.	Aerospace Engg.	16	9	-	4	4	33
2.	Applied Mechanics	-	18	-	5	6	29
3.	Chemical Engg.	31	19	-	2	6	58
4.	Chemistry	-	-	29	-	10	39
5.	Civil Engg.	29	34	-	7	5	75
6.	Computer Sci Engg	29	35	-	11	2	77
7.	Electrical Engg	62	43	-	11	4	120
8.	Hum.Soc.Sciences	-	20	-	3	4	27
9.	Mathematics	-	-	22	-	3	25
10.	Mechanical Engg.	59	70	-	16	18	163
11.	Metallurgical Engg.	23	11	-	1	6	41
12.	Naval Architecture	9	-	-	-	-	9
13.	Ocean Engg.Centre	-	8	-	2	4	14
14.	Physics	-	5	23	-	13	41
	<b>Tota</b>	<b>253</b>	<b>272</b>	<b>74</b>	<b>62</b>	<b>85</b>	<b>751</b>

With this Convocation the number of degrees awarded so far by the Institute is 16,931, the details of which are as follows:

Ph.D	..	1547	M.Tech	..	5561
B.Tech	..	7490	M.S.	..	909
M.Sc.	..	1179	DIIT	..	245
B.Sc.(TA)	..	20			

### 3.5 Award of Prizes

The following are the details of award of Prizes for the students with the best academic records in each course:

#### President of India Prize

B.Tech - Computer Science, Anand .R

#### Governor's Prize

B.Tech - Mechanical Engineering, Dinesh Balagangadhar

#### Other Prizes

Donor	Department	Name of Student
<b>Doctor of Philosophy - Ph.D</b>		
1. Sudharshan Bhat Memorial Prize	Metallurgical Engineering	E P Rajiv
2. Prof AL Lasker Memorial Prize	Physics	K R Dhillsha

## Master of Science - MS

Donor	Department	Name of Student
1. Sudharshan Bhat Memorial Prize	Metallurgical Engg.	P B S Naga Vara Prasad
<b>Master of Technology - M.Tech.</b>		
1. Air India Prize	Aerospace Engineering	P Mohan
2. Indira Sivasailam Merit Prize	Industrial Tribology	U Solomon
3. Institute Merit Prize	Maintenance Engineering and Management	Ranjit Ghosh
4. Institute Merit Prize	Bio-Medical Engg.	Vemuri Vedavyas
5. Mico-Bosch Prize	Chemical Engg.	K Subodh Kumar
6. Dr K Subbaraju Memorial Prize	Chemical Engineering	V R Basker
7. Valli Anantharama krishnan Merit Prize	Civil Engineering	Satti Srinivasu
8. K Devarajan Memorial Prize	Civil Engg.(Transportation Engg.)	Sajith S
9. CMC Prize	Computer Science	K Krishna
10. Siemens India Ltd. Prize	Electrical Engineering	Arun Kumar Rajamani
11. K V Arunkumar Memorial Prize	Industrial Management	Sasirekha C
12. Coka Partha sarathy Memorial Prize	Industrial Management	Sasirekha C
13. Prof B Sengupto Prize	Mechanical Engineering	Bapat Sudhir Bhalchandra
14. Dr S Vaidyanathan Memorial Prize	Mechanical Engg. (Production Engg. & Machine Tools)	Debanik Roy
15. Giri Brothers Prize	Mechanical Engineering (Best Individual Project in Metrology)	J V Suryanarayana
16. S Anantharama krishnan Merit Prize	Mechanical Engineering (Best Individual Project)	Pravin Ramachandra Deshmukh
17. Sudarshan Bhat Memorial Prize	Metallurgical Engineering	Hemant Kumar Sabat
18. Anantharama krishnan Memorial Prize	Metallurgical Engineering (Metal Casting Option)	Satyapal Singh
19. American Bureau of Shipping Prize	Ocean Engineering	Gedala Tirupathi Naidu
20. Institute Merit Prize	Solid State Technology	Binodkumar G



**Master of Science - M.Sc.,**

<b>Donor</b>	<b>Department</b>	
1. Dr S R Ramadas 60th Birthday Commomeration Award	Chemistry	Sriram K
<b>Name of Student</b>		
2. Ratna Rao Memorial Prize	Chemistry	Sriram K
3. Institute Merit Prize	Mathematics	S P Vijayalakshmi
4. Prof Chilukury Rama Sastry Memorial Prize	Physics	V Ramya

**Bachelor of Technology - B.Tech.**

1. HAL Prize	Aerospace Engineering	Suraj R Vasudev Parameswar
2. Prof C A Sastry Endowment Prize	Chemical Engineering	Shankar M
3. B Ravichandran Memorial Prize	Chemical Engineering	Banerjee SumanKumar
4. Reliance HeatTransfer (P) Ltd.,Prize	Chemical Engineering	Banerjee Suman Kumar
5. Larsen & Toubro - ECC Endowment Prize	Civil Engineering	G Narayanan
6. B Ravichandran Memorial Prize	Computer Science	Anand R
7. Alumni Association Prize	Computer Science	Anand R
8. Philips (India) Prize	Electronics & Communication Engineering	Rao Subramanya PN
9. Motorola Prize	Electronics and Communications Engg.	Murari Srinivasan
10.Siemens Prize	Electrical and Electronics Engineering	G Mahesh
11.Banco Foundation Prize	Mechanical Engineering	M Satya Srinivas
12.Sivasailam Merit Prize	Mechanical Engineering	M Satya Srinivas
13.Dandapani Prize	Metallurgical Engineering	R Rekha
14.American Bureau of Shipping Prize	Naval Architecture	K Ashok

## 4. DEPARTMENTS AND CENTRES

The Institute is having following Departments and Centres.

### Departments

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

### Centres

- Centre for Bio-Science & Bio-Technology
- Regional Sophisticated Instrumentation Centre
- Computer Centre
- Material Science Research Centre
- Fibre Reinforced Plastics Research Centre
- Central Electronics Centre
- Centre for Industrial Consultancy & Sponsored Research

The activities of these Departments and Centres during the year 1993-94 are as follows:

## 4.1 Aerospace Engineering Department

### 4.1.1 Introduction

The Department of Aerospace Engineering was established in 1969 and has been offering Ph.D., M.S., M.Tech., and B.Tech. programmes. 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 areas of specialisation
<b>Professors</b>	
T.K.Bose, Dr.Ing. (Stuttgart)	Computational Fluid Dynamics, Plasma Physics, Gasdynamics, Heat Transfer, Propulsion
S.Krishnan, Ph.D.(IIT Madras)[Head]	Aerospace Propulsion, Solid Propellant Combustion, Solid Rocket Technology
G.Subramanian, Ph.D.(IIT Madras)	Structural Analysis, Finite Element Method, Experimental Moire, Holography
E.G.Tulapurkara, Ph.D.(IIT Madras)	Aerodynamics, Turbulent Flows, Flight Dynamics, Wind Tunnels, Aircraft Design
T.K.Varadan, Ph.D.(IIT Madras)	Structural Mechanics, Composites, Non-linear Structural Mechanics
<b>Associate Professors</b>	
S.S.Gokhale, Ph.D.(Illinois)	Propulsion, Computational Fluid Dynamics, Simulation & Optimization, Multiphase flows
A.Krishnan, Ph.D.(IIT Madras)	Aircraft Structural Analysis and Design, Finite Element Methods, Composites
S.Santhakumar, Ph.D.(IIT Madras)	Aerodynamics, Flight Dynamics, Instrumentation
<b>Assistant Professors</b>	
K.Bhaskar, Ph.D.(IIT Madras)	Structural Mechanics, Elasticity, Composites
R.M.S.Gowda, Ph.D.(IIT Madras)	Structural Mechanics, Experimental Stress Analysis, Thermal Stress Analysis
Job Kurian, Ph.D.(IIT Madras)	Gasdynamics, Experimental Aerodynamics, Shock tube flows and measurements
S.C.Rajan, M.Tech.(IIT Madras)	Aerodynamics, Vortex dominated flows
M.Ramakrishna, Ph.D.(Arlington)	Aerodynamics, Numerical Methods, Computational Fluid dynamics

### 4.10.3 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	5	-	5	-	2	-	3	-	1	-	16	-	16
M.S.	1	1	1	1	3	1	-	-	-	-	5	3	8
M.Tech.	2	-	10	-	-	-	-	-	-	-	12	-	12
B.Tech.	20	3	22	-	21	-	14	1	-	-	77	4	81
<b>Total</b>	<b>28</b>	<b>4</b>	<b>38</b>	<b>1</b>	<b>26</b>	<b>1</b>	<b>17</b>	<b>1</b>	<b>1</b>	<b>-</b>	<b>110</b>	<b>7</b>	<b>117</b>

#### 4.10.4 Number of Scholarship holders

Programme	Institute	Others	Total
Ph.D	6	2(QIP)	8
M.S	5	-	5
M.Tech	1	-	1
<b>Total</b>	<b>12</b>	<b>2</b>	<b>14</b>

#### 4.1.5 Number of Degrees Awarded

Programme	No. awarded
Ph.D	4
M.S.	4
M.Tech	9
B.Tech	16
<b>Total</b>	<b>33</b>

#### 4.1.6 New Facilities added and Major Equipment procured

Hypersonic Shock Tunnel for Mach number for 4 to 12 was developed, tested and calibrated

#### 4.1.7 Short-term Courses/Workshops/Seminars/Symposia Conferences organised

S.No.	Title	Duration	Co-ordinators
1	Solid Propellant Technology 45 Scientists/Engineers from the Dept. of Space and Ministry of Defence attended, supported by MHRD.	May 1993	Prof.S.Krishnan Dr.S.S.Gokhale

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

S.No.	Name of Faculty	Topic of the Lecture	Delivered at
1.	Prof.S.Krishnan	Solid Fuel Ramjets for Missiles Propulsion	7th National High Energy Material Soc.Conf. VSSC, Trivandrum, 22-2-1994

#### 4.1.9 Visits Abroad

Name of Faculty	Country visited	Date	Purpose of visit
Prof.T.K.Bose	U.S.A.	03-06-93-15-07-94	Visiting Professor at Purdue University and to visit Germany to utilize AVH Senior fellowship

#### 4.1.10 Distinguished visitors to the Department

Sl.No.	Name of the Visitor and Occupation	Date of visit	Purpose of visit
1.	Dr.A.P.J.Abdul Kalam, Scientific Advisor Ministry of Defence, Government of India	10-4-1993	Meeting and discussion with the faculty

Sl.No.	Name of the Visitor and Occupation	Date of visit	Purpose of visit
2.	Prof. Song Jian Chinese Minister The People's Republic of China and Prof. Dong Jinsheng, Scientific Counsellor, Embassy of the People's Republic of China	13-4-1993	Meeting and discussion with the faculty
3.	Lt. Gen. Dr.V.J.Sundaram Director DRDL/RCI, Hyderabad	17-5-1993	Meeting and Discussion
4.	Prof.K. Morgan University of Swansea United Kingdom	12-8-1993	Guest Lecture
5.	Dr.Narayanan M Komerath Georgia Institute of Technology Atlanta, USA	6-9-1993	Guest Lecture
6.	Dr.Sharad Patel Professor,,(Retd.) Brooklyn Polytechnic New York, USA	7-1-1994	Meeting and Discussion
7	Dr.Virendra C.Patel Professor IOWA Institute of Hydraulic Research The University of IOWA,IOWA City, IOWA.	12-1-1994	Meeting and discussion with the faculty

#### 4.1.11 Sponsored Projects

S.No	Title of the Project	Period	Funding Agency	Amount (Rs. in Lakhs)	Co-ordinators
1.	Symbolic Computation as an Aid for Structural Analysis	1 year	IRDF	0.500	Dr.K.Bhaskar
2.	Design,,Fabrication and Testing of Metal Polymer Lined Filament Wound pipesyear under Cryogenic Conditions	1 year	IRDF	0.366	Dr.K.Bhaskar
3.	Computer Aided Design of Aerodynamically Heated Structure	3 years	ARDB	0.850	Prof.T.K.Bose Prof.R.Palaninathan
4.	Nozzle Flow with Secondary Injection Phase-II	2 years	ISRO	5.000	Prof.T.K.Bose
5.	Vibration Relaxation Effects in Gasdynamics	2 years	ISRO	3.900	Prof.T.K.Bose
6.	Theoretical Studies in Composite Airbreathing Propulsion	2 years	ISRO	4.950	Dr.S.S.Gokhale
7.	Computer Aided Instruction for Air Breathing Propulsion	1.1/2 years	ARDB	9.075	Dr.S.S.Gokhale Dr.H.S.Mukunda (IISc)
8.	Development and Calibration preliminary experiments on a Hypersonic Shock tunnel	3 years	ARDB	6.450	Dr.Job Kurian
9.	Studies on shock wave propagation in Gas particle mixtures	3 years	DAE	6.100	Dr.Job Kurian
10.	Ignition studies on Solid Propellants	3 years	ISRO	4.700	Dr.Job Kurian Dr.K.A.Bhaskaran (Mech. Engg.)
11.	Studies on Advanced Propulsion for Aerospace Vehicles	4 years	DRDL	19.980	Dr.Job Kurian
12.	Testing of Ramjet Combustors	1 year	ISRO	1.550	Dr.Job Kurian
13.	Erosive Burning Studies of Solid Propellants under transonic and supersonic cross flow Mach numbers	3 years	ARDB	5.980	Prof.S.Krishnan

S.No	Title of the Project	Period	Funding Agency	Amount (Rs. in Lakhs)	Co-ordinators
14.	Burning Rate Prediction in AP/HTPB Propellants with Burning Rate Modifiers	3 years	ISRO-IIT(M)	4.290	Prof.S.Krishnan
15.	Analysis of Flow through an Augmented Rocket	3 years	ISRO-IIT(M)	4.400	Dr.M.Ramakrishna
16.	Study of Flow through Axisymmetric/Two Dimensional Variable area Convergent-Divergent Nozzle	2 years	ADA	6.025	Dr.M.Ramakrishna
17.	Study of Flow through Axisymmetric/Two Dimensional variable area Convergent/Divergent Nozzles	2 years	ADA	6.225	Dr.M.Ramakrishna
18.	Computational Studies of Complex flows	1 year	IRDF	0.500	Dr.M.Ramakrishna
19.	A Distributed Problem Solver for Navier Stokes Equations	1 year	IRDF	0.720	Dr.M.Ramakrishna
20.	A distributed problem solver for Navier-Stokes equations	1 year	IRDF	0.720	Dr.M.Ramakrishna Dr.D.Janakiraman
21.	Development of Self-correcting wind tunnel technology	3 years	ARDB	6.650	Dr.S.Santhakumar
22.	Experimental Techniques for studying high velocity missile impact on concrete structure	1 year	IRDF	0.550	Dr.S.Santhakumar Dr.V.Paramasivam
23.	Duct Losses in Oscillatory flow (Wave Energy Group)	6 months	DOD	1.460	Dr.S.Santhakumar
24.	Performance Calculation for Wells Turbine (Wave Energy Group)	6 months	DOD	0.120	Dr.S.Santhakumar
25.	Escape from military Aircraft at Very high Mach numbers	4 years	ARDB	5.450	Dr.S.Santhakumar
26.	Computation of Supersonic turbulent base flows	2 years	ISRO	4.500	Dr.E.G.Tulapurkara
27.	Flow Around 3-D Bluff bodies with relevance to Building Aerodynamics	3 years	DST	8.000	Dr.E.G.Tulapurkara Dr.B.H.L.Gowda
28.	Studies on Low Speed Turbulent Flows in Complex Enclosures	3 years	VOLKS-WAGEN FOUNDATION	20.000	Dr.E.G.Tulapurkara Dr.T.K.Bose
29.	A Higher order theory of laminated composite shells under transverse loads	4 years	ARDB	3.210	Prof.T.K.Varadan
30.	Thermal stress analysis of laminated composites with specific reference to aerospace applications	3 years	ARDB	5.005	Prof.T.K.Varadan Dr.K.Bhaskar

#### 4.1.12 Major Consultancy Assignments

Sl.No.	Title	Funding Agency	Amount (Rs.in Lakhs)	Co-ordinator
1	Analysis of Gas Generator in the Missile Canister	DRDL	1.200	Dr.S.Krishnan
2	Design of Low Turbulence wind tunnel	FCRI	0.040	Dr.E.G.Tulapurkara
3	Evaluating Tyre Curing Press Design	L & T McNeil	0.030	Dr.G.Subramanian Dr.A.Krishnan
4	Model Testing of ALH Helicopter with EFG	HAL	19.500	Dr.S.Santhakumar Mr.S.Sambandan(OEC)

Sl.No.	Title	Funding Agency	Amount (Rs.in Lakhs)	Co-ordinator
5	Aerodynamic and Structural Performance of Airfoil and Mounting	BCEL(Joint Project)	6.000	Dr.E.G.Tulapurkara (Principal Co-ordinator) Dr.G.Subramanian Dr.T.K.Varadan Dr.A.Krishnan Dr.S.Santhakumar Dr.M.Ramakrishna Mr.S.C.Rajan

#### 4.1.13 Honours and Awards

Sl.No	Name of Faculty	Award	Purpose
1	Prof.E.G.Tulapurkara Prof.V.Ramjee (AM) Mr.Jacob George (M.S.Scholar)	Dr.M.G.Deshpande Memorial Prize. 20th National Conference on Fluid Mechanics & Fluid Power held at Palghat during 15-17 Dec.1993	Best paper from Acad. and Research Organization
2	Prof.S.Krishnan Prof.E.G.Tulapurkara	Elected Associate Fellow of American Institute of Aeronautics & Astronautics	

#### 4.1.14 Research Publications

1. Savithri, S. and T.K.Varadan, "Large deflection analysis of laminated composite plates", Int.J. Nonlinear Mechanics, Vol.28, No.1, 1993, pp.1-12.
2. Ganapathi, M. Varadan, T.K., Jigen,J., "Field Consistent element applied to flutter analysis of circular cylindrical sheels, Journal of Sound & Vibration, 1993.
3. Bhaskar, K. and Varadan, T.K., "Exact elasticity solution for laminated anisotropic cylindrical shells" Transactions of the ASME, Jl. of Applied Mechanics, March 1993, Vol.60, No.1, pp-41-47.
4. Bhaskar, K. and Varadan,T.K. "Inter laminar stress in composite cylindrical shells under transient loading" Journal of Sound & Vibration, 168(3), 1993, pp 469-477.
5. Bhaskar, K. and Varadan,T.K. "A benchmark elasticity solution for an axisymmetricly loaded angle-ply cylindrical shell", Composite Engineering, 3(11), 1993, 1065-1073.
6. Tulapurkara, E.G. and Vengadesan,S. and Narasimhan, J.L. "Computation of turbulent asymmetric wake", Int. J. Num. Methods in Fluids, Vol.16, pp.239-248, Feb.1993.
7. Gowda, B.H.L., Tulapurkara,E.G. and Swain,S.K. "Reverse flow in a channel-influence of obstruction geometries", Experiments in fluids, Vol.16, pp.137-145, Dec. 1993.
8. Viswanathan, B. and Krishnan, A . "Free vibration studies on Traingular FRP Lamina" Accepted for publication in journal of Sound and Vibration.
9. Rangachari,K, Rajan,S.C., Krishnan,A. "A new approach to the evolution of two dimentional vortex sheets" Journal of Aeronautical Soc. of India, Vol.45, 43-48, 1993

#### 4.1.15 Books/monographs Publish

- 1 Lecture Notes on Solid Propellant Technology

#### 4.1.16 Any other relevant details

The Department has 13 faculty members, 13 non-teaching technical and 11 non-teaching and non-technical staff.

## 4.2 Applied Mechanics Department

### 4.2.1 Introduction

The Department of **Applied Mechanics** was established in 1959, and it offers Ph.D., M.S., M.Tech. and B.Tech. programmes. The major areas of teaching and research of the Department are the following:

The research in the **Biomedical Engineering Division** is concentrated in three main areas of Biomedical Instrumentation, Biomechanics and Biomedical Imaging and Signal processing in collaboration with hospitals and medical research institutes, in the areas of Biomechanics of Leprotic hand and foot, Rehabilitation aids, Finite element image processing applications in Biomechanics, Macro-micro hemo-dynamics and in Laser applications in medical diagnosis.

The faculty in the **Elasticity (Solid Mechanics) Division** are doing research in Stress analysis of plates and shells by finite element and boundary element techniques, Elasto-plastic analysis, Fracture mechanics, Fatigue, Reliability, Metal matrix composites, high temperature design and application of image processing techniques.

The faculty in the **Fluid Mechanics Division** are doing research in industrial aerodynamics, Automobile aerodynamics, Helicopter aerodynamics, Aerodynamics of wind turbines and Wind energy problems, Wind effects on buildings structures and bridges, Flow induced vibration, Computational fluid dynamics and Atmospheric boundary layers, Internal flow problems and Flow through conical and curved diffusers, Turbulent shear flows, Wall jets, Turbulence modelling.

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, Random vibration, Chaotic/non-linear vibrations, Active vibration and noise control, Machinery diagnostics and Condition monitoring and Modal testing.

### 4.2.2 New Courses Introduced

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

Sl.No.	Course No.	Title	Structure	Faculty
01.	AM 644	Mechanics of Continuous Media	3 0 0 3	Prof.R.S.Alwar Dr.C.Lakshmana Rao
02.	AM 645	Discrete Element Methods in Engineering Mechanics	3 0 0 3	Prof.R. Palaninathan Dr.C.Lakshmana Rao

### 4.2.3 Details of Faculty

Name and Qualification	Major area of Specialisation
<b>Professors</b>	
R.S. Alwar, Ph.D (IISc)	Solid Mechanics
P.A. Aswatha Narayana, Ph.D (IIT Madras)	Fluid Mechanics
N.V. Chandrasekara Swamy, Ph.D (IISc)	Fluid Mechanics
N. Ganesan, Ph.D (IIT Madras)	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),	Lasers and ultrasound in medicine, Biofluid mechanics, Biomedical Instrumentation
S. Narayanan, Ph.D (IIT Kanpur)	Vibration, Random Vibration, Non-linear Dynamics Systems, and Acoustics & Noise Control/Chaos



**Name and Qualification**

R. Palaninathan, Ph.D (IIT Madras)

K.M. Patil, D.Sc. (Washington) [Head]

J. Raamachandran, Ph.D (IIT Madras)

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)

**Associate Professors**

M. Balakrishnan, Ph.D (IIT Madras)

S. Radhakrishnan, Ph.D (IIT Madras)

**Assistant Professors**

P. Krishna Iyer, Ph.D (IIT Madras)

J. Lakshminarasimhan, Ph.D (IIT Madras)

M. Ramasubba Reddy, Ph.D (IISc)

S. Swarnamani, Ph.D (IIT Madras)

**Lecturer**

C. Sujatha, Ph.D (IIT Madras)

**Senior Scientific Officer Gr.II**

G. Thomas, M.Sc. (Madras)

**Technical Officer**

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

**Visiting Faculty**

C. Lakshmana Rao, D.Sc (MIT)

C.F. Starmer

**Major area of Specialisation**

Structural Mechanics, Composite Materials, Technology &amp; Structures

Biomechanics, Rehabilitation Engineering

Structural Mechanics, Experimental Stress Analysis, Composite Structures

Machine Dynamics, Vibration, Stress Analysis, Rotor Dynamics, Computer Aided Design

Fluid Mechanics

Rotor Dynamics, Tribology, Maintenance Engineering

Fluid Mechanics

Dynamics of structures - Composite Structures

Fluid Mechanics/Low speed Aerodynamics

Biomedical Engineering, Biomechanics and Rehabilitation Engineering

Solid Mechanics, Stress Analysis - Elasticity and Plasticity

Fluid Mechanics; Incompressible Aerodynamics, Internal Flows

Neural network applications in medicine, Biomedical Instrumentation, Medical Imaging &amp; Signal processing

Instrumentation, Machine Dynamics, Tribology, Medical Ultrasonic, Acoustics, Diagnosis and Condition Monitoring and Maintenance Engineering

Machine Dynamics, Acoustics, Instrumentation, Condition Monitoring, Vehicular Vibration

Experimental Stress Analysis

Fracture Mechanics

**4.2.4 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	5	-	7	1	6	-	6	-	7	1	31	2	33
M.S.	7	1	6	-	3	-	3	-	-	-	19	1	20
M.Tech.	11	-	14	1	-	-	-	-	-	-	25	1	26
<b>Total</b>	<b>23</b>	<b>1</b>	<b>27</b>	<b>2</b>	<b>9</b>	<b>-</b>	<b>7</b>	<b>1</b>	<b>7</b>	<b>1</b>	<b>75</b>	<b>4</b>	<b>79</b>

#### 4.2.5 Number of Scholarship/Fellowship holders

Programme	Institute	Others	Total
Ph.D	23	8 [5 QIP + 3 Project]	31
M.S.	16	1 [Project]	17
M.Tech.	15	-	15
<b>Total</b>	<b>54</b>	<b>9</b>	<b>63</b>

#### 4.2.6 Number of Degrees Awarded

Programme	Number Awarded
Ph.D	4
M.S.	3
M.Tech	12
<b>Total</b>	<b>19</b>

#### 4.2.7 New Facilities added and Major Equipment procured

1. Pin-on Disc Machine
2. Four Ball Tester
3. Data Acquisition System
4. Storage Oscilloscope
5. Inertial Shaker System

#### 4.2.9 Short-term Courses/Workshops/Seminars/Symposia/Conferences organised

S.No.	Co-ordinator(s)	Title of Course / Workshop / Seminar/ Symposia/Conference	Period
1.	Dr. B.S. Prabhu	National Symposium on Frontiers of Tribology and Condition Monitoring	June 19

#### 4.2.10 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. K.M. Patil	Int. Conference on Recent Advances in Biomedical Engg., Hyderabad	Jan 6-8, 1994
2.	Dr. Megha Singh	XXI National Symposium on Optics Madras	Feb 10- 12, 1994
3.	Dr. S. Radhakrishnan	Int. Conf. on Recent Advance in Biomedical Engg. Hyderabad	6-8 Jan. 1994
4.	Dr. S. Narayanan	IUTAM Symposium on Non-linearity and Chaos in Engg. Dynamics, London, England	July 1993
5.	Dr. S. Narayanan	National Symposium on Acoustics NSA-93, Bangalore	Nov 1993
6.	Dr. S. Swarnamani	DAAD Scholarship, University of Kassel, Germany	July-Oct 1993

Sl.No.	Name of Faculty	Title	Period/Duration
7.	Dr. M. Ramasubba Reddy	Int. Conf. on Recent Advances in Bio-Medical Engg. Hyderabad	6-8 Jan. 1994

#### 4.2.11 Special Lecture(s) Delivered

Sl.No.	Name of Faculty	Topic of Lecture	Delivered at	Date
1.	Dr. K.M. Patil	Measurement of on-line dynamic foot pressures in normals and leprosy patients	Dept. of Biomedical Engg., University of Iowa, Iowa City, USA	3-9-93
2.	Dr. S. Narayanan	Fan & Blower Noise	Workshop on Quiet HVAC Systems, Bangalore	
3.	Dr. S. Narayanan	Active control concepts in Non-stationary vehicle response	ISVR Southampton, England	July 1993
4.	Dr. S. Narayanan	Active suspension design for control of non-stationary vehicle response	Inst. for Mechanics, Univ. Stuttgart, Germany	Aug. 1993

#### 4.2.12 Visits Abroad

Sl.No.	Name of Faculty	Country visited	Date	Purpose of visit
1.	Dr. K.M. Patil	The Netherlands	15.8.93	On collaborative project
2.	K.M. Patil	Orlando, USA	29.8.93-6.9.93	To present papers in the 14th Intl. Leprosy Congress

#### 4.2.13 Distinguished Visitors to the Department (Important dignitaries above the level of Professors)

Sl.No.	Name of the Visitor and Occupation	Date of visit	Purpose of visit (Lecture/Discussion)
1.	Dr. R.C. Schroter, Centre for Biological & Medical Systems, Imperial College, London SW7 2BY	Sept. 14-16, 1993	Lecture- cum-visit
2.	Dr.A.Khalili Centre for Applied Space Technology & Microgravity Res. Univ. of Bremen	Germany	Feb.28-Mar.2 1994

#### 4.2.14 Sponsored Projects

S.No.	Title	Period	Funding Agency	Amount (in Lakhs)	Co-ordinator(s)
1.	Augmentation of vortex formation during discharge of liquid from containers due to disturbances induced on the liquid	3 years	ICSR-ISRO	2.88	Dr. B.H.L. Gowda Dr.S. Swarnamani
2.	Maintenance Engg. with emphasis on Tribo monitoring and testing	2 years	MHRD	10.0	Dr. B.S. Prabhu, Dr. B.V.A. Rao, Dr.S. Swarnamani

S.No.	Title	Period	Funding Agency	Amount (in Lakhs)	Co-ordinator(s)
3.	Development of Research facility for active vibration and noise control applied to machineries	15 months	MOL	11.5	Dr.S.Narayanan Dr. S. Swarnamani
4.	Generation of dynamic data for blade section of wind energy system	3 years	DNES	5.20	Dr. N.V.C. Swamy Dr.P.A.Aswatha Narayana
5.	Niharika lshan - A new type of wind turbine	1.1/2 years	DNES	2.0	Dr. N.V.C.Swamy Dr. P.A. Aswatha Narayana
6.	Numerical modelling of complex flows with heat transfer	3 years	NSF	17.39	Dr.K.N.Seetharamu Dr.P.A.Aswatha Narayana
7.	3-D conduction code temperature distribution using FEM for GT blades	3 years	ARDB	6.75	Dr.K.N.Seetharamu Dr.P.A.Aswatha- narayana
8.	Flow studies of 'S' blade profiles a fully reversible and flow pump turbine for a tidal plant	1 year	IRDF	0.50	Dr. P.A. Aswatha Narayana Dr. M. Balabaskaran Dr. E.G. Tulapurkara
9.	Fluid mechanical and combustion aspects of interference effects in spray combustion	3 years	ISRO	5.0	Dr.B.H.L. Gowda Dr.R.Natarajan
10.	Studies on the mixing and combustion phenomena in ramjet	3 years	ARDB	5.17	Dr.B.H.L.Gowda Dr.R.Natarajan Mr.K.S. Padiyar
11.	Numerical prediction of two dimensional reacting flows with application to ramjet combustion	3 years	ARDB	5.8	Dr.B.H.L. Gowda Dr.R.Natarajan Dr.V.Ganesan
12.	Interference and turbulence in spray combustion	3 years	ISRO	7.41	Dr.B.H.L.Gowda Dr.R.Natarajan Dr. K.N. Seetharamu
13.	Helicopter Aerodynamics in hover and climb	--	IRDF	--	Dr.M.Balakrishnan Dr.S.C.Rajan Dr.M.Ramakrishna
14.	Study on instability of liquid sheets from swirl spray nozzles	2 years	ISRO	5.5	Dr.M.Balakrishnan
15.	Computer aided design of aerodynamically heated structures	4 years	ARDB	11.85	Dr.R.Palaninathan
16.	Matrix composite products for automotive applications	--	MHRD under Tech.Dev. Missions	--	Dr.R.Palaninathan Dr.C.V.Gokularathna m
17.	Micro controller based communicator kit for spastic children	1 year	IRDF	--	Dr.M.Ramasubba Reddy Dr.S.Radhakrish- nan Dr.Ranjana Shukla
18.	Setting up environment to develop a real time arrhythmia detector based on system representation of electro-cardiogram	1 year	IRDF	--	Dr.M.Ramasubba Reddy

S.No.	Title	Period	Funding Agency	Amount (in Lakhs)	Co-ordinator(s)
19.	Development of foot model & foot pressure monitoring system .... leprosy patients	3 years	DST	23.4	Dr.K.M. Patil Dr.P.K.Oommen(CL TRI Chengalpattu) Dr.G.N.Malaviya (CJIL Agra) Dr.A.Huson(Limburg University, The Netherlands), Dr.D.H.van Campen (Eindhoven University, The Netherlands)

#### 4.2.15 Major Consultancy Assignments

S.No.	Title	Organisation	Amount (in Lakhs)	Co-ordinators
01.	Calibration of lubricants on the four ball tester	Chemoleums (P) Ltd., Madras 35	0.05	Dr. M.B.S.Prabhu Dr.S.Swarnamani
02.	Shock and vibration test on loco vacuum circuit breaker	BHEL, Bhopal 22	0.29	Dr.S.Narayanan Dr.B.S.Prabhu Dr.C.Sujatha
03.	Noise survey and noise audit	Tribeni Tissues Ltd., Chandrahathi	0.15	Dr.S.Narayanan Dr.S.Swarnamani Dr.A.Ramachandriah(CE Dept.)
04.	Characteristics of torsional damper	Autolec Manufacturing & Marketing Co. (P) Ltd., Madras	0.0375	Dr.N.Ganesan Dr.S.Swarnamani
05.	Calibration of vibration level meter and techcometer	Air Condition Corp. Ltd., Madras	0.035	Dr.S.Swarnamani Dr.C.Sujatha
06.	Noise calculations	BHEL, Hyderabad	0.15	Dr.N.Ganesan Dr.S.Narayanan Dr.A.Ramachandraiah (CE Dept.) in collaboration with EE Dept.
07.	Vibration studies in Delta Paper Mills	Delta Paper Mills, Bheemavaram	0.10	Dr.S.Narayanan
08.	Noise measurements on air purifier	Eureka Forbes Ltd., Bombay	0.025	Dr.S.Narayanan S.Swarnamani
09.	Harmonic analysis of transformers	Andrew Yle Co. Madras	0.04	Dr.S.Narayanan C.Sujatha
10.	Seismic testing and evaluation of 400 KV CVTs and CTs	Crompton Greaves, Nasik	0.36	Dr.S.Narayanan Dr.B.S.Prabhu Dr.C.Sujatha
11.	Theoretical modelling of turbine blades and Campbell plots	Nuclear Power Corp., Bombay	0.30	Dr.V.Ramamurti
12.	Measurement of natural frequencies by RAP test	Nuclear Power Corp., Bombay	0.12	Dr.V.Ramamurti Dr.S.Swarnamani Dr.C.Sujatha
13.	Harmonic analysis test	Andrew Yule & Co. Ltd. Madras	0.04	Dr.S.Swarnamani Dr.C.Sujatha
14.	Natural frequency determination of torsional damper	Holwart Engg. Co., Madras	0.015	Dr.V.Ramamurti Dr.C.Sujatha

S.No.	Title	Organisation	Amount (in Lakhs)	Co-ordinators
15.	Seismic test on high voltage insulators	Eastland Switchgears (P) Ltd. Calcutta	0.15	Dr.S.Narayanan Dr.B.S.Prabhu Dr.N.Ganesan Dr.S.Swarnamani
16.	Dynamics analysis calculations of torsional and bending vibration of electric motor and load systems	BHEL, Hyderabad	0.30	Dr.B.S.Prabhu
17.	Seismic analysis of 245KV SF6 circuit breaker	Asea Brown Boveri Ltd. Vadodara	0.15	Dr.B.S.Prabhu Dr.N.Ganesan
18.	Noise studies on air purifier	FACIT Asia Ltd., Madras-96	0.025	
19.	Noise pollution in aeropole system	Gajambuja Cement, Kodinar	0.30	Dr.S.Narayanan Dr.S.Swarnamani
20.	Harmonic test on transformers 10/16MVA 132/33KV	Andrew Yule, Madras	0.04	Dr.S.Swarnamani
21.	Evaluation of performance characteristics of isolator with respect to mechanical endurance & temperature rise	S&S Power Switchgear Ltd., Porur	0.20	Dr.S.Narayanan Dr.N.Ganesan Dr.S.Swarnamani Dr.M.Krishnamurthi (EE Dept.)
22.	Vibration test on torsional vibration dampers	Vibromech Engineering (P) Ltd., Madras-96	0.015	Dr.V.Ramamurti Dr.C.Sujatha
23.	Seismic qualification testing on lightning arrester	ELPRO International Ltd., Pune	0.30	Dr.S.Narayanan Dr.B.S.Prabhu Dr.S.Swarnamani
24.	Seismic Test on 420 KV CB isolator	Hivelm Industries, Madras-32	0.25	Dr.V.Ramamurti Dr.S.Narayanan Dr.S.Swarnamani
25.	Seismic vibration withstand test on 245 KV current transformer	BHEL, Jhansi	0.15	Dr.S.Narayanan Dr.N.Ganesan Dr.S.Swarnamani
26.	Seismic Test on 220 KV current transformer and 220 KV CVT	W.S. Industries (India) Ltd., Bangalore-157	0.24	Dr.V.Ramamurti Dr.S.Swarnamani
27.	Strain gauge measurements for D412 centrifugal machines	KCP Ltd.	--	Dr.V.Ramamurti
28.	Retainer Consultancy from Jan.94	KCP Ltd.	--	Dr.V.Ramamurti
29.	Retainer Consultancy from March 1994	Nuclear Power Corpo.	--	Dr.V.Ramamurti
30.	Aerodynamic force and moment measurements on missile nose cap	DRDL Hyderabad	0.25	Dr.M.Balakrishnan
31.	Retainer Consultancy	Ritechoice Micro Systems, Madras	0.08	Dr.Megha Singh
32.	Calibration of load cells	IGP Engineers, Madras	0.02	Mr.G.Thomas Dr.P.Krishna Iyer
33.	Calibration of LOT load cells	Lone Star Industries, Madras	0.03	Mr.G.Thomas

S.No.	Title	Organisation	Amount (in Lakhs)	Co-ordinators
34.	Noise and vibration of 55" tyre curing press	L & T-McNeil Ltd, Madras	0.10	Mr.G.Thomas Dr.S.Swarnamani
35.	Experimental stress analysis of 300-42 M 21 tyre curing press	L&T-McNeil Ltd, Madras	0.20	Mr.G.Thomas Dr.R.S.Alwar
36.	Structural integrity assessment of control plug mock-up	IGCAR Kalpakkam	7.2	Mr.G.Thomas Dr.P.Krishna Iyer
37.	Viscoplastic analysis of high temperature components	BHEL	3.0	Dr.P. Krishna Iyer Dr.R.S.Alwar
38.	Stress analysis and design of cross bar and rail	L&T McNeil Madras	2.5	Dr.P.Krishna Iyer R.S.Alwar

#### 4.2.16 Honours and Awards

S.No.	Name of Faculty	Honours/Awards	Purpose
1.	Dr. V. Ramjee	Dr. M.G. Deshpande Memorial Prize	Best paper in FMPP Conference
2.	Dr. Megha Singh	Member	Intl. Committee I Asian Congress on Micro circulation Japan

#### 4.10.17. Books/Monographs Published

SI.No.	Name of Faculty	Title	Publisher
01.	Dr. J. Raamachandran	Thin Shells	Orient & Longman, India

#### 4.2.18 Research Publications

1. V. Arun Kumar and B.S. Prabhu, Stiffness and damping coefficient variation in squeeze film dampers a brief discussion, National Conf. on Industrial Tribology, Dehradun, Mar 24-26, 1993, 93-98, Recent Advances in Tribology, Tata McGraw Hill, 1993.
2. P.A. Aswatha Narayana, Design considerations and field measurements in wind turbine arrays, Indian Wind Energy - The Potential of Wind Energy, New Delhi, 1993.
3. P. Balasubramanian, A.K. Srivatsava, J.G.Jagadeesh, H.K.Suhas and V. Ramamurti, On the use of Ritz-Wilson method of dynamic response analysis of cycle symmetric structures, J. of Sound and Vibration, Vol.164, No.2, 193-206, 1993.
4. P. Balasubramanian, A.K. Srivatsava, J.G.Jagadeesh, H.K.Suhas and V. Ramamurti, Application of block Ritz method for the dynamic analysis of cycle symmetric structures, I.J.N.M.E., Vol.36, 273-285, 1993.
5. P. Balasubramanian, J.G.Jagadeesh, H.K.Suhas and V. Ramamurti, Some studies on vibration of cyclic symmetric structures using subspace method, Engg. Computations, Vol.10, 279-286, 1993.
6. P. Balasubramanian, J.G.Jagadeesh, H.K.Suhas and V. Ramamurti, Application of block Lanczos method for analysis of cycle symmetric structures, Int. Jou. of Num. Methods in Engg., Vol.36, 273-285, 1993.
7. K. Dargaiah, P. Kamalam and B.S. Prabhu, Turbulence effects on dynamics coefficientws and stability limits of multi-lobe journal bearings, Proc. 8th Int. Conf. on NUmberical methods in Laminar & Turbulent Flow, Swansea, July 18-23, 205-216, 1993.
8. K. Dargaiah, P. Kamalam and B.S. Prabhu, Stability analysis of multilobe bearings, National Conf. on Industrial Tribology, Dehradun, March 24-26, 1993, 46-51, Recent Advances in Tribology, Tata McGraw Hill, 1993.

9. K. Dargaiah, P. Kamalam and B.S. Prabhu, Finite element method and pad assembly method for computing dynamic coefficients of four pad and five pad tilting pad journal bearing, STLE Annual meeting, May 17-20, Calgary, Canada, 1993.
10. K. Dargaiah, K. Parthasarathy and B.S. Prabhu, Finite element method for computing dynamic coefficients of multi lobe bearings, STLE Tribology Trans., Vol.36, 1, 73-83, 1993.
11. V.S.B. Durbha and B.H.L. Gowda, Mean flow characteristics of a 3-D wall jet on a convex surface, 20th National Conf. on Fluid Mechanics and Fluid Power, FCRI, Palghat, India, Dec 1993.
12. R. Dhanraj and R. Palaninathan, Free vibration of thermally loaded laminated composites, Int. Conf. on Composite Materials, Spain, July 12-16, 261-268, 1993.
13. B.P. Gautham and N. Ganesan, Finite element analysis of elastic contact between a shell of revolution and a rigid plate, Communications in Applied Numerical Methods, Vol.9, 883-888, 1993.
14. B.P. Gautham and N. Ganesan, Free vibration analysis of thick orthotropic shells of revolution using discrete layer theory, Journal of Sound and Vibration, Vol.167, 1993.
15. B.H.L. Gowda and M.M. Sitheeq, Interference effects on the wind pressure distribution on prismatic bodies in tandem arrangement, Indian Journal of Technology, Vol. 31, 485-495, 1993.
16. B.H.L. Gowda, Flow around a circular and square cylinder in tandem and side-by-side arrangements, Journal of Flow Visualisation and Image Processing, Vol. 1, 21-26, 1993.
17. B.H.L. Gowda, E.G. Tulapurkara and S.K. Swain, Reverse flow in channel - Influence of obstruction geometry, Experiments in Fluids, Vol. 16, 137-145, 1993.
18. B.H.L. Gowda, V. Sreedharan and S. Narayanan, Vortex induced oscillatory response of a circular cylinder due to interference effects, Journal of Wind Engg., Vol. 49, 157-166, 1993.
19. B.H.L. Gowda, G.W. Rankin and K. Sridhar, Computation of flow through a plane rectangular constriction, 8th Int. Conf. on Fluid Mechanics, Beijing, China, July 18-23, 1993.
20. B.H.L. Gowda, G.W. Rankin and K. Sridhar, Computation of flow through a plane symmetric sudden expansions, 2nd Int. Conf. on Numerical Methods in Laminar & Turbulent Flow, Swansea, UK, July 7-10, 1993.
21. B.H.L. Gowda, V. Sreedharan and S. Narayanan, Vortex induced oscillatory response of a circular cylinder due to interference effects, J. of Wind Engg. & Industrial Aerodynamics, Vol.49, 157-166, 1993.
22. S.R. Jayaram and B.S. Prabhu, Analysis and design of tilting pad journal bearing using finite element method, quality through engineering design, An Indo US Japan Conf. Bangalore, India, Jan 11-14, 371-379, Elsevier, 1993.
23. S.R. Jayaram and B.S. Prabhu, Two dimensional analysis of tilting pad journal bearing using finite element method, Int. Congress on Computational methods in Engg., May 3-5, Shirajz University, Shirajz, Iran, Vol.3, 131-138, 1993.
24. S.R. Jayaram and B.S. Prabhu, Experimental investigation of a rotor mounted on tilting pad journal bearings, National Conf. on Industrial Tribology, Dehradun, March 24-26, 1993, 87-92, Recent Advances in Tribology, Tata McGraw Hill, 1993.
25. Kumaravel and M. Singh, Sequential analysis of aggregation mechanism of erythrocytes by He-Ne laser light scattering, Proc. XXI National Symposium on Optics, Madras, 110, 1994.
26. S. Kumaresan, S. Radhakrishnan and N. Ganesan, Free vibration analysis of human head using finite element analysis in Recent Advances in Biomedical Engg., D.C. Reddy (ed), Tata McGraw Hill, 98-101, 1994.
27. P. Muthukumar and M. Balakrishnan, Prediction and its verification of swirling flow between a rotating and a stationary disk, 4th Asian Int. Conf. on Fluid Machinery, Hefei, Peoples Republic of China, Oct 1993.
28. S.M. Nabi and N. Ganesan, Static stress analysis of spur gears using 3D - Finite element and cyclic symmetric approach, J. of Composite Structures, Vol.25, 541-546, 1993.
29. S.M. Nabi and N. Ganesan, Vibration and damping analysis of pre twisted composite blades, Computers & Structures, Vol.47, 275- 280, 1993.
30. S.M. Nabi and N. Ganesan, Vibration and damping analysis of layered isotropic twisted blades, Computers & Structures, Vol.48, 729-732, 1993.
31. S.M. Nabi and N. Ganesan, Stress analysis of composite centrifugal fan impeller using the cyclic symmetric approach, Computers & Structures, Vol.48, 781-785, 1993.



32. S.M. Nabi and N. Ganesan, Sandwich triangular plate element using modified Ahmed approach, *J. of Sound & Vibration*, Vol.161, 545-547, 1993.
33. H.C. Nagaraj, S. Radhakrishnan and S. Srinivasan, Acquisition and analysis of brain stem auditory evoked responses, *Recent Advances in Biomedical Engg.*, D.C. Reddy (ed), Tata McGraw Hill, New Delhi, 255, 1994.
34. A. Namasivayam, B. Prakash and M. Singh, Erythrocyte velocity distributions in invivo microvessels and glass capillaries, *Proc. First Asian Congr. Microcirculation*, Osaka, 48, 1993.
35. S. Narayanan and K. Jayaraman, Chaotic oscillations of a square prism in fluid flow, *J. of Sound & Vibration*, Vol.166, 87- 101, 1993.
36. S. Narayanan and P. Sekar, Bifurcation analysis and chaos of coupled nonlinear dynamical systems by fast incremental harmonic balancing, *IUTAM Symposium in Nonlinearity and Chaos in Engg. Dynamics*, University College, London, July 19-23, 1993.
37. S. Narayanan, Active noise control - a state of the art review, *J. of Acoustics Soc. of India*, XXI(1), 80-88, 1993.
38. S. Narayanan and P. Sekar, Flow induced chaotic vibration of a square prism, *National symposium on Advances in Structural Dynamics*, IIT Madras, Dec 14-17, 1993.
39. S. Narayanan, Active noise control - A state of the art review, *Proc. of National Symposium on Acoustics (NSA-93)*, 80-88, Nov. 25-26, 1993.
40. S. Narayanan, Chaos and bifurcation in impacting mechanical systems, *National Seminar on Frontiers of Tribology & Condition Monitoring*, Ed. G. Santhanakrishnan, 167-184, Tata McGraw Hill, 1993.
41. S. Narayanan and P. Sekar, Flow induced chaotic vibration of a square prism, *National Symposium on Advances in Structural Dynamics*, Madras, 1993.
42. K.M. Patil, L.H. Braak and A. Huson, Stresses in a simplified two dimensional model of a normal foot - A preliminary analysis:, *Journal of Mechanics Research Communications*, 20(1), 1-7, 1993.
43. K.M. Patil, L.H. Braak and A. Huson, A two dimensional foot model of a normal foot with cartilages and ligaments for stress analysis, *Innov. Tech. Biol. Med.*, (France), Vol.14, No. 2, 152-162, 1993.
44. K.M. Patil, L.H. Braak, A. Huson and J. Shanti, Analysis of stresses in two dimensional model of leprotic foot, *Proc. of the 14th International Leprosy Congress*, Orlando, Florida, Aug. 29 to Sept 4, 142A, 1993,.
45. K.M. Patil, R. Manoj, M.S. Srinath, P.K.Oommen, M. Babu and G.N. Malaviya, Analysis of static and dynamic foot pressure in leprosy patients, *Proc. of the 14th Intl. Leprosy Congress*, Orlando, Florida, Aug 29 to Sept 4, 142A-143A, 1993.
46. K.M. Patil, M. Babu, R. Manoj, P.K.Oommen, and G.N. Malaviya, Measurement and analysis of dynamic foot pressures in normals and leprosy patients, *Proc. of the 14th Intl. Conference on Recent Advances in Biomedical Engg.*, Osmania University, Hyderabad, Tata McGraw Hill, 114-117, January 1994.
47. B.S. Prabhu, Performance characteristics of hydrodynamic journal bearings considering non-Newtonian thermal and elastic effects, *Frontiers of Tribology & Condition Monitoring*, 3-13, Tata McGraw Hill, 1993.
48. B. Prakash, A. Namasivayam, M. Singh, Tomographic analysis of blood flow pattern in mirovessles, *In Recent Advances in Biomedical Engineering*, D.C. Reddy (ed), Tata McGraw Hill, New Delhi, 130-133, 1994.
49. J. Raamachandran and K. Srikanth, A cubic element .... boundary element method, *Advances in Engg. Software*, 16, 171-179, 1993.
50. J. Raamachandran, Static analysis of shell using charge simulation method, *15th Int. Conf. on BEM*, Worcester Polytechnic Institute USA, August 9-13, 1993.
51. J. Raamachandran, Buckling of plates ... charge simulation method, *II Int. Conf. in Mathematical Theory of Elasticity and Vibration*, Jalbaiguri, Nov 7-10, 1993.
52. T.V. Radhakrishna, R.C. Mehta, K.N. Seetharamu and P.A. Aswatha Narayana, Explicit and implicit finite element methods for inverse heat conduction problem, *Proc. 8th Intl Conf. Numerical Methods in Thermal Problems*, Swansea, 177-188, 1993.
53. S. Radhakrishnan and M. Naga Ravindra, Analysis of hand forces in health & disease during maximal isometric grasping of cylinders, *Medical and Biological Engg. & Computing*, 31, 372-376, July 1993.
54. V. Ramamurti and C. Sujatha, Parametric study on ball mills, *ZKG*, Vol.46, No.3, 129-132, 1993.

55. V. Ramamurti, Dynamics of machine foundations, Shock and Vibration Digest, Vol.25, No.12, 9-11, 1993.
56. V. Ramamurti, P. Kankipati and B. Veeraraghavan, Stress analysis of a cement mill, Computers & Structures, Vol.48, No.3., 541-544, 1993.
57. S. Ramamurthy, V. Arun Kumar and B.S. Prabhu, Frictional torque measurement in foil bearings, a simple experimental technique, National Conf. on Industrial Tribology, Dehradun, Mar 24-26, 1993, 93-98, Recent Advances in Tribology, Tata McGraw Hill, 1993.
58. T.C. Ramesh and N. Ganesan, Stresses in a railway wheel due to an impact load, Computers & Structures, Vol.46, 231-235, 1993.
59. T.C. Ramesh and N. Ganesan, Vibration and damping analysis of cylindrical shells with a constrained damping layer, Computers & Structures, Vol.46, 751-758, 1993.
60. T.C. Ramesh and N. Ganesan, Vibration and damping analysis of conical shells with a constrained damping treatment, Finite Elements in Analysis and Design, Vol.12, 17-29, 1993.
61. T.C. Ramesh and N. Ganesan, Studies on metal matrix composite railroad wheels, Computers & Struc., Vol.47, 259-263, 1993.
62. V. Ramjee, E.G. Tulapurkara and George Jacob, Development of wake in curved diffusers, 20th FMFP Conf, 1993.
63. V. Ramjee, Acoustic resonance and curvature effects on wake, J. Aero. Society, Vol.44, 335-339, 1993.
64. M.S. Ravisankar, M. Srinivas, K.N. Seetharamu, P.A. Aswatha Narayana and J.N. Reddy, Turbulent flow and heat transfer over backward facing step comparison with experimental results, National Heat Transfer Conf., AEME, Atlanta, 1993.
65. M.R.S. Reddy, J. Aganauskienė, L. Sornmo and O. Pahlm, Short term reproducibility of the signal averaged ECG measurements of precordial leads, Intl. Conf. on Recent Advances in Biomedical Engg., Hyderabad, 39-42, 1994.
66. P.K. Roy and N. Ganesan, Dynamic stress analysis of tapered clamped free annular circular plate, J. of Sound & Vibration, Vol.160, 549-553, 1993.
67. P.K. Roy and N. Ganesan, Dynamic stress analysis of tapered cantilever square plate under impact load, Computers & Structures, Vol.49, 275-281, 1993.
68. P.K. Roy and N. Ganesan, Studies on dynamic behaviour of a cantilever square plate with varying thickness, Computers & Structures, Vol.47, 995-1003, 1993.
69. C. Sam and P. Krishna Iyer, Photoelastic assessment of 3D elasticity solution of pile caps, Int. Journal of Structures, Vol.13, 2, 137-158, July-Dec 1993.
70. B.V.K. Satya Sai, K.N. Seetharamu, P.A. Aswatha Narayana, J.N. Reddy, Finite element analysis of the effect of radius ratio on natural connection in an annular cavity, Int. J.N.H. Heat and Fluid Flow, 3, 305-318, 1993.
71. A.S. Sekhar and B.S. Prabhu, Dynamic analysis of cracked shafts using finite element method, Int. Congress on Computational methods in Engg., May 3-5, Shirajz University, Shirajz, Iran, Vol.3, 27-34, 1993.
72. A.S. Sekhar and B.S. Prabhu, Vibration severity of cracked rotor supported on fluid film journal bearings, National Conf. on Industrial Tribology, Dehradun, Mar 24-26, 1993, 81-86, Recent Advances in Tribology, Tata McGraw Hill, 1993.
73. A.S. Sekhar and B.S. Prabhu, Analysis of a cracked rotor supported on fluid film bearings with a special reference to parametric instability, NACOMM-93, IIT Kharagpur, 37-42, 1993.
74. A.S. Sekhar and B.S. Prabhu, Dynamic analysis of an industrial rotor - a case study, NACOMM-93, IIT Kharagpur, 43-52, 1993.
75. A.S. Sekhar and B.S. Prabhu, Rotor crack detection and monitoring through vibration characteristics, Proc. 8th ISME Conf. on Mechanical Engg., IIT Delhi, 363-368, 1993.
76. S. Shanmugam, G. Padmanabham and J. Lakshminarasimhan, Numerical prediction and experimental study of conical diffuser flow, J. of Aero. Soc. of India, Vol. 45, No. 2, 132-137, May 1993.
77. J. Shanti, K.M. Patil, L.H. Braak and A. Huson, Analysis in a three dimensional model of a normal foot, Proc. of the 14th Intl. Conference on Recent Advances in Biomedical Engg, Osmania University, Hyderabad, Tata McGraw Hill, 102-105, Jan 1994.

78. D. Sheeja and B.S. Prabhu, Non-Newtonian effects on the coast down phenomena of hydrodynamic journal bearings, *STLE Tribology Trans.*, Vol.36, 1, 405-410, 1993.
79. D. Sheeja and B.S. Prabhu, Experimental study of journal bearing performance with non-Newtonian lubricants, National Conf. on Industrial Tribology, Dehradun, Mar 24-26, 1993, 60-65, *Recent Advances in Tribology*, Tata McGraw Hill, 1993.
80. M. Singh, J. Middleberg, G. Ramachandran and H.J. Rath, Alternation in structure and mobility of erythrocyte aggregates under normal - to microgravity conditions, *Microgravity Sci. Technol.* 6, 39-42, 1993.
81. M. Singh and P. Kanakaraj, Influence of hypercholesterolemia on structure and functioning of erythrocytes, *Biomedicine* 13, 21-30, 1993.
82. K.R. Sivasdas and N. Ganesan, Axisymmetric vibration analysis of thick cylindrical shell with variable thickness, *J. of Sound and Vibration*, Vol.160, 387-400, 1993.
83. K.R. Sivasdas and N. Ganesan, Dynamic analysis of circular cylindrical shells with material damping, *J. of Sound & Vibration*, Vol.166, 103-116, 1993.
84. A.J. Stanley and N. Ganesan, Comparison of shell theories in the analysis of cylindrical shells with discontinuity in the thickness, *Computers & Structures*, Vol. 48, 1057-1071, 1993.
85. B.S.K. Sundarasiva Rao and Ganesan, Axisymmetric deformation of varying thickness composite cylindrical shell with various end conditions, *Composite Structures*, Vol.24, 342-352, 1993.
86. V.S.S. Suribhotla Rajasekhar and K.M. Patil, Determination and analysis of foot-footwear interface pressures during walking using Micro-Emed system, *Proc. of the 14th Intl. Conference on Recent Advances in Biomedical Engg.*, Osmania University, Hyderabad, Tata McGraw Hill, 177-180, January 1994.
87. N.V.C. Swamy, P.A. Aswatha Narayana and K. Chandrasekar, Parametric studies of parabolic vertical axis wind rotors, *Renewable Energy*, 3, 947-949, 1993.
88. N.V.C. Swamy, P.A. Aswatha Narayana and K. Chandrasekar, Pitch regulating aerodynamics of horizontal axis wind turbines, *Indian Wind Energy - The Potential of Wind Energy*, New Delhi, 1993.
89. S. Swarnamai, Development in sensor technology with application to tribology, *Proc. National Seminar on Frontiers of Tribology & Condition Monitoring*, 109-, Tata McGraw Hill, 1993.
90. E.G. Tulapurkara, S. Vengadesan and J. Lakshminarasimhan, Computation of turbulent asymmetric wake, *Int. J. for Num. Methods in Fluids*, Vol. 16, No. 3, 239-248, Feb 1993.
91. E.G. Tulapurkara, B.H.L. Gowda and S.K. Swain, Reverse flow in a channel with obstruction at the entry, *20th National Conf. on Fluid Mechanics & Fluid Power*, FCRI, Palghat, India, Dec 1993.
92. K. Venkataraman and S. Narayanan, Schur's theorem and its application to synthesis of one dimensional and acoustic filters, *J. of Acoustics Soc. of India*, XXI(1), 50-55, 1993.
93. K. Venkataraman and S. Narayanan, Active control of flow induced vibrations, *J. of Sound & Vibration*, Vol.162(1), 43-56, 1993.
94. S. Vijayarangan and N. Ganesan, Stress analysis of composite spur gear using the finite element approach, *Computers & Structures*, Vol.46, 869-875, 1993.
95. S. Vijayarangan and N. Ganesan, A static analysis of metal matrix composite spur gear by three dimensional finite element method, *Computers & Structures*, Vol.46, 1021-1027, 1993.
96. S. Vijayarangan and N. Ganesan, A study of dynamic stresses in spur gear under moving line load and impact load conditions by a three dimensional finite element method, *Computers & Structures*, Vol.162, 185-189, 1993.
97. S. Vijayarangan and N. Ganesan, A static analysis of composite helical gears using a three dimensional finite element method, *Computers & Structures*, Vol.49, 253-268, 1993.
98. S. Yogesh, S. Radhakrishnan and K. Radhakrishna Rao, Micro controller based communicator kit for spastic children, *Recent Advances in Biomedical Engg.*, D.C. Reddy (ed), Tata McGraw Hill, New Delhi, 278, 1994.

#### 4.2.19 Any other relevant details

Stochastic stability of fluid conveying pipes, *Proc. ASME Conf. on Vibration & Control of Structural Systems*, 155-165, 1993.

## 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
<b>Professors</b>	
M.S. Ananth, Ph.D(Florida)[Head]	Thermodynamics, Mathematical Modelling
A. Baradarajan, Ph.D.(IIT Madras)	Bio-reactors, Modelling of Bio-reaction processes, Solid-Solid reactions.
Ch.Durgaprasada Rao Ph.D.(Andhra)	Mathematical Modelling,, Computer Process Control
Y.B.G. Varma, Ph.D.(IIT Madras)	Multisphase Systems, Process Development, Equipment Design
T.Venkatram, Ph.D.(IISc.)	Process Development, Heat Transfer,Membrane,Separation, Equipment Design
<b>Associate Professors</b>	
A.R.Balakrishnan, Ph.D.(Waterloo)	Heat Transfer, Computer Aided Design
M Chidambaram, Ph.D.(IIT Madras)	Non-Linear Control, Periodic operation of Reactors
K.Krishnaiah, Ph.D.(IIT Madras)	Chemical Reactor Analysis and Design, Fluidization
D.V.S. Murthy, Ph.D.(IIT Madras)	Particle Technology, Environmental Engineering
N.R.Neelakantan, Ph.D.(Swansea)	Polymer Processing, Rheology
Dr.V.S.Ramachandra Rao, Ph.D(IIT Madras)	Internal Model Control, Adptive Contral
T.K.Ramanujam, Ph.D.(IIT Madras)	Environmental Engineering, Particle Technology
T.Panda, Ph.D.(IIT Delhi)	Biochemical Engineering and Bio Technology, Protoplast Fusion Technology
S.Subba Rao, Ph.D.(IIT Madras)	Mass Transfer, Computer Aided Design
R.Vedaraman, Ph.D.(IIT Madras)	Particle Technology, Mineral processing
<b>Assistant Professors</b>	
S.K.Rakshit, Ph.D.(IIT Delhi)	Biochemical Engineering and Biotechnology, Downstream processing
P.Sesha Talpa Sai, Ph.D.(IIT Madras)	Chemical Reactor Analysis and Design
S.Sankaranarayanan,Ph.D.(Queensland)	Optimum Control of Grinding Circuits And other Mineral Beneficiation Process
R.Subramanian, Ph.D.(IIT Madras)	Polymer Development
T.Swaminathan, Ph.D.(IIT Kanpur)	Environmental Management, Biotechnology, Membrane Technology

#### 4.3.3 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	11	1	12	1	10	1	6	1	9	1	48	5	53
M.S.	3	-	1	-	2	-	2	-	-	-	8	-	8
M.Tech.	15	5	17	2	-	-	-	-	-	-	32	7	39
B.Tech.	47	2	46	3	40	5	29	2	-	-	162	12	174
<b>Total</b>	<b>76</b>	<b>8</b>	<b>76</b>	<b>6</b>	<b>52</b>	<b>6</b>	<b>37</b>	<b>3</b>	<b>9</b>	<b>1</b>	<b>250</b>	<b>24</b>	<b>274</b>

#### 4.3.4. Number of Scholarship/Fellowship holders

Programme	Institute Scholarship	Others	Total
Ph.D.	32	3(CSIR-1,QIP-2)	35
M.S.	8	-	8
M.Tech.	16	-	16
<b>Total</b>	<b>56</b>	<b>3</b>	<b>59</b>

#### 4.3.5. Number of Degrees Awarded

Programme	Number
Ph.D	6
M.S.	2
M.Tech.	19
B.Tech.	31
<b>Total</b>	<b>58</b>

#### 4.3.6. New Facilities added and Major Equipment procured

1. Methane Gas analyser
2. Electrodes for the measurement of CO<sub>2</sub> and O<sub>2</sub> were added to the ion electrometer

#### 4.3.7 Short-term Courses/Workshops/Seminars/Symposia/ Conferences organised

S.No.	Co-ordinator(s)	Title of Course / Workshop / Seminar/ Symposia / Conference	Period
1.	Dr. T.Swaminathan	Hazardous waste Management	June 11-18, 1993

#### 4.3.8 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.T.K.Ramanujam	National Seminar on Environmental Monitoring and control, Raipur	10-11 Dec. 93
		Moments - National students Seminar, Trichy	30 Dec. 1993
		National Symposium on waste water treatment and Reuse	2-4 March

2.	Dr.D.V.S.Murthy	National Seminar on Environment monitoring and control, Raipur CHE CON-93, Bombay	2-4 Dec. 1993 Dec. 1993
		Global Forum on Environment Education and sustainable development, New Delhi	Sept. 1993
3.	Dr.K.Krishnaiah	DAAD Seminar, New Delhi SMART-93, Kalpakkam	Feb. 1993 Mar. 1993

#### 4.3.9. Special Lecture(s) Delivered

Sl.No.	Name of Faculty	Topic of Lecture	Delivered at	Date
1.	Dr. A. Baradarajan	Bioreactor	Loyola College, Madras	Jan 1994
2.	Dr.T.Venkatram	Computational Techniques of thermal design of organic vapor noncondensable gas employing Coulburn Hougen procedure	Andhra Univ. Waltair	5-7 Jan. 1993
3.		Some method of conversion of Biomass to gaseous and liquid fuels	ndhra Univ. Waltair	12-13 Mar. 1994
4.	Dr.T.Swaminathan	Pollution control for Leather Tanning Industry	Service Institute, Madras	Jan. 1994
5.	Dr.P.S.T.Sai	Analysis of Bio-reactors for enhanced performance	Trivandrum	5-7 Mar. 1994

#### 4.3.10 Visits Abroad

Sl.No.	Name of Faculty	Country visited	Date	Purpose of visit
1.	Dr.S.K.Rakshit	Thailand	Sep. 17-20 1993	Visiting Faculty at AIT, Bangkok
		Japan	13-20 Marh, 1994	Invited lecture at AIST, Tsukuba
2.	Dr.T.Swaminathan	Japan	Nov, 1993	Presenting paper at 2nd IDA & WRDL Conference

#### 4.3.11. Distinguished Visitors to the Department

Sl.No.	Name of the Visitor and Occupation	Date of visit	Purpose of visit (Lecture/Discussion)
1.	K.R. Rajagopal	Professor Dept. of Mech. Pittsburg USA	June 25th 1993
2.	Dr.Moses David	Sr.Res.Engnr. 3M Company St.Paul.	Minnesota, USA
3.	Ajay Kumar Dalai	Dept. of Che.Engg. Univ.of Calgary Alberta, Canada	10 Jan. 1994
4.	Prof.G.Narasimhan	Curtin Univ. of Tech. Perth, Australia	10 Feb 1994
5.	Prof.Dr.-Ing.L.R.Oellrich	Inst.Techl. Thermodyn. & Refr. Faculty Karlsruhe, Germany	25 Feb. 1994

#### 4.3.12. Sponsored Projects

S.No.	Title	Period	Funding Agency	Amount (in Lakhs)	Co-ordinator(s)
1.	Evaluation of Bioreactor for Hazardous waste treatment		CSIR	3.67	Prof. CA Sastry, Dr.T.Swaminathan
2.	Effect of cone angle on hydro-cyclone performance	6 months	Fachhochschule Konstang, Germany	-	Prof.P.Meissner, Dr. S.S.Narayanan

#### 4.3.13. Major Consultancy Assignments

S.No.	Title	Organisation	Amount
1.	Common effluent treatment Plant	Ranipet	Tamilnadu Pollution Control Board
2.	Common effluent treatment Plant	Methalpet	-do-
3.	Sewage treatment plant	Madras Port Trust	
4.	Retainer Consultancy	TEAM, Madras	0.29

#### 4.3.14. Research Publications

1. M. Chidambaram, "Periodic operation of an isothermal plug- flow reactor with input multiplicities", Can. J.Chem. Eng., 71, 477- 480, 1993.
2. G.V. Nettle and M. Chidambaram, "Fuzzy Logic Control of a fed- batch fermentor", Bioprocess Eng. 9, 115-118, 1993.
3. G. Pavan Kumar, I.V.K. Sastri and M. Chidambaram, "Periodic operation of bioreactors with input multiplicities", Can. J. Chem. Eng. 71, 761-770, 1993.
4. M.M. Mahesh, K.P. Madhavan and M. Chidambaram, "Fuzzy Logic control & Copolymerization reactor", Chem. & Eng. Process 32, 327-337, 1993.
5. M. Chidambaram and Y.S.N.M. Rao, "Nonlinear Control of a steam- heated heat exchanger", Indian Chem. Engr. 35, 135-138, 1993.
6. M. Chidambaram, "Parallel Cascade Control of unstable bioreactors", Hung. J. Ind. Chem., 21, 109-116, 1993.
7. R.C. Panda and V.S. Ramachandra Rao, "Dynamic Model of a Fluidized Bed Dryer", Drying Technology, Vol.11, No.3, 589- 602, 1993.
8. R. Gopalan, N.S. Punekar, H. Veeramani and T. Swaminathan, "Study of Iron removal from Ferric citrate medium by pure and mixed cultures of iron resistant microbes", Biotechnology letters - 15(14), 433-438, 1993.
9. S.Kar, M.R. Subramaniam, Srinivasamurthy, T. Swaminathan and A. Baradarajan, "Biodegradation of Phenol by Arthrobacter and modelling of the kinetics", accepted for publication in Bioprocess Engineering, 1994.
10. P.B. Rajendra Nair, T.K. Ramanujam & M. Ramanujam, "Flow Characteristics of Raw coal Fines", Advanced Powder Technology, Vol.4, No.4, p 297-309, 1993.
11. P.B. Rajendra Nair, T.K. Ramanujam and M. Ramanujam, "Tensile Strength of Raw Coal Fines", Advanced Powder Technology, Vol.3, No.2, p 1-0, 1993.
12. M. Velan and T.K. Ramanujam, "Influence of Reactor Geometry on Mixing Characteristics in a Down Flow Jet Loop Bioreactor - Newtonian and non-Newtonian Fluids", Bioprocess Eng., Paper accepted for publication, Vol.11, 1994.
13. K. Yagna Prasad and T.K. Ramanujam, "Liquid Circulation Velocity and Overall Gas Holdup in a Modified Jet Loop Bioreactor with Low Density Particles", Bioprocess Eng., 1993.
14. A.K. Sharma, C.A. Sastry and T.K. Ramanujam, "Studies on Treatment of Waste Water in a Reversed Jet Loop Reactor: Part 1 - Hydrodynamics and Residence Time Distribution Studies", Ind. J.of Environ. Prot., V.12, p.903-911, 1993.

15. V.V. Chaturvedi and D.V.S. Murthy, "Studies in lime mud utilization", *Indian Journal of Technology*, 1993.
16. M. Kapalleswar, V. Srinivas and D.V.S. Murthy, "Plume dispersion modelling for better stack designs", *Institutions of Engineers Journal, Chemical Engg. Division*, 1993.
17. C. Srinivasa Kannan, A.R. Balakrishnan and Y.B.G. Varma, "Suspended Particle Drying Systems", *J. of Energy, Heat & Mass Transfer*, 15, 45-57, 1993.
18. P. Sivagnanam, A.R. Balakrishnan and Y.B.G. Varma, "On the Mechanism of subcooled Flow Boiling of Binary Mixtures", *Int. J. of Heat and Mass Transfer*, 37, 681-689, 1994.
19. S. Guru, V. Sekar and K. Krishnaiah, "Hydrodynamic studies on inverse gas-liquid-solid fluidization", *Chem. Eng. JI.51*, 109 1993.
20. S. Mukherjee and K. Krishnaiah, "Solid-solid reaction between barium carbonate and copper oxide", *Indian JI. Tech.*, 31,836 1993.
21. Paramasivam and R. Vedaraman, "Effect of fatty acid additives on the material flow properties of dry grinding", *Powder Technology*, 77, p.69-78, 1993.
22. P. Ghosh, V.S. Bisaria and S.K. Rakshit, "Ethanol separation by selective absorption of water", *Bioprocess Engg.*, Vol.18, p 279- 282, 1993.
23. P. Padmini, S.K. Rakshit, K. Krishnaiah and A. Baradarajan, "Studies on a continuous recycle reactor for lipase catalysed processing of rice bran oil", *Bioprocess Engg.*, Accepted for publication, July, 1993.
24. S. Sivakesava, S.K. Rakshit & T. Panda, "Improved process for ethanol production using *Zymomonas mobilis*: Process Biochemistry, Accepted for publication, Jan., 1994.
25. P. Padmini, S.K. Rakshit and A. Baradarajan, "Kinetics of lipase enzyme production in organic media", *Enzyme and microbial Technology*, Accepted for publication, November, 1993.
26. K.V. Lakshmi, N.H. Khan & S.K. Rakshit, "A fed batch surface culture process for the production of citric acid with reuse of *Asperigillus niger* mycelia", *Bioprocess Engg.*, Oct., 1993.
27. G.S. Venkata Ratnam, M.S. Ananth and Y.B.G. Varma, "A Model for the pressure drop in gas-liquid cocurrent downflow through packed beds", *The Chemical engineering journal*, 51, 19- 28, 1993.
28. T.L. Harikrishnan, A. Prabhakar and Y.B.G. Varma, "Apparent and true longitudinal concentration profiles in Reciprocating plate columns", *Bioprocess Engineering*, 9, 23-30, 1993.
29. G.S. Venkata Ratnam, D. Venkata Narasaiah and Y.B.G. Varma, "A correlation for interfacial area in cocurrent gas- liquid downflow through packed beds", *Bioprocess Engineering*, 10, 53- 59, 1994.
30. C. Srinivasa Kannan, S. Subba Rao and Y.B.G. Varma, "A study of stable range of operation in Multistage Fluidized beds", *Powder Technology*, 78, 203-211, 1994.
31. G. Kumar, L. Mahesh, N.R. Neelakantan and N. Subramanian, "Studies on Thermal Stability and Behaviour of Polyacetal and Thermoplastic Polyurethane Elastomer Blends", *Polymer International*, 31, 3, p 283-289, 1993.
32. T.J. Nelson and N. Subramanian, "Mechanical Properties of Blends of Nylon with Chemically Modified ABS", *Polymer International*, 32, p 343-347, 1993.
33. G.Kumar, R. Shyam, N. Sriram, N.R. Neelakantan and N. Subramanian, "Estimated Blend Viscosities by a Simple and Workable Model", *Polymer*, 34, 14, 3120-3122, 1993.
34. G. Kumar, Arindam, N.R. Neelakantan and N. Subramanian, "Stress-Relaxation Behaviour of Polyacetal-Thermoplastic Polyurethane Elastomer Blends", *Journal of Applied Polymer Science*, 50, 12, p 2209-2216, 1993.
35. T.J. Nelson and N. Subramanian, "Mechanical Properties of Nylon with Chemically Modified Polypropylene", *Polymer-Plastics Technology and Eng.*, 32, 6, p 635-646, 1993.
36. P.Padmini, S.K. Rakshit and A. Baradarajan, "Lipase catalysed hydrolysis of rice bran oil by free and immobilized system in Batch stirred reactor", *Bioprocess Engineering*, Vol. 9, 2-3, p.103-106, 1993.
37. P. Padmini, S.K. Rakshit and A. Baradarajan, "Studies on immobilization of Lipase enzyme on alumina beads for hydrolysis of rice bran oil", *Bioprocess Engineering*, Vol.9, No.1, p.43, 1993.
38. P. Padmini, S.K. Rakshit, K. Krishnaiah and A. Baradarajan, "Studies on lipase kinetics using immobilized recycle reaction", *Bioprocess Engineering*, July 1993.



## 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  
Photochemistry  
Electro chemistry  
Inorganic Chemistry

Catalysis  
Polymer Chemistry  
Chemical Kinetics  
Spectroscopy  
Theoretical Chemistry

### 4.4.2. New Courses Introduced

Eighteen new 800 level courses were introduced.

### 4.4.3. Details of Faculty

#### Name and Qualification

#### Major area of Specialisation

##### Professors

K.K.Balasubramanian, Ph.D.(Madras)

Organic Chemistry, Synthesis, mechanisms

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.N.Pillai, Ph.D.(Northwestern)

Organic Chemistry, Catalysis

T.V.Ramakrishna, Ph.D.(Birmingham) [Head]

Analytical and Environmental Chemistry

M.Ramakrishna Udupa, Ph.D.(IIT Madras)

Inorganic Chemistry

D.V.Ramana, Ph.D.(IIT Madras)

Organic Chemistry, Organic mass spectrometry and organic synthesis

R.Ramaswamy, Ph.D.(IIT Madras)

Electrochemistry, Oscillatory Reactions

C.S.Swamy, Ph.D.(IISc.)

Surface Chemistry, Catalysis

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

Thermodynamics and Electrochemistry and Electro organic reactions

B. Viswanathan, Ph.D.(IIT Madras)

Surface Science, Catalysis, Solid State Chemistry, Hydrogen Energy

##### Professors (Adjunct)

Name and Qualification	Major area of Specialisation
<b>Professors (Adjunct)</b>	
T.K.K.Srinivasan, Ph.D.(Banares)	Theoretical Chemistry, Spectroscopy
S. Subramanian, Ph.D.(Leicester)	Theoretical Chemistry, Spectroscopy, Magnetic Resonance
Surjit Singh, Ph.D.(IIT Kanpur)	Chemistry, Spectroscopy
<b>Associate Professors</b>	
N. Balasubramanian, Ph.D.(IIT Madras)	Analytical and Environmental Chemistry
(Mrs.)Chandra Sainathan, Ph.D.(IISc.)	Biochemistry
S.Vancheesan, Ph.D.(IIT Madras)	Inorganic Chemistry, Catalysis
T.K.Varadarajan, Ph.D.(IIT Madras)	Catalysis
<b>Assistant Professors</b>	
Archita Patnaik, Ph.D.(B.H.U.)	Nuclear and Radiochemistry
(Mrs.)K.Lalitha, Ph.D.(Mysore)	Biochemistry
D.Loganathan, Ph.D.(IIT Bombay)	Organic Chemistry
A.K.Mishra, Ph.D.(IIT Kanpur)	Photochemistry
S.Sankararaman, Ph.D.(Victoria)	Organic Photochemistry
M.V. Sangaranarayanan, Ph.D.(IISc)	Theoretical Electro-chemistry
M.S.Subramanian, Ph.D.(IIT Madras)	Analytical and Radio- chemistry
M.N.Sudheendra Rao, Ph.D.(IISc)	Inorganic Chemistry
N.Sundaram, Ph.D.(IIT Madras)	Organic Chemistry, Synthesis and Mass Spectroscopy
G.Sundararajan (Rutgers)	Organometallic Chemistry
K.Vidyasagar, Ph.D.(IISc)	Synthetic and Structural Solid State Chemistry
R.P. Viswanath, Ph.D.(IIT Madras)	Catalysis
<b>Senior Scientific Officer Gr.I</b>	
K.D. Chandrasekaran, Ph.D.(IIT Madras)	Material Science

During the year under review the following Professors retired after superannuation:

1. Dr. V. Ramakrishnan
2. Dr. V. Mahadevan

#### 4.4.4. 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.	14	10	14	11	10	10	16	6	17	11	71	48	119
M.Sc.	12	14	14	7	-	-	-	-	-	-	26	21	47
<b>Total</b>	<b>26</b>	<b>24</b>	<b>28</b>	<b>18</b>	<b>10</b>	<b>10</b>	<b>16</b>	<b>6</b>	<b>17</b>	<b>11</b>	<b>97</b>	<b>69</b>	<b>166</b>

#### 4.4.5. Number of Scholarship/Fellowship holders

Programme	Institute	CSIR Fellowship	Others	Total
Ph.D.	70	24	27	121
M.Sc.	11	-	-	11
<b>Total</b>	<b>81</b>	<b>24</b>	<b>27</b>	<b>132</b>

#### 4.4.6. No. of Degrees Awarded

Programme	Number Awarded
Ph.D	10
M.Sc.	29

#### 4.4.7. Instruments/Equipments Designed and Developed

Vacuum pyrolysis setup,, large scale mixed culture anaerobic fermenter designed and tested,, Varian 5000 liquid chromatograph made functional,, new software for molecular weight analysis was installed,, Haake Viscometer RV20 has been serviced and made functional.

#### 4.4.8. New facilities added and major equipment procured

1.	Preparative Gas Chromatograph
2.	Special IR)cell with high vacuum & flowmeters for in-situ studies under reaction conditions
3.	Quadrupole Mass Spectrometer for Gas Analysis
4.	3000V Power supply for electrophoresis
5.	Trans UV illuminator
6.	BOD Incubator
7.	Pilot scale temperature controller
8.	Saker 86°C deep freezer
9.	Autoclave
10.	Integrated nuclear spectroscopy laboratory is being developed
11.	Anaerobic microbial cultivation of methanogens
12.	Fully equipped chemical laboratory for handling of air sensitive compounds
13.	Buchi Rotary Evaporator
14.	AT 486 computer
15.	Schlenck line with dual nitrogen)vacuum for synthesis and distillation.

#### 4.4.9. Short term courses Workshop/ 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. C Kalidas	National Symposium on Electrochemical Science & Technology	IISc. Bangalore
2.	Dr. C N Pillai	11th National Symposium on Catalysis, IICT, Hyderabad	April 2-4, 1993
3.	Dr. D V Ramana	Sixth National Conference for Mass Spectrometry	Oct 11-13, 1993
4.	Dr. C S Swamy	11th National Symposium on Catalysis, IICT, Hyderabad	April 2-4, 1993
5.	Dr. C S Venkatachalam	30th Annual Convention of Chemists, Udaipur, Rajasthan	Dec. 27-31, 1993
6.	Dr. B Viswanathan	11th National Symposium on Catalysis, IICT, Hyderabad	April 2-4

Sl.No.	Name of Faculty	Title	Period/Duration
7.	Dr. T S Chandra	2nd International Conference on Stabilized enzymes and biosensors, PROMED, Madras	Mar. 1-4, 1994
		2nd Asia-Pacific Conference on Agricultural Biotechnology M.S. Res. Swaminathan Foundation	Mar. 6-10
8.	Dr. S Vancheesan	Organic synthesis via organo-metallics, NCL, Pune	Sep. 24-25, 1994
9.	Dr. Archita Patnaik	Workshop on Low-energy Ion-Beams, IGCAR, Kalpakkam	Feb.27 Mar.4.1994
		Workshop on Radiation Biology and Chemical Physics	Oct. 9- 15, 1993
10.	Dr. D Loganathan	IX Carbohydrate Conference on Carbohydrates in Bio-medical Research, Lucknow	Nov. 24-26, 1993
11.	Dr. A K Mishra	Trombay symposium on Radiation and Photochemistry, B.A.R.C. Bombay	Jan. 17-21, 1994
12.	Dr. M S Subramanian	Safety aspects in the Research Applications of Tonising Radiation	Aug. 2-10
13.	Dr. G Sundararajan	11th National Symposium on Catalysis, IICT, Hyderabad	Apr. 2-4, 1993
		Modern Trends in Inorganic Chemistry	Aug. 11-13, 1993
14.	Dr. K Vidyasagar	Modern Trends in Inorganic Chemistry	August 11-13, 1993
		Current Topics in Solid State Chemistry	Dec. 14-17, 1993
15.	Dr. RP Viswanathan	8th International Symposium on Ferroelectrics, NIST, U.S.A.	Aug. 8-13, 1993
		11th National Symposium on catalysis, IICT Hyderabad	April 2-4, 1993
16.	Dr. K D Chandrasekaran	Curriculum Development Workshop on Advanced Powder Metallurgy	March 16-17, 1994

#### 4.4.10 Invited Lectures delivered by the faculty in Academic Institutions/Public Bodies

Sl.No.	Name of Faculty	Topic of Lecture	Delivered at	Date
1.	Dr.C.N.Pillai	Recent Trends in Rerefining of lub. oils	Indian Oil Corpn. Madras	10-6-93
		Rerefining of Lub. oils	IIT Madras	19-6-93
		HPLC and Gas chromatography role of clays in catalytic cracking	Bharathidasan Univ. Trichy	9-12-93
		Zeolites in petroelum industry	Annamalai Univ. Annamalai Nagar	4-3-94
		Applications of clays as catalysts	IUPAC Symposium on Surface and Colloid Sci. CLRI, Madras	9-3-94
2.	Dr.D.V.Ramana	Organic Mass spectrometry & applications	Bharathidasan	Dec. 93

Sl.No.	Name of Faculty	Topic of Lecture	Delivered at	Date
		Mass spectrometry and applications	Calicut Univ.	May. 93
		Substituent Interactions in arylacetylenes under E.I. conditions	Conf. on Mass Spectrometry, IIP, Dehradun	Oct. 93
3.	Dr.C.S.Venkatachalam	Some aspects of eletro organic chemistry	RM Vivekananda College	Jan. 94
4.	Dr.B.Viswanathan	Structural, electronic Vibrational properties of adsorbed CO/N <sub>2</sub> Surface science and Catalysis	11th National Catalysis Symp.	Apr. 93
		Applications of Catalytic chemistry	Bharathidasan Univ.26.11.93	
		Surface studies	RM Vivekananda College	Jan. 94
5.	Dr.Archita Patnaik	Ion-implantation into polymers	IGCAR Kalpakkam	Mar.94
		Simulation experiments for Planetary Gammaray spectroscopy REC, Rourkela	17.12.93	
6.	Dr.D.Loganathan	Exploring structural basis of Carbohydrate Protein interactions	IIT Kanpur	23.11.93
7.	Dr.A.K.Mishra	Excited state charge-transfer and Proton transfer reactions	REC Rourkela	Dec.93
8.	Dr.S.Sankararaman	Synthetic Organic Photochemistry	JNCASR IISc.	15.12.93
		Photochemistry	Pondicherry Univ.	24.2.94
		Synthetic transformations in Lithium Perchlorate/diethlether	-do-	24.2.94
			IIT Bombay	30.12.93
			Pune Univ.	25.12.93
9.	Dr.G.Sundarajan	Third-order NLO studies on organic Polymeric materials	Indo-Fresh Symp. CLRI Madras	Apr. 93
		Organic NLO materials	IVth NOST IIP. Dehradun	13-16 Mar.94
10.	Dr.Y.Vidyasagar	Zintl compounds:structure & Bonding	MTIC IISc. Bangalore	11-8-93
11.	Dr.K.D.Chandrasekaran	Corrosion control by coatings	NIPM Madras	30.6.93
		Surface preparation and application of heavy duty coatings	Visakapatnam Port Trust	26.8.93

#### 4.4.11 Visits Abroad

Sl.No.	Name of Faculty	Country visited	Date	Purpose of visit
1.	Dr.K.K.Balasubramaniam	NIST USA	1.12.93	Guest Scientist

Sl.No.	Name of Faculty	Country visited	Date	Purpose of visit
2.	Dr.C. Kalidas	Perth, Australia	Dec. 93	Collaboration
3.	Dr. R. Narayan	New Orleans, USA	Oct. 93	184th Mtg. of EC Society
4.	Dr.C.S. Swamy	Malaysia	Nov. 93	Intr. Conf. Materials and Environment
5.	Dr.R.P.Viswanath	NIST USA	Aug. 93	IMF 8

#### 4.4.12 Distinguished Visitors to the Department

Sl.No.	Name of the Visitor and Occupation	Date of visit	Purpose of visit (Lecture/Discussion)
1.	Dr.R.Soundarajan Staff Scientist Washington State Univ. USA	23.4.93	Seminar Talk
2.	Dr.B.Singaram Asst. Professor Univ. of California, USA	10.8.93	Seminar Talk
3.	Prof.M.L. Gross Nebraska 4-6 Oct.93	Seminar/Discussion	
4.	Dr.Helmut Karge Fritz Haber Institute Berlin	Feb. 94	Seminar/Discussion
5.	Dr.J.Margitfalvi Dr.M.Magdolna	20-23 Feb. 94	Seminar Talk
6.	Dr.P.Sinay Ecole Normale Superieure France	13 Jan. 94	Seminar Talk
7.	Dr.S.Sabesan DuPoint USA	10 Mar. 94	Seminar Talk

#### 4.4.13 Sponsored Projects

S.No.	Title	Period	Funding Agency	Amount (in Lakhs)	Co-ordinator(s)
1.	Mechanisms of reactions of aromatic hydrocarbons and 3,3- sigmatropic systems under thermal and flash pyrolytic conditions with importance to fossil fuels	3 years	Indo-US	17.00	Dr.K.K.Balasubraman Dr.Stephen Stein(NIST)
2.	Ion solvation of Group IB and IIB metal cryptate complexes in mixed solvents	3 years	CSIR	2.00	Dr.C.Kalidas
3.	Quantum chemical studies on the functionalities of zeolites	-	CSIR	2.00	Dr.B.Viswanathan
4.	Production of Vitamin-B complex enriched animal feed	-	DBT	33.90	Dr.N.G. Karanth Dr.M.S.Ananth Dr.T.S.Chandra
5.	Application of nuclear instrumental methods to microanalysis	-	IUC-DAEF	1.34	Dr.Archita Patnaik
6.	Airborne particular matter analysis and disposal	-	ICSR IITM	0.30	Dr.Archita Patnaik
7.	Control & utilisation of lack-electron-transfer in organic Donor-acceptor systems	-	DST	15.00	Dr.S.Sankaraman

#### 4.4.14 Major Consultancy Assignments

S.No.	Title	Organisation	Amount (in lakhs)	Coordinator(s)
1.	Rerefilling of used oil: Development of (RBIC)	Chemoleums (P) Ltd.	1.20	Dr.C.N. Pillai
2.	Determination of boron, phosphorous and other trace elements in chloro-silanes	Metkem Silicon Ltd. Madras	0.50	Dr.T.V.Ramakrishna Dr.N.Balasubramanian Dr.B.Viswanathan
3.	Development of catalysts for N <sub>2</sub> O decomposition (RBIC)	Air Products & Inc. USA	3.20 (US\$10,000)	Dr.C.S.Swamy
4.	Fungal deterioration of auto compounds	Lucas-TVS	0.05	Dr.T.S.Chandra
5.	Retainer Consultancy	Alkasol, Ranipet	0.12	Dr.K.D.Chandrasekaran
6.	Retainer Consultancy	Advanced Labs. Pondicherry	0.06	Dr.K.D.Chandrasekaran

#### 4.4.15 Honours and Awards

S.No.	Name of Faculty	Honours/Awards	Purpose
1.	Dr.K.K.Balasubramanian	Fellow of National Academy(FNA) Indian National Science Academy (INSA)	Distinguished Scientist Distinguished Scientist
2.	Dr.C.Kalidas	Associate Member of IUPAC Commission on Solubility Data	For assessing solubility data of chem. systems
3.	Dr.T.V.Ramakrishna	Dr.S.Krishnamurthy award by Electro Chemical Society of India	Best paper award
4.	Dr. D.V. Ramana	Second Prize in 6th National MS Conf. TTP, Dehradun	For paper presentation
5.	Dr.C.S. Swamy	Air-Products, USA (\$10,000/-)	Transfer for know-how for Decomposition N <sub>2</sub> O by anionic Cl materials
6.	Dr.B.Viswanathan	Eminent Scientist Award from Catalysis Society of India	Work in the field of Catalysis
7.	Dr.T.S.Chandra	Thannambikai award, Pondicherry Welfare Assn. for Disabled	Achievements in spite of Physical handicap

#### 4.4.16. Research Publications

1. S. Dhanalakshmi, C.S. Venkatachalam and K.K. Balasubramanian, Cation radical induced Claisen rearrangement of aryl allenylmethyl ethers, J. Chem. Comm. Soc., 511, 1994.
2. S. Dhanalakshmi, K.K. Balasubramanian and C.S. Venkatachalam, Anodic oxidation of aryl, allyl and propargyl ethers at a platinum electrode, Tetrahedron, 0000, 1994.
3. C. Booma and K.K. Balasubramanian, A novel tandem Ferrier rearrangement - cyclisation, synthesis of chiral pyran [2,3- b][1]-benzopyran system, Tet. Lett., 34, 6757, 1993.
4. C. Booma and K.K. Balasubramanian, A new Ferrier system: 2-C- Acetoxymethylglycals. A convenient entry to 2)C)methylene glycosides, J. Chem. Soc. Chem. Commun., 1394, 1993.5.

5. Ramesh Babu and K.K. Balasubramanian, Simple oxidation of aldehydes to carboxylic acids, *Organic Preparations and Procedures*, 26, 123, 1994.
6. N. Bhuvanewari, K.K. Balasubramanian and C.S. Venkatachalam, Proton transfer reaction in the cathodic reduction of bromohydrins in neutral aprotic media, *J. Electroanal. Chem.*, 354, 223, 1993.
7. N. Bhuvanewari, S. Venkatachalam and K.K. Balasubramanian, Novel electrochemical route to 1-(alkoxyallyl)phenols - eliminative ring opening reaction, *Tetrahedron Lett.*, 1409, 1994.
8. N. Palani and K.K. Balasubramanian, Lithium perchlorate diethyl ethrate induced rearrangement of epimeric endo and exo dicyclopentadienyl vinyl ethers, *Tetrahedron Lett.*, 5001, 1993.
9. T. Rajamannar, N. Palani and K.K. Balasubramanian, Alkylation of cyclic 1,3-diketones, *Synth. Commun.*, 23, 3095, 1993.
10. T. Rajamannar and K.K. Balasubramanian, An unusual radical fragmentation of 8 $\alpha$ -cycloalkenylmethyl Wieland Mischler ketones mediated by tri-n-butyl tin hydride, *Tetrahedron Lett.*, 35, 637, 1994.
11. T. Rajamannar and K.K. Balasubramanian, Synthesis of propellanes by tri-n-butyl tin hydride mediated radical cyclisation, *Tetrahedron Lett.*, 7283, 1993.
12. M. Vijayakumar and M.S. Gopinathan, Pair-correlation energy and successive ionization potential of atoms He-Zn, *J. Chem. Phys.*, 97, 6639, 1992.
13. M. Vijayakumar and M.S. Gopinathan, Multiple scattering relationships as correlation method for molecules, *J. Chem. Phys.*, 98, 4009, 1993.
14. C. Kalidas and G. Rajendran, Conductance studies of silver (I) salts in water-pyridine mixtures, *Bull. Soc. Chem. Belg.*, 102, 365, 1993.
15. T.K. Sreekumar and C. Kalidas, Preferential solvation of some copper (II) salts in dioxane - DMSO mixtures, *Ber. Bunsenges. Physik. Chemie*, 102, 98, 1994.
16. R. Sreekumar and C.N. Pillai, Reactions of benzyl alcohol and dibenzyl ether over zeolites, *Catalysis Letters*, 281, 19, 1993.
17. R. Sreekumar and C.N. Pillai, Asymmetric synthesis of amines by reductive amination of ketones using (+) and (-) norephedrine followed by periodate oxidation, *Tetrahedron Asymmetry*, 4, 2095, 1993.
18. R.B.C. Pillai, K.K. Bhattacharyya and C.N. Pillai, Reductive alkylation of ethanolamine and methylamine by carbonyl compounds over copper chromite, *Indian J. Chem.*, 165, 32, 1993.
19. R.B.C. Pillai and C.N. Pillai, Alkylation of aniline by p-propanol over zeolites, *Indian J. Chem.*, 32, 592, 1992.
20. K. Padmaja, T.V. Ramakrishna and N. Balasubramanian, A enhancement method for the spectrophotometric determination of mercury after iodide oxidation, *Talanta*, 41, 250, 1994.
21. D.V. Ramana and E. Kantharaj, Ortho interactions of methyl group in the extrusion of CO and CS from anilides and thioanilides under electron impact conditions, *Ind. J. Chem.* 32B, 645, 1993.
22. D.V. Ramana and P. Mahalakshmi, Proximity interactions in 2,2')disubstituted diphenyl ethers under electron impact conditions, *Ind. J. Chem.* 32B, 651, 1993.
23. D.V. Ramana and M.S. Sudha, Claisen rearrangements and cyclisations in phenyl propargyl ethers under electron impact conditions, *J. Chem. Soc. Perkin Trans. 2*, 675, 1993.
24. D.V. Ramana and P. Mahalakshmi, Novel proximity effects and the ortho interactions in 2,2')disubstituted diphenylamines on electron impact, *Org. Mass Spectrom.*, 28, 107, 1993.
25. D.V. Ramana and P. Mahalakshmi, Novel aryloxy migrations in substituted diphenylthiocarbonates under electron impact conditions, *Org. Mass Spectrometry*, 28, 459, 1993.
26. The synthesis of 2)substituted benzimidazoles, *Tetrahedron*, D.V. Ramana and E. Kantharaj, Facile synthesis of 2)aryl)4)H<sup>3</sup>,1)benzoxazin)4)ones, *Org. Prep. Proceed. Int.*, 25, 588, 1993.50, 2495, 1994.
28. P.V. Lalitha and R. Ramaswamy, The unusual potentiometric behaviour of bromine and its application in the estimation of some substrates, *Ind. J. Chem* 32)A, 177, 1993.
29. P.V. Lalitha, P.V. Sambasiva Rao and R. Ramaswamy, An EPR study of the Belonsov)Zhabatinsky reaction, *Chemical Physics Letters*, 201, 559, 1993.
30. P.V. Lalitha and R. Ramaswamy, New substrates in the Ferroun catalysed bromate system in aqueous)organic mixed media, *Int. J. of Chemical Kinetics*, 25, 457, 1993.



31. S. Subramanian, C.S. Swamy and H.G. Karge, Formation of a new superconducting tetragonal phase YBC-T'(T<sub>c</sub> = 87K) in C<sub>2</sub>Cu<sub>3</sub>O<sub>7-8</sub>, J. mat. Sci. Letters, 12, 928, 1993.
32. S. Kannan and C.S. Swamy, Catalytic decomposition of N<sub>2</sub>O on 'in situ' generated thermally calcined hydrotalcites, Applied Catalysis B, Environmental, 3, 109, 1994.
33. B.S.M. Kumar and N. Balasubramanian, Spectrophotometric determination of NO<sub>2</sub> in air, Ind. J. Environmental Health, 35, 20, 1993.
34. B.S.M. Kumar, N. Balasubramanian and T.R. Sreekanth, Spectrophotometric determination of NO<sub>2</sub> in air, Fresenius J. Anal. Chem., 345, 592, 1993.
35. B.S.M. Kumar and N. Balasubramanian, Pararosaniline as a new chromogen for the extractive spectrophotometric determination of HCC2DDS in air, J. AOAC International, 76, 730, 1993.
36. K. Lalitha, C.M. Vargheese and N. Balasubramanian, Spectrophotometric determination of mimisine and 3)hydroxy)4)1 H pyridine, the toxic principles of Leucaena leucocephala, Analytical Biochemistry, 213, 57, 1993.
37. B.R. Lakshmi and T.S. Chandra, Rapid release of protoplasts from E. ashbyn in comparison with T. reesei and P. chrysogenum using novozyme and Funcelase, Enzyme Microbial Technology, 15, 699, 1993.
38. K. Lalitha, C.M. Vargheese and N. Balasubramanian, Spectrophotometric determination of minosure and 3-hydroxy 4-1H-pyridine, the toxic principles of L. leucocephala, Anal. Biochem., 213, 57, 1993.
39. K.R. Swaminathan, R. Padma Bai and K. Lalitha, Enhanced biomethanation using L. leucocephala based mixed inoculum for the anaerobic digestion of low strength mixed biomass substrates, Adv. Pl. Biotech. Biochemistry, eds M.L. Lodha et al, I.S.A. Biochemistry, 127, 1993.
40. C.M. Vargheese and K. Lalitha, Development of a high protein feed for livestock by microbial degradation of thyrotoxic munosine of L Ceucocephala, Adv. Pl. Biotech. Biochemistry, eds. M.L. Lodha et al, I.S.A. Biochemistry, 133, 1993.
41. K. Easwaran and K. Lalitha, Uptake of selenium, its requirement and metabolic change mediated by germinating vigna radiata L, Adv. Pl. Biotech. Biochem., eds., M.L. Lodha et al, I.S.A. Biochemistry, 143, 1993.
42. H. Mach, D.B. Volkin, C.J. Burke, C.R. Middaugh, R.J. Linhardt, J.R. Fromm, D. Loganathan and L. Mattsson, nature of interaction of heparin with acidic fibroblast growth factor, Biochemistry, 32, 5480, 1993.
43. P.K. Behere and A.K. Mishra, Static and dynamic model for 1\* naphthol fluorescence quenching by CCICG4DD in dioxane\*acetonitrile mixtures, J. Photochem. Photobiol., Sec. A, 71, 115, 1993.
44. S. Nigam, S. Srivastava, S.K. Dogra and A.K. Misra, Inorganic anion induced fluorescence quenching of a few benzimidazoles and their monocations, Ind. J. Chemistry, 33)A, 206, 1994.
45. Serge Perrier, S. Sankararaman and J.K. Kochi, Photo)induced electron transfer in pinacol cleavage with quinones via highly labile cation radicals: direct comparison of charge transfer and excitation and photosensitization, J. Chem. soc. Perkin Trans. 2, 825, 1993.
46. D. Ramkumar and S. Sankararaman, Selective photooxidation of sulfides to sulfoxides with tetranitromethane, Synthesis, 1057, 1993.
47. Lizamma Mathew and S. Sankararaman, Mild and efficient photochemical and thermal deprotection of thioacetals and ketals with DDQ, J. Org. Chem., 58, 7576, 1993.
48. Lizamma Mathew, Babu Vargheese and S. Sankararaman, Photochemistry of charge)transfer complexes of styrene derivatives with tetranitromethane: X-ray crystalalm structure of a novel dimeric adduct from p)methylstyrene, J. Chem. soc. Perkin Trans. 2, 2399, 1993.
49. N. Rajesh and M.S. Subramanian, Substoichiometric isotope dilution analysis of Indium by liquid scintillation counting, Radiochemica Acta, 62, 101, 1993.
50. A. Parthiban and N. Sundaram, Preparational characterization of co) and homopoly(phenylene etherimide)ketones, J. Polymer Scince, Part A, Polymer Chemistry, 31, 1233, 1993.
51. B. Gita and G. Sundararajan, Synthesis of homo and block copolymers of norbornene with W(CO)CC5DD via photoinitiation, Tetrahedron Lett., 34, 6123, 1993.
52. R. Vijaya, Y.V.G.S. Murti, T.A. Vijayaraj and G. Sundararajan, Optical non)linearities in substituted conjugated polymers, Optical and Quantum Electronics, 25, 725, 1993.

53. S. Sripadma, T.A. Vijayaraj and G. Sundararajan, Metathetical polymerization of phenylacetylenes under charge)transfer\*induced catalysis, Polymer Science ) Recent Advances, Ed. I.S. Bhardwaj, Allied Publishers Ltd., New Delhi, 1994, p.147.
54. K.D. Chandrasekaran and A. Narayanan, Use of spray dryers in forming pseudochromate/alumino-silicate, Chemical Industry Digest, 6, 130, 1993.
55. V. Ganesan, R. Srinivasan, S. Aswathay, K.D. Chandrasekaran, R.B.C. Pillai, Synthesis of secondary amines by reductive alkylation using copper chromite catalyst: steric effect of compounds, J. Mol. Catal., 84, 125, 1993.
56. R.B.C. Pillai, Synthesis of secondary amines by reductive alkylation using copper chromite catalyst: steric effect of carbonyl compounds, J.Mol. Catal. 84, 125, 1993.
57. T. Chandiran and S. Vancheesan, Hydrogenation of conjugated dienes catalysed by  $n^0$ -are netri carbonylchromium complexes, J. Mol. Catal., 88, 31, 1994.
58. T. Chandiran and S. Vancheesan, Reactions of  $Mo(CO)_6$  under biphasic conditions, Proc. Indian Acad. Sci. (Chem. Sci.), 106, 1, 1994.
59. S. Rajagopal, S. Vancheesan, J. Rajaram and J.C. Kuriacose, J. Mol. Catal., 81, 185, 1994.
60. Vasanthi Lakshmanan, K.S. Nagarajan and M.R. Udupa, Synthesis and characterization of oxomolybdenum(V) complexes with dithiooxamide, Ind. J. Chem. 31A, 806, 1992.
61. Vasanthi Lakshmanan, M.R. Udupa and K.S. Nagarajan, Sulphidomolybdenum (V) complexes with amino acid dithiocarbamates, Polyhedron, 11, 1387, 1992.
62. R. Krishna Kumar, G. Aravamudhan, M.R. Udupa, M. Seshasayeee and T.A. Hamor, Structure of bis(diethyldithiocarbamate) diiodotellurium(IV), Acta Cryst. C49, B28, 1993.
63. R. Krishna Kumar, G. Aravamudan, M.R. Udupa, M. Seshasayee and T.A. Hamor, Synthesis and crystal structure determination of the novel compound iodoethyldithiocarbamatotellurium (II), Polyhedron, 12, 2201, 1993.
64. B. Viswanathan and T. Lakshmi, Strong metal support state in titania supported iron catalysts ) EHMO model cluster calculations, Ind. J. Chem., A32, 937, 1993.
65. N.S. Raman and B. Viswanathan, Effect of substitution at the Tbarium site in  $YBaCu_3O_7$  Bulletin of Material Sci., 16, 381, 1993.
66. N.S. Raman, B. Viswanathan, T.K. Varadarajan, M. Subrahmanian and A.R. Prasad, Catalytic properties of  $YBaCu_3O_7$  and alkaline earth cuprates, Indian J. Chem., 33A, 187, 1994.
67. B. Viswanathan, Metallization of plastics by electroless plating, Current Science, 65, 537, 1993.
68. I.B. Rufus, V. Ramakrishnan, B. Viswanathan and J.C.Kuriacose, XPS studies on Pd/CdS, Journal of Material Science Letters, 12, 1536, 1993.
69. B. Viswanathan and Alex C. Pulikottil, Surface properties of ZSM)5 modified by phosphorous, Catalysis Letters, 22, 373, 1993.
70. K.T. Ranjit, R. Krishnamurthy and B. Viswanathan, and physicochemical studies on metallized titania systems, Studies in Surface Science and Catalysis, 75, 2147, 1993.
71. K.S. Rajam, Indira Rajagopal, S.R. Rajagopalan and B.Viswanathan, DSC, X-ray and magnetic studies on electroless Ni)P films grown in alkaline ethanolamine baths, Materials: Chemistry and Physics, 33, 289, 1993.
72. B. Viswanathan and R. Narayan, Chemical and Electrochemical Energy Systems, Orient Longmans Ltd., 1994.

## 4.5 Civil Engineering Department

### 4.5.1 Introduction

The Department of Civil Engineering was established in the year 1959.

The educational objective of the Civil Engineering Department has been to train the students with emphasis on understanding the fundamental behaviour and design of civil engineering systems and components. The students thus trained could meet the challenging demands, become leaders and give appropriate direction to the engineering profession.

The degree programmes in the Department include education at the undergraduate and graduate levels. The undergraduate Civil Engineering curriculum is broad based, making a wide choice of careers possible. The course based graduate M.Tech. degree programme, on the other hand, offers specialisation in the five major areas of Civil engineering namely, Building Technology and Construction Management, Geotechnical Engineering, Hydraulic and Water Resources Engineering, Structural Engineering and Transportation Engineering. The M.Tech. degree programme prepares students to meet the advanced technology requirements of the industry. M.S. degree programme gives an exposure to the process of research, whereas the Ph.D degree programme gives training for original research on advanced topics in the five areas of specialisation and prepares the scholars for an academic as well as research and development career.

There is extensive interaction between the faculty and industries belonging to both public and private sectors. The Department has been leading at the institute level in the earnings through industrial consultancy projects. There is also growing emphasis on sponsored research projects and the faculty members are actively involved in several research projects funded by international collaborative scheme and national agencies.

### 4.5.2 New Courses Introduced

The following new courses were introduced during the period under report

Sl.No.	Course No.	Title	Faculty
1.	CE 793	Computational Geomechanics	Dr. Rajagopal

### 4.5.3 Details of Faculty

#### Name and Qualification

#### Major Area of Specialisation

#### Professors

H.Achyutha, Ph.D.(IIT Madras)	Structural Engineering
P.K.Aravindan, Ph.D.(IIT Madras)	Structural Engineering
K.Elango, Ph.D.(IIT Madras)	Hydraulic & Water Resources Engg.
V.Kalyanaraman, Ph.D(Cornell)	Structural Engineering
C.S.Krishnamoorthy, Ph.D.(London)	Structural Engineering
N.R.Krishnaswamy, Ph.D.(IIT Kanpur)	Geotechnical Engineering
Nainan P.Kurian, Ph.D(IIT Madras)	Geotechnical Engineering
V.Paramasivam, Ph.D(IIT Madras)	Structural Engineering
N.Rajagopalan, Dr.-Ing(Stuttgart)[Head]	Structural Engineering

**Name and Qualification**

H.Raman, Ph.D.(IIT Madras)  
 P.Srinivasa Rao, Dr.-Ing(Munchen)  
 H.Suresh Rao, Ph.D.(IIT Madras)

**Visiting Professors**

R.Jayaraman, Ph.D.(IIT Madras)  
 R.Pitchai, Ph.D.(Harvard)  
 Shan Somayaji, Ph.D.(Illinois)

**Associate Professors**

M.S.Mathews, Ph.D.(IIT Madras)  
 V.R.Rengaraju, Ph.D.(IISc Bangalore)  
 B.S.Thandaveswara, Ph.D.(IISc.)

**Assistant Professors**

R.Ambalavanan, Ph.D.(IIT Madras)  
 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.Rajagopal, Ph.D.(Florida)  
 S.Rajeev, Ph.D. (IIT Madras)  
 A.Ramachandraiah, Ph.D(IIT Madras)  
 K.Srinivasan, Ph.D.(IIT Madras)  
 V.Tamizh Arasan, Ph.D.(IIT Madras)

**Lecturers**

Koshy Varghese, Ph.D.(Texas, Austin)  
 K.Ramamurthy, Ph.D.(IIT Madras)  
 K.N.Satyanarayana, Ph.D.(Clemson)

**Senior Scientific Officers**

K.Ananthanarayanan, M.E.(Madras)  
 M.Subbi Reddy, M.S.(IIT Madras)

**Technical Officer (SG)**

Technical Officers

P.R.Kothandaraman  
 M.Innaci

**Major Area of Specialisation**

Hydraulic & Water Resources Engg.  
 Structural Engineering  
 Hydraulic & Water Resources Engg.

Hydraulic & Water Resources Engg.  
 Environmental Engineering  
 Building Tech.& Constrn. Management

Building Tech.& Constrn. Management  
 Transportation Engineering  
 Hydraulic & Water Resources Engg.

Building Tech.& Constrn. Management  
 Geotechnical Engineering  
 Geotechnical Engineering  
 Environmental Engineering  
 Structural Engineering  
 Hydraulic & Water Res. Engg.  
 Transportation Engineering  
 Geotechnical Engineering  
 Structural Engineering  
 Building Tech.& Constrn. Management  
 Hydraulic & Water Res. Engg.  
 Transportation Engineering

Building Tech. & Constrn. Management  
 Building Tech.& Constrn. Management  
 Building Tech.& Constrn. Management

Building Tech.& Constrn. Management  
 Transportation Engineering

K.Bhaskaran  
 V.Raman

**4.5.4 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.	6	4	11	-	4	2	10	1	11	-	42	7	49
M.S	10	-	6	-	5	1	4	-	-	-	25	1	26
M.Tech	28	2	31	3	-	-	-	-	-	-	59	5	64
B.Tech	42	4	37	4	34	5	26	1	-	-	139	14	153
<b>Total</b>	<b>86</b>	<b>10</b>	<b>85</b>	<b>7</b>	<b>43</b>	<b>8</b>	<b>40</b>	<b>2</b>	<b>11</b>	<b>-</b>	<b>265</b>	<b>27</b>	<b>292</b>

#### 4.5.5 No. of Scholarship/Fellowship

Programme	Institute Scholarship	Others	Total
Ph.D	17	8 (QIP)	25
M.S.	16	-	16
M.Tech	33	8 (QIP)	41
<b>Total</b>	<b>66</b>	<b>16</b>	<b>82</b>

#### 4.5.6 No. Degrees Awarded

Programme	No. Awarded
Ph.D	5
M.S.	7
M.Tech	34
B.Tech	29
<b>Total</b>	<b>75</b>

#### 4.5.7 Instruments/Equipment designed and developed

1. C.S.Krishnamoorthy, Developed software DEKBASE and PASSFEMEC\_GNL.
2. Prof.V.Paramasivam and Prof.H.Achyutha, completed installation of new equipment and facilities for Nuclear Structures Research Cell in the newly constructed third floor of the Structural Engineering Laboratory.
3. Prof. R.Jayaraman developed a VHF soil moisture for measurement of soil moisture.
4. Dr.K.Ramamurthy developed an equipment for testing structural bond strength of masonry prisms.
5. Dr.V.Kalyanaraman developed a water tank staging based on core loaded sleeved column system and tested the same.

#### 4.5.8 New facilities and major equipment procured

1. Electronic distance meter and electronic theodolite procured can be used to measure more than 2 km range.

#### 4.5.9 Sponsored projects

Sl.No.	Title	Period	Funding Agency	Amount (Rs.in lakhs)	Coordinators
1.	Production of low relaxation steel	1 year	ICSR	0.50	Dr.N.Rajagopalan Dr.K.A.Padmanaban
2.	Knowledge based expert system for Civil engineering design	5 years	National Science Foundation USA	22.00	Dr.C.S.Krishnamoorthy V.Kalyanaraman Dr.N.Rajagopalan
3.	Knowledge based expert system for finite element analysis for engineering design	3 years	DST	7.18	Dr.C.S.Krishnamoorthy Dr.K.N.Seetharamu Dr.S.Rajeev
4.	CAD/CAM Programme	2 years	MHRD	15.00	Dr.C.S.Krishnamoorthy Dr.V.Radhakrishnan
5.	Expert systems for water resources management	3 years	DST	4.5	Dr.H.Raman Dr.S.Mohan

Sl.No.	Title	Period	Funding Agency	Amount (Rs.in lakhs)	Coordinators
6.	Application of finite element method to structures and components	3 years	MHRD/BMFT Germany	32.0	Dr.V.Paramasivam Dr.H.Achyutha
7.	Hydraulic routing of floods	3 years	DST	4.57	Dr.H.Suresh Rao Dr.B.S.Thandaveswara
8.	Creek hydrology	3 years	DOD-CODAPS	5.00	Dr.H.Suresh Rao Dr.B.S.Thandaveswara
9.	Numerical modelling of pollutant load in river system	3 years	JNCH	18.75	Dr.H.Suresh Rao Dr.B.S.Thandaveswara
10.	Analysis of layered fibre composite stiffened panels	4 years	ARDB	3.62	Dr.V.Kalyanaraman
11.	Expert system for computer aided engg. of steel structures	5 years	DST	16.37	Dr.V.Kalyanaraman Dr.S.Rajeev
12.	Instability and CFC elements and panels	3 years	ARDB	5.21	Dr.V.Kalyanaraman
13.	Laboratory facilities for studies on nonlinear behaviour of structural systems	-	MHRD	15.00	Dr.A.Mehar Prasad Dr.V.Kalyanaraman
14.	Stress analysis of branch connections in pipes	3 years	DAE(BRNS)	3.2	Dr.V.Paramasivam Dr.H.Achyutha
15.	Nuclear structures research cell	3 years	MHRD	15.0	Dr.V.Paramasivam Dr.H.Achyutha
16.	Ultimate strength of nuclear containments	3 years	Atomic Energy Reg. Board	12.00	Dr.V.Paramasivam Dr.H.Achyutha
17.	Geosynthetics in reinforced earth embankments	3 years	DST	9.83	Dr.N.R.Krishnaswamy Dr.K.Rajagopal Dr.S.R.Gandhi Dr.A.Boominathan
18.	Development of infrastructure facilities in Transport Engg.	5 years	MHRD	32.00	Dr.V.R.Rengaraju Dr.V.Tamizh Arasan
19.	Effectiveness of percolation ponds	3 years	DST	4.08	Dr.K.Elango Dr.S.Mohan
20.	Computer aided simulation study of Thambaraparani river system	2 years	TNPWD	24.00	Dr.H.Raman Dr.K.Elango Dr.S.Mohan
21.	Standardisation of damage frequency relationship	3 years	DST	5.00	Dr.B.S.Thandaveswara Dr.K.Srinivasan
22.	Modernisation of laboratories with complete electronic digital surveying system	15 months	MHRD		Mr.K.Ananthanarayanan Dr.M.S.Mathews

#### 4.5.10 Major Consultancy Assisntments

Sl.No.	Title of Assignment	Organisation	Amount (Rs.in lakhs)	Coordinators
1.	Typical design of overhead reservoirs	TWAD Board	1.28	Dr.N.Rajagopalan
2.	Development of low relaxation steel for prestressing works	JCT Limited	1.25	Dr.N.Rajagopalan
3.	Study of relaxation properties and suggesting improvement techniques	Special Steels	0.20	Dr.N.Rajagopalan
4.	Study of relaxation properties and suggesting improvement techniques	General Engg.Works	0.45	Dr.N.Ragagopalan
5.	Study of relaxation properties and suggesting improvement techniques	JCT	0.80	Dr.N.Rajagopalan
6.	Development of prestressing anchorages 12T 13 stresses	Freyssenet & Co.	0.40	Dr.N.Rajagopalan
7.	Checking of the design of Varapuzha bridge in Kerala	NATPAC Kerala	0.25	Dr.N.Rajagopalan
8.	Precamber calculation presentation for Vasishta bridge	ECC Larsen & Tubro	0.25	Dr.N.Rajagopalan
9.	Study of fatigue behaviour of FRP blades for boilers	BHEL	0.50	Dr.N.Rajagopalan
10.	Extracting radio active material from Cooum	Halliburton	0.50	Dr.N.Rajagopalan
11.	Study of properties of steel acks and quality control of prestressing equipment]	UPSBC	0.40	Dr.N.Rajagopalan
12.	Optimal Design of Transmission line towers	Tata Consulting Engrs. Bombay	9.00	Dr.C.S.Krishnamoorthy Dr.S.Rajeev Dr.V.Kalyanaraman
13.	Design checking of transmission line towers	Bagiratha Electrical Structurals Cochin	0.40	Dr.C.S.Krishnamoorthy Dr.S.Rajeev Dr.V.Kalyanaraman
14.	Software for adaptive 2D FEA and GA for discrete size optimization	Aero. Dev. Agency, Bangalore	4.90	Dr.C.S.Krishnamoorthy Dr.S.Rajeev
15.	Investigations on Drought occurrence in lower Cauvery basin	Govt.of Tamilnadu	1.00	Dr.H.Raman Dr.K.Elango
16.	Real time operations for Jeddah water supply system	Computer Resources Int.Ltd.	0.50	Dr.H.Raman
17.	Analysis and design of improvements to the existing stores water Nullah	National Aromatics and Petrochemicals Ltd. Madras	0.40	Dr.K.Elango Dr.B.S.Thandaveswara
18.	Soil investigation for the construction of 152 HIG flats for TNHB Spl.Division	TNHB, Madras	0.88	Dr.N.R.Krishnaswamy Dr.Nainan P.Kurian Dr.T.S.Ramanatha Iyer Dr.A.Boominathan

Sl.No.	Title of Assignment	Organisation	Amount (Rs.in lakhs)	Coordinators
19.	Geotechnical investigation for the construction of the administrative block at Madras Airport	Intl. Airports Authority of India Madras Airport	0.30	Dr.N.R.Krishnaswamy Dr.Nainan P.Kurian Dr.A.Bomminathan
20.	Geotechnical investigations and recommendations of foundations	Garrison Engineer Madras	0.26	Dr.Nainan P.Kurian Dr.N.R.Krishnaswamy
21.	Geotechnical investigation for the New storage tanks for IOC	Indian Oil Corpn. Madras	1.96	Dr.N.R.Krishnaswamy Dr.Nainan P.Kurian Dr.A.Boominathan
22.	Geotechnical investigation for const. of building	Export Import Bank of India Madras	0.68	Dr.N.R.Krishnaswamy Dr.Nainan P.Kurian
23.	Structural design of pile foundation for new storage tanks for IOC	Indian Oil Corpn. Madras	0.40	Dr.Nainan P.Kurian Dr.N.R.Krishnaswamy
24.	Geotechnical investigations for stability of ash slurry pipeline embankment at thermal power plant	North Madras Thermal Power Project Madras	0.73	Dr.A.Boominathan Dr.NainanP.Kurian Dr.S.R.Gandhi Dr.N.R.Krishnaswamy
25.	Fixed permeability tests in ash dyke area at Thermal plant	-do-	0.85	Dr.S.R.Gandhi Dr.Nainan P.Kurian Dr.A.Boominathan Dr.N.R.Krishnaswamy
26.	Soil investigation and foundation recommendation	EID Parry India Ltd. Madras	0.21	Dr.Nainan P.Kurian Dr.N.R.Krishnaswamy
27.	Consultancy services and quality control tests	TNUD, Madras	0.40	- do -
28.	Analysis and design of water supply system for eshidiyer project	Jordan, SPIC-SMO Madras	0.8	Dr.K.Elango Dr.H.Suresh Rao Dr.S.Kumaraswamy
29.	Analysis and design of flood dram through arochem	National Aromatics and Petro Chemical Products Corpon. Madras	0.40	Dr.K.Elango Dr.B.S.Thandaveswara
30.	Ash pond design at RTPP	Andhra Pradesh State Electricity Board	2.00	Dr.K.Elango Dr.V.S.Raju Dr.P.K.Aravindan Dr.S.R.Gandhi
31.	Design checking for common effluent treatment plants	TALCO & Pollution Control Board	4.00	Dr.K.Elango Dr.V.S.Raju
32.	Behaviour of core loaded sleeved column system	T.I.Ltd	7.00	Dr.V.Kalyanaraman
33.	Development of space truss node	N.R.Patel & Co.	0.50	Dr.V.Kalyanaraman
34.	Checking and approving analysis and design of 100m micro wave tower	NSL Ltd.	0.20	Dr.V.Kalyanaraman
35.	Design Calculation and drawing for spreader beam for container handling	Reefer Mech Engineers	0.30	- do -
36.	Design of bridges subways etc.	poration of Madras	3.00	Dr. P.K. Aravindan Dr. V.S.. Raju
37.	Addition of an upper floor to the existing factory building	India Meters	0.12	Dr.H.Achyutha



Sl.No.	Title of Assignment	Organisation	Amount (Rs.in lakhs)	Coordinators
39.	Properties of nonshrink grout	Pidilite Indus.	0.15	Dr.H.Achyutha
39.	Properties of elastometric bearings	Hevea Corpn.	0.17	Dr.H.Achyutha
40.	Testing of soil samples for Ash bund embankment	Sri Renganathan & Co.	0.25	Dr.A.Boominathan Dr.N.R.Krishnaswamy
41.	CBR and related soil tests for IAAI integrated Cargo terminal at Madras airport	Intl.Airport Authority of India	0.46	Dr.N.R.Krishnaswamy Dr.A.Boominathan Dr.K.Rajagopal
42.	Evaluation of suitability of lime stone quarry refuse for road work	ECC group L & T Madras	28.0	Dr.V.Thamizh Arasan Dr.V.R.Rengaraju
43.	Job-mix formula for flexible pavements	Highways Dept.	0.30	Dr.V.Tamizh Arasan Dr.V.Rengaraju
44.	Assessment of pavement structure and quality	Urban Dev. Wing Highways Dept.	0.15	Dr.V.R.Rengaraju Dr.V.Tamizh Arasan
45.	See water intake structure - advice and design	Magunta Aqua Farming Ltd.	0.80	Dr.B.S.Thandaveswara Dr.M.R.Pranesh
46.	Soil consultancy for the proposed prawn cultivating unit	Nagarjuna Aqua Ltd.	2.00	Dr.B.S.Thandaveswar Dr. V.S.Raju
47.	Calibration and flow analysis	Switzer Instrument Ltd.	0.12	Dr.B.S.Thandaveswara Dr.K.Srinivasan
48.	Design of effluent treatment plants for chilling centres and Madurai Dalry	NDDDB	22.00	Dr.P.Srinivasa Rao Mr.K.Gopalakrishna Dr.R.Ambalavanan
49.	Prediction of noise due to large induction motor	BHEL	0.70	Dr.A.Ramachandraiah Dr.N.Ganesan Dr.S.Narayanan
50.	Study on acoustical absorption	IDL Salzbau	0.25	Dr.A.Ramachandraiah Dr.S.Swarnamani
51.	Investigation of building materials and quality control	CPWD	0.30	Dr.M.S.Mathews Dr.R.Ambalavanan
52.	Non-destructive testing of RCC turbogenerator deck	SEW Constructions	0.22	Dr.A.Ramachandraiah Dr.K.Ramamurthy
53.	Investigation of building materials and advice	TN pollution control	0.20	Dr.R.Ambalavanan Dr.M.S.Mathews
54.	Nonlinear static and dynamic analysis of guyed masts	ECIL	1.20	Dr.A.Mehar Prasad Dr.V.Kalyanaraman

#### 4.5.11 Honours and Awards

S.No.	Name of Faculty	Honours/Awards	Purpose
1.	H. Suresh Rao	CBIP Certificate of merit	Best Paper on Ground Water
2.	Dr.K.Srinivasan	CBIP Medal	Best Paper on Hydrology
3.	Mr K Ananthanarayanan.	Sir Arthur Cotton Memorial Prize	best paper published in the journal of Institution of Engineers (India) Election to Academic and Professional Societies
4.	Dr N Rajagopalan	Member	Bridges and Standards Committee of Indian Roads Congress

S.No.	Name of Faculty	Honours/Awards	Purpose
5.	Dr.C.S.Krishnamoorthy	Fellow	Indian National Academy of Engineering
6.	Dr.M.S.Mathews	Member	Indian Concrete Institute
7.	Dr.S.B.Patnaik	Member	WCTRS, USA
8.	Dr.K.Rajagopal	Member Member Member	Canadian Geotechnical Soc. International Geotextile Soc. Indian Geotechnical Society, Madras Chapter
9.	Mr.K.Gopalakrishna	Member Member	Indian Water Works Association Indian Public Health Engrs.Association
10.	Dr.A.Ramachandraiah	Fellow	Acoustical Society of India
11.	Dr.K.Ramamurthy	Member	British Masonry Society

#### 4.5.12 Distinguished Visitors to the Department

Sl.No.	Name of the Visitor and Occupation	Date of visit
1.	Dr.Ing.J.Alters Research Centre, Julich, Germany	2-6 March 1993
2.	Mr.U.M.Schulz INTES, Stuttgart, Germany	2-6 March 1993
3.	Dr.Ing.H.Heinrichs,,GFS, Aachen, Germany	2 - 6 March 1993

#### 4.5.13 Visit of Faculty Members to other Institutions

Sl.No.	Name of Faculty	Institution Visited	Purpose and period
1.	S.Mohan	Ruhr University Bochum, Germany University of Colorado, Denver, USA	Technical Univ., Aachen, Germany August 1993

#### 4.5.14 Seminars/Symposium/Conferences/Short-term Courses organised

S.No.	Co-ordinator(s)	Title of Course/Workshop / Seminar/Symposia/ Conference	Period
1.	Dr.C.S.Krishnamoorthy Dr.K.N.Seetharamu	ASI on Computational Methods for Engineering Analysis and Design	02-11 Aug.93
2.	Dr.V.Paramasivam Dr.H.Achyutha Dr.A.Mehar Prasad	Symposium on Advances in Structural Dynamics	14-17 Dec.93
3.	Dr.V.Paramasivam	STC on Finite Element Methods in Engineering Analysis	20-30 Dec.93
4.	Mr.K.Gopalakrishna	Maintenance of waste water treatment units	29 Nov. - 10 Dec.93
5.	Dr.A.Boominathan	STC on Design and construction methods in foundations	6-17 Dec. 93
6.	Dr.R.Ambalavanan Dr.K.Ramamurthy	STC on Design and Construction of Structural masonry	20-23 Dec. 93
7.	Dr.S.Somayaji Dr.M.S.Mathews	Workshop on Prevention and restoration of monumental structures	21 Aug. 93

#### 4.5.15 Participation In Seminars, Symposium/Conference

Sl.No.	Name of Faculty	Title	Date	Nature of Participation
1.	Dr.N.R.Krishnaswamy	Sem. on Landslides in Kerala, Trivandrum	8.12.93	Paper Presentation and Chairing a Technical Session
2.	Dr.K.Elango	Flood disaster mitigation under Natural Hazards Mitigation, Bombay	1993	Participant
3.	Dr.B.S.Thandaveswara	National Symp. on Recent trends in design of hydraulic structures, Roorkee	1993	Paper presentation
4.	Dr.B.S.Thandaveswara	Flood disaster mitigation under Natural Hazards Mitigation, Bombay	1993	Participant
5.	Dr.S.B.Pattnaik	3rd Ntl. Conf. on Transportation systems studies, Andhara University	Dec.1993	-do-
		Symp. on Mathematical Methods and Applications IIT Madras	Dec.1993	- do -
6.	Mr.K.Gopalakrishna	Ntl. Seminar on Protection of fresh water bodies from pollution	Varanasi	- do -
		Ntl. Workshop on Self sustainability of water supply and sewerage systems, Bhubaneswar	1993	Participant
7.	Dr.K.Srinivasan	Ntl. Symp. on Recent trends in design of hydraulic structures, Roorkee	1993	Paper presentation
		Flood disaster mitigation under Natural Hazards Mitigation, Bombay	1993	Participant
8.	Dr.A.Ramachandraiah	Ntl. Sym. on Acostics, Bangalore	1993	Participant
9.	Dr.K.Ramamurthy	4th Intl. Sem. on Structural Masonry for developing countries	1993	Member, Paper Review Committy

#### 5.16 List of Publications

1. N.Rajagopalan, K.Muthumani, "Load-time variation and energy absorption under repeated impact loading", Intl.symposium on Advances in Structural Dynamics, IIT, Madras, Dec. 1993.
2. N.Rajagopalan, K.Muthumani, "Load-time variation of projectiles penetrating into reinforced concrete beam elements", Ntl.symposium on Plasticity and Impact- Implast-93, IIT, Delhi, Dec. 1993.
3. Benny Raphael and C.S.Krishnamoorthy, "Automotive finite element development using OOP Techniques", Intl. Jl. of Engineering Computations, Vol.10, No.3. pp.267-278, 1993.
4. G.Ramesh and C.S.Krishnamoorthy, "Post-buckling analysis of structures by dynamic relaxation", Intl. Jl. for Numerical Methods in Engineering, Vol.36, pp.1339-1364, 1993.

5. K.Rajeshirke Umesh and C.S.Krishnamoorthy, "Adaptive- mesh refinement for 2D finite element stress analysis", Intl. JI. of Computers and Structures, Vol.48, No.1, pp.121-133, 1993.
6. C.S.Krishnamoorthy, C.S.Rao and S.Rajeev, "Design synthesiser for KBES", Structural Engineering Review, Vol.5, No.2, pp.107-119, 1993.
7. C.S.Krishnamoorthy, H.Shivakumar and S.Suresh, "A knowledge based system with generic tools for structural engineering", Structural Engineering Review, Vol.5, No.2, pp.121-131, 1993.
8. S.Rajeev, S.Suresh and C.S.Krishnamoorthy, "A criticism based model for cooperative problem solving", Intl. JI. of Computing Systems in Engineering, Vol.4, No.2-3, pp.201-210, 1993.
9. Sriram Kalaga and C.S.Krishnamoorthy, "KBES for finite element analysis: State-of-the-art and future applications", Proc. Civil-Comp 93/AI Civil-Comp 93, Civil Comp Press, Edinburgh, pp.235-243, 1993.
10. S.Rajeev and C.S.Krishnamoorthy, "Optimization of structural systems using genetic algorithms", All India seminar on Personal Computers Applications in Civil Engineering, Nagpur.
11. H.Raman, K.Elango, S.Mohan and M.Venkateswara Rao, "Stochastic analysis of draughts in Adyar Basin", JI. of Indian Water Resources Society, Vol.13, No.3 & 4, pp.192-197, 1993.
12. N.P.Kurian, "The influence of prestressing the edge beams of shell foundation", Fourth East Asia Pacific Conf. on Structural Engineering and Construction, Seoul, Vol.III, pp.2127- 2132, 1993.
13. N.P.Kurian, "Performance of shell foundations on softsoil", The Proc. Intl. Conf. on Softsoil Engineering, China, pp.387-392, 1993.
14. L.Srinivasa Reddy and K.Elango, "Optimal design of water distribution networks with head dependant outflows using augmented Lagrangian", JI. of Institution of Engineers (India), Vol.73, Part EN-2, pp.27-33.
15. K.Elango, S.Mohan and S.Sankaranarayanan, "Computerised design primer for percolation ponds", Ntl. Conf. on Water Harvesting, Trichy, pp.199-207, 1993.
16. K.Elango and B.Shivakumar, "Drought hazard mitigation. Proc. Seminar on Water Management and Water Conservation Techniques for Drought prone areas, Mysore, pp.231-238, 1993.
17. C.Nagarajukumar and K.Elango, "A dated crop water response function for paddy", Proc. Workshop on Integrated Development of Irrigated Agriculture, CBIP, pp.312-319, 1993.
18. C.Nagarajukumar and K.Elango, "Review of models of irrigation systems facing water scarcity", Ntl. Sym. on Irrigation Management, Hyderabad, pp.13.1 - 11, 1993.
19. V.Paramasivam and P.C.Koteswara Rao and D.V.S.Raghuram, "Eigen mode analysis of a 500 MWe fast breeder reactor building", JI. of Structural Engineering, Vol.19, No.4, pp.183-186, 1993.
20. S.P.T.R.Gowda, V.Paramasivam, H.Achyutha, K.Udayasurian, C.Kadiravan, A.Kakodkar and H.S.Kushwaha, "Experimental and theoretical investigation of stresses and flexibility coefficients at pipe junctions", Intl. Conf. on Structural Mechanics in Reactor Technology, Stuttgart, Vol.F. pp.19-24, 1993.
21. V.Paramasivam, S.P.T.R.Gowda, M.P.Vardhini and K.Radhakrishna, "Reformulation of Reissner-Mindlin plate equations for computational efficiency", Intl. Conf. on Structural Mechanics in Reactor Technology, Stuttgart, Vol.B, pp.147-152, 1993.
22. V.Paramasivam, H.Achyutha, S.Santhakumar, M.P.Varvadhini and K.Radhakrishna, "An experimental facility to investigate missile impact on small scale concrete elements", Intl. Conf. on Structural Mechanics in Reactor Technology, Stuttgart, Vol.JH, pp.300-314, 1993.
23. V. Paramasivam and A.Bagchi, "Stress and buckling analysis of inner vessel of a fast breeder nuclear reactor", Intl. Conf. on Structural Mechanics in Reactor Technology, Stuttgart, Vol.E, pp.251-256, 1993.
24. V.Paramasivam and A.Bagchi, "Prediction of nonlinear collapse load of axi-symmetric thin shells through eigen-value buckling analysis", SEIKEN-IASS Sym. on Nonlinear Analysis and Design for Shell and Spatial Structures, Tokyo, 1993.
25. V.Paramasivam, J.Altes and D.Koschmieder, "Eigenmode Analysis of a Reactor Containment Structures", Sym. on Advances in Structural Dynamics, Madras, 1993.
26. V.Paramasivam, P.C.Koteswara Rao and D.V.S.Raghuram, "Dynamic response of a fast breeder reactor containment building to aircraft impact", Sym. on Advances in Structural Dynamics, Madras, 1993.

27. T.Soundararajan and H.Suresh Rao, "Numerical simulation of pumping and recharge well fluids - A case Study", *Jl. of Irrigation & Power*, Vol.50, No.1, pp.89-102, 1993.
28. Prince Arul Raj and H.Suresh Rao, "Concept of critical pipes in the design of pipe network", *Intl. Conf. on Hydrology and Water Resources*, New Delhi, 1993.
29. K.B.Aji and V.Kalyanaraman, "Machine learning in a blackboard system for steel structures", *Jl. of IABSE Colloquium on Knowledge Based System in Civil Engineering*, China, 1993.
30. K.Satyanarayana, S.Rajeev, Sathya Kalindindi and V.Kalyanaraman, "Resource allocation in construction projects using genetic algorithm", *Proc. of Intl. Conf. on the Applications of AI in Civil and Structural Engineering*, CIVIL- COMP 93, 1993.
31. D.K.Gosh and V.Kalyanaraman, "KBES for design of steel structural elements", *Jl. of Computing in Civil Engineering*, ASCE, Vol.7, No.1, pp.23-35, 1993.
32. V.Baburaj and V.Kalyanaraman, "STIPSY - A programme for stiffened plate synthesis", *Jl. of Computers and Structures*, Vol.46, No.2, pp.347-355, 1993.
33. T.S.Sakthivel and V.Kalyanaraman, "Standards processing in an integrated engineering system", *Intl. Jl. of Computing systems in engineering*, Vol.4, No.2-3, pp.295-305, 1993.
34. T.S.Sakthivel and V.Kalyanaraman, "A KBES for integrated engineering", *Intl. Jl. of Engineering with Computers*, Vol.9, pp.1-16, 1993.
35. H.Achyutha and J.Altes, "Elastic response of a German HTR Modul reactor building to aircraft impact", *Ibid*, Paper No.J06, pp.145-150, 1993.
36. N.R.Krishnaswamy, "Use of geofacrics in the prevention of landslides", *Proc. of Seminar on Landslides in Kerala*, pp.NRK1-7, 1993.
37. N.R.Krishnaswamy and S.P.Parashar, "Uplift behaviour of plate anchor with geosynthetics", *Jl. of Geotextiles and Geomembranes*, Vol.13, pp.67-89, 1993.
38. M.S.Mathews, S.Somayaji and C.Madakannu, "A report on the blast investigation damage to the RSS building, Madras, 1993.
39. T.L.Shaji, M.S.Mathews and S.Somayaji, "Inspection and restoration of timber in historic buildings", Presented at Congress on Traditional Sciences and Technologies of India, IIT, Bombay, 1993.
40. M.S.Mathews and S.Somayaji, "Mud construction in India - Renovation", presented at Congress on Traditional Sciences and Technologies in India, IIT Bombay, 1993.
41. A.Mehar Prasad, S.Somayaji and B.S.Thandaveswara, "Technology development mission on natural hazards mitigation", *Seminar on Cyclone and Drought Hazards Mitigation*, Madras, 1993.
42. Somayaji, A.Mehar Prasad and M.S.Mathews, "Failures of buildings during cyclones: A Survey", presented at Symposium on Advances in structural dynamics, IIT Madras, 1993.
43. R.Pitchai, "Design of a synoptic water quality monitoring system for coastal waters", *Intl. Workshop on Coastal Zone Management as a sustainable process*, IIT Madras, 1993.
44. V.Tamizh Arasan and V.R.Rengaraju, "Intercity travel demand analysis: A case study", *Highway research bulletin No.48*, Indian Road Congress, pp.109-119, 1993.
45. P.Surya Raja, B.Kumar and K.Gopalakrishna, "Algal extraction from stabilization ponds using a low cost natural co- agulant", *Jl. of Indian Water Works Assn.* pp.271-274, 1993.
46. S.B.Pattnaik and M.A.Sridhar, "Accident analysis with an expert system for remedial measures - Madras as Case study", *Jl. of Institution of Engineers (India)*, Vo.:74, pp.122-127, 1993.
47. S.B.Pattnaik, "Private participation in the transportation sector", *Ntl. Seminar on Transportation Scenario in Tamil Nadu*, 1993.
48. S.B.Pattnaik and Y.S.Babu, "Analysis of passenger waiting time for urban bus transit - Madras as Case study", *Ntl. Conf. on Transportation system studies: Analysis and policy*, Visakhapatnam, VI 7-21, 1993.
49. S.B.Pattnaik and K.R.Kumar, "Application of fuzzy logic in transportation systems planning", *Symp. on Mathematical methods and applications*, IIT Madras, 1993.
50. A.Boominathan and Prasad S.Ravishankar, "Laboratory investigation of the effectiveness of lime treatment in polluted soils", *Indian Geotechnical Conference*, Calcutta, pp.497-600, 1993.
51. V.Thamizh Arasan and Chiguluri Srinivas, "Measurement of saturation flow at signalised intersections", *Indian Highways*, Vol.21, No.8, pp.31-37, 1993.

52. V.Thamizh Arasan and Sherly John, "Model Split modelling for a binary choice situation", *Jl. of the Institution of Engineers (India)*, Vol.CV74, pp.118-121, 1993.
53. S.Mohan and G.Saravanakumar, "Interstate multivalley multi-reservoir simulation: A case study", *Intl. Jl. of Water Resources Development*, U.K. Vol.9, No.3, pp.305-317, 1993.
54. S.Mohan, "Forest hydrology with reference to water conservation", *Proc. Ntl. Sem. on Water Harvesting*, Trichy, pp.119-125, 1993.
55. S.Mohan and N.Arumugam, "Performance analysis of system and non-system tanks", *Proc. Ntl. Sem. on Water harvesting*, Trichy, pp.152-160, 1993.
56. K.Srinivasan and S.K.Ramesh, "Stochastic streamflow models for over year droughts studies", *Jl. of Indian Water Resources Society*, Vol.13, No.3 & 4, pp.186-191, 1993.
57. K.Srinivasan and M.C.Philipose, "Stochastic modeling for drought analysis", *Proc. Intl. Symp. on Engineering Hydrology*, San Fransisco, 1993.
58. K.Srinivasan and M.C.Philipose, "Comparitive study of stochastic models for seasonal streamflow generation", *Intl. Conf. on Hydrology and Water Resources*, New Delhi, 1993.
59. K.Srinivasan and M.C.Philipose, "A new procedure for analysis of streamflow droughts with monthly carry-over", *Proc. of the XXV Congress of IAHR*, Tokyo, pp.706-712, 1993.
60. K.Srinivasan, R.Honert and G.Rouve, "Stochastic modelling for drought analysis using Thomas-Flering Lognormal three parameter model", *Proc. Intl. Symp. on Engineering Hydrology*, Sanfransisco, 1993.
61. K.Srinivasan and M.C.Philipose, "Autoregressive model for over year drought studies", *Proc. All India Seminar on Computer application in Civil engineering*, Nagpur, pp.257-264, 1993.
62. K.Srinivasan and M.C.Philipose, "Stochastic streamflow models in water resources planning and design - an overview", *Fifth Ntl. Symp. on Hydrology*, Patna, pp.VII-1 - VII-10, 1993.
63. A.Ramachandraiah and P.Devadoss, "Performance evaluation of enclosures in low frequency region", *Jl. of Acoustical Society of India*, Vol.XXI, 1993.
64. A.Ramachandraiah, N.Ganesan and B.V.A.Rao, "Acoustical radiation characteristics of variable cross sections", *Computers & Structures*, Vol.46, No.4, pp.695-701, 1993.
65. A.Ramachandraiah and P.Devadoss, "Evaluation of noise reduction of enclosure", *Acoustical Symp. Bangalore*, 1993.
66. Badhurst and K.Rajagopal, "Large scale triaxial testing of reinforced granular soils", *ASTM Geotechnical Testing Jl.* Vol.16, No.3, pp.296-303, 1993.
67. R.Ambalavanan and K.Ramamurthy, "Raational design approach to structural masonry", *The Hindu - supplement on Science & Technology*, August, 1993.
68. R.Ambalavanan and K.Ramamurthy, "Energy conservation in materials of construction for human settlement", *Intl. Workshop on Sustainable energy technologies for human settlements*, IIT Madras, 1993.
69. K.N.Satyanarayana, S.Rajeev and N.Uma, "Information system for advanced building materials and technologies", *Proc. All India Seminar on Personal computer applications in civil engineering*, Nagpur, pp.200-207, 1993.
70. K.Ramamurthy and T.P.Ganesan.. "Analysis of hollow block masonry prims under eccentric compression", *Magazine of Concrete Research*, Vo.45, No.163, pp.147-153, 1993.
71. T.P.Ganesan and K.Ramamurthy, "A review of some finite element analysis techniques for load bearing masonry", *Masonry International*, *Jl. of the British Masonry Society*, 1993.
72. Satyanarayana N.Kalidindi and R.Kandaswamy, "ENOVPT - A Programme, for optimization of earthmoving costs", *All India seminar on personal computer applications in civil engineering*, Nagpur, pp.107-114, 1993.
73. K.N.Satyanarayana, "Role of computers in the building industry", *XV All India Builders' Convention*, Coimbatore, pp.D57- D58, 1993.
74. K.Varghese and J.T.O'Corner, "Automated access planning on construction sites An expert GIS approach", *Intl. Symp. on Automation and Robotics in Construction*, pp.325-332,, 1993.

#### 4.5.17 Other Details

1. Dr.C.S.Krishnamoorthy, authored a book on "Finite Element Analysis - Theory and Programming, II Edition, Tata McGraw Hill Publishers, New Delhi, p.710.
2. Dr.V.Kalyanaraman and T.S.Sakthivel, "Reference Manual - Versoion 1.0 on Genesis - A knowledge based system for integrated engineering of steel industrial structures".
3. Dr.V.Kalyanaraman and T.S.Sakthivel, "User's Manual - Versoion 1.0 on IES - Integrated engineering system A knowledge based system development tool".
4. Dr.S.B.Pattnaik, Member, Research Advisory Council, Highway Research Station, Madras

## 4.6 Computer Science and Engineering Department

### 4.6.1. Introduction

Academic programme in Computer Science and Engineering at the Master's and research level started in 1973 with the installation of the IBM system 370. The department of computer science and engineering was formally started in 1983 and the B.Tech program was initiated. The department has well equipped laboratories including a network of SUN workstations. Several sponsored projects have helped to create specialized laboratories in the areas of Expert systems, Speech, CAD for VLSI, Computer networks, Information technology, AI, etc.

#### Areas of Research:

The department is actively engaged in the following areas of research in computer science:

#### Theoretical Computer Science:

Analysis of algorithms, Automata theory and formal languages, Computational geometry, Graph algorithms, Machine learning, Parallel and randomized algorithms.

#### Networks and Distributed Systems:

Computer networks, Distributed systems, Multimedia systems, Performance evaluation, Protocol engineering.

#### Artificial Intelligence:

Expert systems, Knowledge based systems, Natural language processing, Robotics, Distributed artificial intelligence.

#### Computational Intelligence:

Computer vision, Digital signal processing, Neural networks, Pattern recognition, Speech processing, Statistical signal processing.

#### Software Engineering:

CAD/CAM, Database systems, Distributed computing, Fault tolerant computing, Object oriented programming, Operating systems, Parallel processing, Programming languages, Software quality assurance, Text and image systems.

#### Computer Systems and Design:

Analog and digital systems, Computer graphics, Digital system design, Microprocessors, Parallel architectures, VLSI design.



#### 4.6.2. New Courses Introduced

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

S.No.	Course No.	Title	Structure	Faculty
1	CS788	Architectures and applications of artificial neural networks	3-1-0-4	B.Yegnanarayana C.Chandra Sekhar
2	CS794	Computer vision	3-1-0-4	Sukhendu Das Hema A. Murthy B.Yegnanarayana
3	CS786	Natural language processing	3-1-0-4	S.Raman

#### 4.6.3. Details of Faculty

##### Name and Qualification

##### Major area of Specialisation

##### Professors

R. Kalyanakrishnan, Ph.D. (Univ. of Yale, USA)

Computer architecture, Computer graphics, Digital system design, Microprocessors, Statistical signal processing.

Kamala Krithivasan, Ph.D. (Univ. of Madras)[Head]

Analysis of algorithms, Automata theory and formal languages, Computational geometry.

H.N. Mahabala, Ph.D. (Univ. of Saskatchewan, USA)

Artificial intelligence, Expert systems, VLSI design, Software Engineering.

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

Computer architecture, Distributed computing, Software quality assurance, Object oriented programming, Parallel processing, Text and image systems.

R.Nagarajan, Ph.D. (IIT, Madras)

Simulation and modeling, Operations research.

B.Yegnanarayana, Ph.D. (IISc, Bangalore)

Computer vision, Digital signal processing, Neural networks, Speech processing.

##### Associate Professors

T.A. Gonsalves, Ph.D. (Stanford, USA)

Computer networks, Distributed systems, Operating systems, Performance evaluation.

C. Pandu Rangan, Ph.D. (IISc, Bangalore)

Computational geometry, Graph algorithms, Machine learning, Parallel and randomized algorithms.

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

Computer networks, Computer architecture, Distributed systems, Fault tolerant computing, Multimedia systems, Performance evaluation, Protocol engineering, Software engineering.

##### Assistant Professors

Deepak Khemani, Ph.D. (IIT, Bombay)

Artificial intelligence, Knowledge based systems, Natural language processing, Neural networks.

Hema Arunachalam Murthy, Ph.D. (IIT, Madras)

Computer graphics, Digital signal processing, Pattern recognition, Speech processing.

D. Janaki Ram, Ph.D. (IIT, Delhi)

Software engineering, Object oriented programming, Distributed databases, CAD/CAM, Distributed computing

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

Digital system design, Microprocessors, Multimedia systems, Natural language processing.

Ravi Mittal, Ph.D. (IIT, Delhi)

Computer networks, Fault tolerant computing, Parallel architectures, VLSI design.

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

Parallel architectures, Parallel algorithms, Software engineering.

**Name and Qualification**

P. Sreenivasa Kumar, Ph.D.(IISc, Bangalore)  
Sukhendu Das, Ph.D. (IIT, Kharagpur)

**Major area of Specialisation**

Graph Theory and Algorithms, Parallel Computing.  
Analog and digital systems , Computer graphics.  
Computer vision, Neural networks, Robotics.

**Lecturers**

C. Chandrasekhar, M.Tech. (IIT, Madras)

Digital signal processing, Digital system design,  
Neural networks, Speech processing.

G.V. Ramana Rao, M.Tech. (IIT, Madras)

Artificial intelligence, Natural language processing.  
Speech processing.

G. Ravi Prakash, M.Tech. (IIT, Kanpur)

Database systems, Expert systems, Software  
engineering.

R. Sundar, M.Tech. (IIT, Madras)

Analog and digital systems, Microprocessors.  
Parallel processing, Speech processing.

**Senior Scientific Officers Gr.II**

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

Microprocessors, Digital system design. Systems  
programming.

B. Prabhakaran, M.S. (IIT, Madras)

Computer networks, Multimedia systems.

J.T. Sanjeeva Murthy, M.Tech. (IIT, Delhi)

Pattern recognition, Computer vision.

**4.6.4.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.	3	1	4	--	7	--	2	--	9	--	25	1	26
M.S.	8	1	13	1	10	--	2	--	1	--	34	2	36
M.Tech.	41	5	31	5	--	--	--	--	--	--	72	10	82
B.Tech.	26	1	26	1	28	2	27	--	--	--	107	4	111
<b>Total</b>	78	8	74	7	45	2	31	--	10	--	238	17	255

**4.6.5.Number of Scholarship/Fellowship holders**

Programme	Institute Scholarship	Others	Total
Ph.D.	17	8	25
M.S.	20	8	28
M.Tech.	56	21	77
B.Tech.	--	107	107
<b>Total</b>	93	144	237

**4.6.6.Number of Degrees Awarded**

Programme	Number
B.Tech	30
M.Tech	43
M.S.	11
P.h.D.	2
<b>Total</b>	86

#### 4.6.7. Instruments/Equipment Designed and Developed

1. X.500 directory service was added to OSInet
2. OSInet is ported to UNIX platforms also
3. CLAM/DOS - networked library automation package
4. MEIS - mangrove ecosystem information package
5. PC-based remote ethernet bridge

#### 4.6.8. Short-term Courses/Workshops/Seminars/Symposia/Conferences organised

S.No.	Co-ordinator(s)	Title of Course/Workshop Seminar /Symposia/Conference	Period
1.	Kamala Krithivasan	Recent trends in computer science (in honour of Prof.R.Nagarajan)	16-03-1994

#### 4.6.9. Short-term Courses/ Workshops/ Seminars/ Symposia/ Conferences/ Training attended by the Faculty In recognised Academic Insitutions and Public Sectors

Sl.No.	Name of Faculty	Title	Period/Duration
1.	C.Pandu Rangan	ISSAC'93	Hong kong
2.	B.Yegnanarayana	ICAPRDT'93, Calcutta	27-30, Dec. 1993
3.	B.Yegnanarayana	CSI-Akshara, Delhi	25-26, Apr. 1994

#### 4.6.10. Special Lecture(s) Delivered

Sl.No.	Name of Faculty	Topic of Lecture	Delivered at	Date
1.	S.V.Raghavan	Multimedia Systems	STQC, Directorate seminar	June 1993
2.	T.A.Gonsalves	Network protocols	REC, Warangal	May 1993
3.	T.A.Gonsalves	Network design	Pondicherry Univ.	Mar. 1994
4.	S.Raman	Multimedia computer	AIR Madras 'A'	28-3-1994.
5.	Deepak Khemani	AI & computer games,	SURGE-94 Tech. Ses- sion: Electrical Dept. Annamalai University	05-02-1994
6.	C.Pandu Rangan	Computational geometry for terrain analysis	NRSA, Hyderabad	Oct. 1993
7.	C.Pandu Rangan	Path problem on planar graphs	National Univ., Singapore	21- 12-1993
8.	Kamala Krithivasan	Kolam generation through L systems	Seminar on "Kolam and Mathematics"	19-02-1994
9.	Kamala Krithivasan	Computational geometry	Anna University	16 & 18-11-1993
10.	B.Yegnanarayana	Artificial neural netorks	REC, Trichy	10-04-1993
11.	B.Yegnanarayana	Artificial neural networks	CSI, Calcutta	18-11-1993
12.	B.Yegnanarayana	Speech recognition and synthesis	IIT, Kharagpur	23-12-1994
13.	B.Yegnanarayana	Artificial neural networks	PSG college, Coimbatore	06-01-1994
14.	B.Yegnanarayana	Speech processing	SAMEER, Madras	12-01- 1994

## 4.11. Visits Abroad

Sl.No.	Name of Faculty	Country visited	Date	Purpose of visit
1.	S.V.Raghavan	Vienna	May-June,1993	Lectures on Distributed systems and networks
2.	S.V.Raghavan	USA	Aug-Jan.1994	Research in Multimedia systems
3.	C.Pandu Rangan	Germany	Jun-Sep. 1993	Indo-German Project
4.	C.Pandu Rangan	Hong Kong	10-20-Dec.1993	Paper presentation in an international conference
5.	C.Pandu Rangan	Singapore	21-23-Dec.1993	Invited talk in a national level workshop

## 4.6.12.Distinguished Visitors to the Department (Important dignotories above the level of Professors)

Sl.No.	Name of the Visitor and Occupation	Date of visit	Purpose of visit (Lecture/Discussion)
1.	Prof. Popovic, Director, Institute for Automation Technology Univ. of Bremen, Germany	18-03-1994	Lecture and discussion

## 4.6.13.Sponsored Projects

Title	Period	Funding Agency	Amount (in Lakhs)	Co-ordinator(s)
FDDI Software and study	1994-96	DoE	27.2	T.A.Gonsalves, A.Jhunjunwala,(EE), B.Ramamurthy (EE)
Mangorve Information System	1993-94	M.S.Swaminathan Foundation	1.5	T.A.Gonsalves, A.Jhunjunwala,(EE), B.Ramamurthy (EE)
ERNET	1989-97	DoE UNDP	225	S.V.Raghavan
Voice Conversion	1992-95	DST	8	B.Yegnanarayana, Hema A.Murthy, C.Chandra Sekhar, R.Sundar
Development of neural network models for classification of sonar targets	1991-95	DoE	19.63	B.Yegnanarayana, C.Chandra Sekhar
Development of a multimedia video subsystem	1993-94	IRDF	---	S.Raman, S.Srinivasan (EE)
Studies in parallel and distributed AI search algorithms	1991-94	DAE	6	C.Pandu Rangan

Title	Period	Funding Agency	Amount (in Lakhs)	Co-ordinator(s)
Studies in computational Geometry and applications	1993-95	Indo-German Project MHRD & BMFT	---	Kamala Krithivasan, C.Pandu Rangan
Algorithms for robot motion planning	1989-93	DAE	1.6	Kamala Krithivasan
Task allocation in parallel computers	3 years	INSA	0.6	Siva Ram Murthy
On allocation problems in parallel and distributed computing systems	2 years	DST	2	Siva Ram Murthy
Application of artificial neural networks for remote sensing	1991-93	ISRO	5	B.Yegnanarayana, R.Sundar, C.Chandra Sekhar
Studies in Man-Machine interface	1993-96	Indo-German Project MHRD & BMFT	---	B.Yegnanarayana, N.Alwar, R.Sundar, C.Chandra Sekhar, W.Anheier.

#### 4.6.14. Books/Monographs Published

Sl.No.	Name of Faculty	Title	Publisher
1.	S.V.Raghavan along with G.V.Prochmann and G.Pujolle	IFIP Transactions C-13 Computer networks, architectures and applications	Elsevier, North-Holland

#### 4.6.15. Research Publications

- H.N.Mahabala, A.T.Arunkumar, R.R.Kurup, G.Raviprakash,, "Fault diagnosis of machines", Sadhana, Journal of Indian Academy of Sciences, March 1994.
- Deepak Khemani, "Planning in bridge with thematic action", Sadhana, March 1994.
- Deepak Khemani, and Kiran K. Kedleja, "Design of a semantic lexicon", International Workshop on AI, March 4-5, IIM, Calcutta, 1994.
- Ashish K.Pani and G.Ravi Prakash, "Plan generation using allen's algebra: implementation issues", Proc. of ICC'93, Hyderabad, December 1993.
- Ashish K.Pani, G.Ravi Prakash and K.Induprakash, "Temporal multiagent planning", Proc. of ICC-93, Hyderabad, December 1993.
- B.Yegnanarayana and P.Sathyanarayana Murthy, "On windowing speech data for analysis", Proc. of the Thirid International Conference on Advances in Pattern Recognition and Digital Techniques", ISI, Calcutta, pp.334-345, Dec. 1993.
- B.Yegnanarayana and R.Ramaseshan, "An artificial neural network model for image reconstruction from multiple frame of noising sparse data", INDO-US Workshop on Parallel and Distributed Signal and Image Integration, Dec. 1993.
- N.Sudha, H.M.Chouhan and B.Yegnanarayana, "Sonar target recognition: A neural network approach", Symposium on Ocean Electronics, Cochin University, Dec. 1993.
- K.Krishna, K.Ganesan and D.J.Ram, "Distributed simulated annealing algorithms for JSS", International Conference on CAD/CAM/Robotics, New Delhi, Dec. 1993.
- T.Ramaswamy, P.David and D.J.Ram, "Importance of facilities layout in intelligent manufacturing systems", International Conference on CAD/CAM/Robotics, New Delhi, Dec. 1993.

11. M.Thomas, A. Jhunjunwala, B.Ramamurthi and T.A.Gonsalves, "Design and performance evaluation of a low bit-rate packet radio network", *Journal of IETE*, Vol.39, pp.281- 290, Sep-Oct. 1993.
12. B.Prabhakaran and S.V.Raghavan,, "Synchronization models for multimedia presentation with user participation", *Proceedings of First ACM Conference on Multimedia Systems-MM'93*, Anaheim, California,, USA,, August 1993.
13. K.Krithivasan and M.Mahajan, "Nondeterministic, probabilistic and alternating computation in cellular array models", *Proc. of Development of Language Theory, Turkn, Finland*, pp.36-38,, July 1993.
14. N.V.Vinod Chandran, K.Krithivasan and M.Mahajan, "On the structure within mod classes", *Proc. of National Seminar on Theoretical Computer Science, Kharagpur*, pp.152-161, June 1993.
15. D.Velmurugan and K.Krithivasan, "Optimal path across a rotating convex polygon", *Proc. of National seminar on Theoretical computer science, Kharagpur*, pp.267-276, June 1993.
16. T.A.Gonsalves, "High-speed transport protocols: Design and implementation issues", *Journal of IETE*, Vol.39, No.2, pp.99-109, May-June 1993.
17. B.S.Bapat and S.V.Raghavan, "Design of high performance network interface units", *Journal of IETE*, Vol.39, no.3, pp. 165-178,, May-June 1993.
18. K.Vijayananda and S.V.Raghavan, "DOFSON - A distributed fault management system for open system networks", *Journal of IETE*, Vol.39, no.3, pp.157-164, May-June 1993.
19. Ajit S.Bapat and S.V.Raghavan, "Analysis of protocol layer residency in the Host-NIU system of a network node", *Journal of IETE*, Vol.9, No.3, pp.165-178, May-June 1993.
20. Jaidev, G.Ravi Prakash and N.Prameswaran, "Implementing backtrack in production systems: A TMS-based approach", *Defence Science Journal*, pp.151-158, Vol.43, no.2, April 1993.
21. C.S.R.Krishnan and C.Siva Ram Murthy, "A faster algorithm for sorting on mesh-connected computers with multiple broadcasting using fewer processors", *International Journal of Computer Mathematics*, Vol.48, pp.15-20, 1993.
22. C.Siva Ram Murthy, K.N.Balasubramanya Murthy, and A.Sreenivas, "Scheduling of precedence-constrained parallel program tasks on multiprocessors", *Microprocessing and Microprogramming, the Euromicro Journal*, Vol.36, No.2, pp.93-104, 1993.
23. S.Selvakumar and C.Siva Ram Murthy,, "An efficient heuristic algorithm for mapping parallel programs onto multicomputers",, *Microprocessing and Microprogramming,, the Euromicro Journal,, Vol.36,, No.2,, pp.83-92,, 1993.*
24. S.Selvakumar and C.Siva Ram Murthy, "A list scheduling anomaly", *Microprocessors and Microsystems Journal*, Vol.17, No.8. pp.471- 474, 1993.
25. M.Mahajan and K.Krithivasan, "Language classes defined by time- bounded relativised cellular automata", *RAIRO Theoretical Informatics and Applications*, Vol.27, pp.403-432, 1993.
26. G.Raviprakash and H.N.Mahabala, "SVEPOA: A tool to aid verification and validation of OPSs-based AI applications", *Special issue on Verification and Validation, International Journal of Expert Systems: Research and Applications*, pp.193- 236, Vol.6, No.2, 1993.
27. A.S.Madhukumar, S.Rajendran and B.Yegnanarayana, "Intonation component of text-to-speech system for Hindi", *Computer Speech and Language, Academic Press Ltd*, No.7, pp.283-301, 1993.
28. R.Ramaseshan and B.Yegnanarayana, "Image reconstruction from multiple frames of sparse data", *Multidimensional Systems and Signal Processing* Vol.4, no.2, pp.167-179, 1993.
29. A.Jhunjunwala, M.Archana Rao, B.Murugesh, T.A.Gonsalves and B.Ramamurthy,, "A reliable fibre-optic ring network for process control", *International Journal of optoelectronics*, Vol.8, No.4, pp.477-491, 1993.
30. P.B.Ramprasad, C.Pandu Rangan, "Linear algorithms for all bidirectional edges of a planner graphs", *Algorithmica*, Vol.9, pp.199-216, 1993.
31. R.Srikant, Ravi Sundaram, Karan Sher Singh, C.Pandu Rangan, "Optimal path cover problem on block graphs and bd bipartite permutation graphs", *Theoretical Computer Science*, Vol.115, pp.351-357, 1993.
32. K.S.Eswarakumar, C.Pandu Rangan, "An algorithms for MIS of an 1- CUB", *CSI JI on Computers and Informatics*, Vol.23, pp.27-35, 1993.
33. V.Kamakoti and C.Pandu Rangan,, "Efficient transitive reduction of permutation graphs and its applications", *CSI Journal on Computers and Informatics*, Vol.23, No.3, pp. 52-60, 1993.

34. K.Srinivas and C.R. Muthukrishnan, 'Concurrent Computing on a Hypercube Simulated Over Network of Workstations' - Computer Science and Informatics Journal Computer Society of India - Vol.20.No.1 July 1990, pp:10-20.
35. R.Satyanarayanan and C.R. Muthukrishnan, 'Static allocation of communicating process for distributed computing systems with resources heterogeneity' - J Indian Inst. Sci., July-Aug. 1990, 70, 305-315.
36. C.R.Muthukrishnan, 'A Diffusive Decentralized Method for Dynamic Load Balancing in Distributed Computing Systems' - Proceedings of the ISMM International Conference, Parallel and Distributed Computing and Systems, New York, October 10-12, 1990, pp:344-348.
37. S. Jayaprakash and C.R. Muthukrishnan, 'Fault tolerance in Maekawa's distributed mutual exclusion algorithm', ICCS'90, Singapore, Nov.1990.
38. T.V.Gopal, C.R.Muthukrishnan and R.K. Subramanian, 'Data Abstraction and Concurrency in Ada' Journal of Information Science and Technology, Vol.1, No.2, Jan 92.
39. S. Jayaprakash and C.R. Muthukrishnan, 'An improved Reliable Distributed Mutual Exclusion Algorithm', Singapore ICCS/ ISITA '92, pp 209-213.
40. R.Satyanarayanan and C.R.Muthukrishnan, 'A note on Raymond's tree based algorithm for distributed mutual exclusion - Information Processing Letters, 43(1992)249- 255, North- Holland, 5th October 1992.
41. R.Satyanarayanan and C.R.Muthukrishnan, 'Message-efficient distributed mutual exclusion incorporating the 'least recently used' fairness criterion - IEE Proceedings-E, Vol.139, No.6, November 1992.
42. T.V.Gopal and C.R. Muthukrishnan, Concurrent Programming in Encyclopedia of Computer Science and Technology, Vol. 26, Supplement 11, Allen Kent and James G Williams, Marcel Dekker Inc. 1992.
43. Afsal C. Majeed and C.R. Muthukrishnan, 'Usage analysis: a compile-time analysis to improve reference counting', Journal of Programming Languages 1 (1993)93-102.
44. S.Radha and C.R. Muthukrishnan, 'A Portable Implementation of Unity on Von Neumann Machines' - Computer Lang. Vol.18,No.1, pp.17-90, 1993.
45. R.Satyanarayanan and C.R. Muthukrishnan, 'A Dynamic-tree Based Distributed Mutual Exclusion Algorithm Incorporating the 'Least Recently Used' Fairness Criterion' - Sixth International Conference on Parallel and Distributed Computing and Systems (PDCS-93), October 14 - 16, 1993 Sponsored by The International Society for Computers and Their Applications - ISCA in co-operation with the IEEE Computer Society.

#### 4.6.16.Any Other Matter:

- 1) Dr.S.Raman, Assistant Professor, Interacting as IIT Faculty Associate with Dr.R.K.Jayaraman, Officer-in- charge of CIEFL, Shillong as UGC visiting associate.

## 4.7 Electrical Engineering Department

### 4.7.1. Introduction

The Department of Electrical Engineering is an integral one encompassing both the areas of Electrical and Electronics Engineering and also the Centre for Systems and Devices. At present the Department comprises the following laboratories.

- Communication Systems Laboratory/DSP Laboratory
- Electronic Circuits/Microelectronics Laboratory
- Amorphous Semiconductor Laboratory
- Aeronomy and Laser Communications Laboratory
- Microwave Laboratory, Antenna Laboratory
- Television Engineering Laboratory
- Control Engineering including Robotics Laboratory
- Electrical Machines and Drives Laboratory
- Measurements and Instrumentation Laboratory
- Power Systems Laboratory
- High Voltage Engineering Laboratory
- PC Laboratory
- Microprocessor and Digital Systems Laboratory
- Optical Communication Laboratory
- Photonics Laboratory

### B. Tech Degree Courses are offered in the following two Streams:

1. Electrical and Electronics Engineering with emphasis on power systems, Electrical machines, control engineering and related subjects.
2. Electronics and Communication Engineering with emphasis on electronics circuits and devices, control engineering, communication systems and related subjects.

The Curriculum Development Cell in the Department of Electrical Engineering has been working on evolving an integrated undergraduate curriculum which will combine into a single curriculum what are now taught separately under the above two separate programmes. This has been implemented in IIT Madras with effect from July 1993.

### M. Tech Degree in Electrical Engineering

The following 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 Compatibility, Antennas, Optical Communication, Image and Digital Signal Processing, Laser Communication, Microwave Engineering, Television Engineering, Semiconductor Devices, Amorphous Semiconductor Devices, Control Engineering, Electrical Machines and Drives, Guidance Systems, High Voltage Engineering, Measurements and Instrumentation, Networks and Systems, Simulation of Power Electronic Systems, Power Systems, Photonics, Telematics and Robotics.

### 4.7.2. New Courses Introduced

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

Sl.No.	Course No.	Title	Structure	Faculty
1	EE 620	Amorphous and Poly-crystalline Silicon Mat. & Devices	Elective	Enakshi Bhattacharyya
2	EE 626	MOS & MIS Devices: Theory & Characterization	Elective	Nandita Dasgupta
3	EE 629	High Speed Integrated Circuits	Elective	Amitava Dasgupta
4	EE 630	Semiconductor Epitaxial Technology & Application	Elective	P.R.Vaya
5	EE 653	Computer Aided Analysis of Electrical Networks	Elective	K. Sankara Rao
6	EE 674	Neural Network & Applications	Elective	C.Eswaran/ M.V.C. Rao
7	EE 712	Selected Topics in Communication	Elective	R. Aravind

### 4.7.3.Details of Faculty

Name and Qualification	Major area of Specialisation
<b>Professors</b>	
Ashok Jhunjhunwala, Ph.D.(Maine)	Communication Networks, Fibre Optics, Surface Acoustic Wave Devices
M.V.Chalapathi Rao, Ph.D.(IIT Madras)	Control Theory
C.Eswaran, Ph.D.(IIT Madras)	Networks, Digital 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
M.S.Narasimhan, Ph.D.(IIT Bombay)	Antenna Engineering, Applied Electromagnetics
K.Narayana Bhat, Ph.D. (IIT Madras)	Semiconductor 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 Systems
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

<b>Name and Qualification</b>	<b>Major area of Specialisation</b>
G. Sridhara Rao, Ph.D.(IIT Madras)	Machines, Power Electronics, Simulation
S. Srinivasan, Ph.D.(IIT Madras)	Microprocessors, Microcomputers
Vedam Subrahmanyam, Ph.D.(IIT Madras)	Power Electronics
V. Venkata Rao, Ph.D. (Iowa)	Digital Signal Processing, Communications
C. Venkateshaiah, Ph.D.(IIT Madras)	High Voltage, Power Systems
S.S.Yegnanarayanan, Ph.D.(IIT Madras)	Electrical Machines, Simulation
<b>Associate Professors</b>	
Bhaskar Ramamurthi, Ph.D.(California)	Digital Communications & Communication Networks, Signal Processing
C. Dattatreyan, Ph.D. (Sheffield)	Microwaves
K.M.M. Prabhu, Ph.D.(IIT Madras)	Digital Signal Processing
<b>Assistant Professors</b>	
Amitava Dasgupta, Ph.D. (IIT Kharagpur)	Si and GaAs Devices, Technology and Simulation
M. Antony Reddy, Ph.D.(IIT Madras)	Electronic Circuits
Enakshi Bhattacharya, Ph.D. (TIFR Bombay)	Solid State Devices
V. Jagadeesh Kumar, Ph.D.(IIT Madras)	Measurements, Instrumentation
S. Karmalkar, Ph.D.(IIT Madras)	VLSI, Semiconductor Devices
M. Krishnamurthi, M.Tech.(IIT Madras)	Power Systems
P.C.Majhee, M.Tech. (IIT Madras)	Measurements, Instrumentation
G.T. Manohar, M.Tech.(IIT Madras)	Microprocessors, Computers, Control Systems
Nandita Dasgputa, Ph.D.(IIT Madras)	Si and III-V Semiconductor Devices, Technology & Simulation
P. Sasidhara Rao, Ph.D.(IIT Madras)	Electrical Machines
Varadarajan Subrahmanyam, M.E.(IISc.)	Microwaves
T.J.Vitto, Ph.D. (IIT Madras)	Semiconductors
<b>Lecturers</b>	
C. Mathiazhagan, Ph.D.(Univ. of California)	Telematics, RF Communication, Analog Circuits
Vinita Vasudevan, Ph.D.(IIT Bombay)	Devices, CAD for VLSI
<b>Principal Scientific Officer</b>	
P.R. Vaya, Ph.D.(IIT Madras)	Semiconductors and Optoelectronic Device Technology
<b>Senior Scientific Officers Grade II</b>	
T.V. Gopal, M.S. (IIT Madras)	Measurements and Instrumentation, Computer System Management, Graphics
M. Kumaravel, M.E.(Anna Univ)	Instrumentation, Digital Systems, Microprocessors
K. Ponnuraju, Ph.D. (IIT Madras)	Solid State Electronic Devices, Semiconductor Technology
H. Renganathan, M.S.(IIT Madras)	DSP, Microprocessor Systems
<b>Senior Design Engineers</b>	
P. Ramaseshagiri Rao, M.S.(IIT Madras)	Semiconductor Fabrication
Ranjana Shukla, M.S.(IIT Madras)	Microprocessors and Computers
V.N. Shukla, M.S.(IIT Madras)	Microprocessors and Computers

#### 4.7.4 Students on Roll

Programme	I Year		II Year		III Year		IV Year		V Year and above		Total		Total
	M	W	M	W	M	W	M	W	M	W	M	W	
Ph.D.	9	-	8	1	8	-	6	-	11	1	42	2	44
M.S.	9	-	8	-	13	4	5	-	5	-	40	4	44
M.Tech.	35	6	37	4	-	-	-	-	-	-	72	10	82
B.Tech.	68	4	71	5	73	5	72	1	-	-	284	15	299
<b>Total</b>	<b>121</b>	<b>10</b>	<b>124</b>	<b>10</b>	<b>94</b>	<b>9</b>	<b>83</b>	<b>1</b>	<b>16</b>	<b>1</b>	<b>438</b>	<b>31</b>	<b>469</b>

#### 4.7.5. Number of Scholarship/Fellowship holders

Programme	Institute	Others	Total
Ph.D	11	6 (QIP)	17
M.S.	20	1 (CSIR)	21
M.Tech	45	8 (QIP)	53
<b>Total</b>	<b>76</b>	<b>15</b>	<b>91</b>

#### 4.7.6. Number of Degrees Awarded

Ph.D.	4
M.S.	11
M.Tech.	43
B.Tech.	62
<b>Total</b>	<b>120</b>

#### 4.7.7. Instruments/Equipment Designed and Developed

1. Omni Directional Mobile Robot constructed
2. High pressure oxidation system for oxidation of Silicon at pressures upto 10 atmospheres and temperature upto 1000°C
3. A/D and D/A converter experimental kit
4.  $\theta - \cos \theta$  converter
5. Low cost temperature controller
6. Wireless local loop
7. Digital telephone answering machine
8. DSP based products
9. Bed-side ECG monitor
10. PECVD system for the growth of amorphous films and diamond- like carbon films

#### 4.7.8. New Facilities added and Major Equipment procured

1. Robotics Laboratory being extended
2. INTEL-386 based Personal Computer procured from RBIC Project
3. DEC Alpha 3000/300 Workstation
4. Tektronix Digital Transient Recorder

5. System 520 from Intel installed on VAX-11 and used for real-time applications
6. A local area network with novel netware installed in PC Laboratory,
7. A SUN-SPARC workstation with digital VLSI design software installed,
8. Philips digital storage oscilloscope with Asystant GPIB and OSP Software with accessories procured
9. Benchmark DSP sub-system board with software based on Texas TMS 320C50 Signal Processor procured
10. A 486 PC-AT system for characterization and simulation of semiconductor devices have been ordered under Young Faculty from IRD funds
11. CAD for PCB Design
12. MB-71 Diffusion Furnace Systems
13. Setting up laboratory facilities for RF Electronics.
14. 2.2 GHz Spectrum Analyzer (Anritsu) - procured
15. 2GHz Synthesized signal source (Anritsu) - procured

#### 4.7.9. Short-term Courses/ Workshops/ Seminars/ Symposia/ Conferences conducted

S.No.	Co-ordinator(s)	Title of Course/Workshop/Seminar/ Symposia/ Conference	Period
1.	P.R. Vaya	Workshop on Emerging Technology for the Characterization of Semiconductor Materials	Jan. 11-22 1993
2.	P. Sankaran	National Symposium on Systems	Oct. 03 1993
3.	K.N. Bhat	Technology Absorption & Adaption in Semiconductor Device Technology & Microelectronics	Nov. 5 1993
4.	C. Dattatreyan P.R. Vaya	Microwave Solid State Optoelectronic Devices - QIP STC	Dec. 13-24 1993

#### 4.7.10. Special Lecture(s) Delivered

Sl.No.	Name of Faculty	Topic of Lecture	Delivered at	Date
1.	K.N. Bhat	Recent Advances in Semiconductor Device Fabrication and Future Trends	Annamalai University	Jan. 28 '94
2.	K. Ramar	Pole Assignment Techniques	Thiagarajar College of Engineering, Madurai	Mar. 18 '94
3.	K. Ramar	Multi variable Systems	PSG College of Technology, Coimbatore	Jan. 28-29 '94
4.	Amitava Dasgputa	Heterojunction Bipolar Transistors - An overview	Materials Research Centre, I.I.Sc., Bangalore	Nov. 22 '93
5.	V. Jagadeesh Kumar	Data Acquisition Systems	FCRI, Palakkadu	May '93.
6.	P. Sankaran	Recent Research in Instrumentation	VRCE, Nagpur	Feb. '94
7.	P.R. Vaya	Bandgap Engineering and Related Technology	University of Berhampur, Orissa	Mar. 21-24 '94
8.	P.R. Vaya	Quantum well Engineering	Institute of Physics, Bhubaneswar, Orissa	Mar. 25 '94
9.	V.V. Sastry	Simulation of Power electronics circuits & Systems	National Univesity of Singapore, Singapore	May 25 '93.
10.	V.V. Sastry	Simulation of Power electronics circuits & Systems	Generator-motor R&D, Narren, Michigan, USA	Apr. 26 '93.
11.	V.V. Sastry	Simulation of Power electronics circuits & Systems	University of Minnesota, Minneapolis, USA	April 28, 1993.

#### 4.7.11 Visits Abroad

Sl.No.	Name of Faculty	Country visited	Date	Purpose of visit
1.	V.V. Sastry	FR Germany	May-Nov. '92	-
2.	V.V. Sastry	USA	Dec.'92-May '93	-
3.	P.R. Vaya	Australia, University of New Castle	Aug. 16- Sept.10, '93	-

#### 4.7.13. Distinguished Visitors to the Department (Important dignitaries above the level of Professors)

Sl.No.	Name of the Visitor and Occupation	Date of visit	Purpose of visit (Lecture/Discussion)
1.	Dr.S.B.Upadhyay Post Doctoral Fellow UK	14.05.1993	Special Lecture : Impurities and defects in compound semiconductors
2.	Prof. Neelakantasami Univ of Florida Atlanta, USA	26.07.1993	Special Lecture : Stochastic analysis and application of neural networks
3.	Dr. Shekhar Siliconix Incorporated, USA	13.08.1993	Special Lecture : Emitter switched thyristor
4.	Dr. Ramu Ramanathan ESCA Corporation Seattle, USA	17.08.1993	Special Lecture : Hierarchical control of electric energy management systems
5.	Prof. Rao V. Mulpuri Dept of Electrical & Computer Engineering George Mason Univ Fairfax, Virginia, USA	28.08.1993	Special Lecture : High (MEV) energy ion implantation and its device applications in GaAs and INP
6.	Prof. Devendra Jalihal Dept of Electrical Engineering Duke Univ, USA	02.09.1993	Special Lecture : Detection theory approach to the problem of target detection
7.	Prof.S.Umesh Dept of Electrical Engineering Univ of Rhode Island Kingston, USA	14.10.1993	Special Lecture : Fast maximum likelihood estimation of parameters in crowded signal environments
8.	Dr. Poorvi L Vohra North Carolina State Univ USA	29.10.1993	Special Lecture : Numerical analysis of optimization criteria in the design of colour scanning filters
9.	Prof.S.Ashok Dept of Engineering Sciences The Pennsylvania State Univ, University Park, USA	24.12.1993	Special Lecture : Ion Beam and Hydrogen effects in GaAs
10.	Dr.Srinivasan Tridandapani Dept of Electrical Engineering Univ of Washington Seattle, USA	28.12.1993	Special Lecture : Low overhead multiprocessor allocation strategies for fault detection and location
11.	Dr.Manfred Zobel Manager, System Planning Hessen Electricity & Utility Undertaking Germany	10.01.1994	Special Lecture : Modern methods of planning distribution networks and current areas of work
12.	Dr. Manfred Zobel Manager, System Planning Hessen Electricity & Utility Undertaking Germany	11.01.1994	Special Lecture : Knowledge based planning of distribution systems
13.	Dr. Manfred Zobel Manager, System Planning Hessen Electricity & Utility Undertaking Germany	13.01.1994	Industry Lecture : Automation of Distribution Systems
14.	Dr. Kunio Tada, Professor, Dept of Electronic Engg., Univ. of Tokyo, Japan	21.01.1994	Special Lecture : Latest trends in opto-electronics devices/technology

Sl.No.	Name of the Visitor and Occupation	Date of visit	Purpose of visit (Lecture/Discussion)
15.	T.R.H. Nayar Chief Manager S&S Power Switchgear Ltd., Madras	10.02.1994	Industry Lecture : Application of HV switchgear
16.	J. Gopal Dy. General Manager (Computers) Madras Telephones, Madras	17.02.1994	Industry Lecture : Indian Telecommunication Networks
17.	N. Subramanian Managing Director Tesla Magnetics (P) Ltd., Madras	24.02.1994	Industry Lecture : Applications of Transducers in power control
18.	K.S. Madhavan Executive Director S&S Power Switchgear Ltd., Madras	25.02.1994	Industry Lecture : Emerging needs and challenges faced by the industry with special reference to technology design and R&D

#### 4.7.14. Sponsored Projects

Title	Period	Funding Agency	Amount (in Lakhs)	Co-ordinator(s)
Development of optical + power cable	one year, in progress since Apr '93	ADRDE, Agra	2.0	J.P. Raina and Y. Narayana Rao
Development of optical ground wire of EHT transmission lines	-	Under discussion with CEA	-	J.P. Raina and Y. Narayana Rao
Fuzzy logic based soft-start for Induction motor drives	Dec '93- Nov '94	IRDF Project	-	V.V. Sastry and M. Chidambaram
Development of a multi media video system	one year	IRDF	-	S. Raman,, CSE and S. Srinivasan
Development and extension of ROBOTICS Laboratory	one and a half years	MHRD	10.0	P.A. Janakiraman
Development of Bipolar and MOS device simulator	4 years	DOE	21.25	K.N. Bhat, G.Sridhara Rao, K.N. Seetharamu, S. Karmalkar, and P.R.S. Rao
Some preliminary investigations on Adaptive Moving Target Detector	Jan-Aug '93	IRDF	-	K.M.M. Prabhu and C. Sivaram Murthy
Telematics	1986-94	MHRD	75.00	Ashok Jhunjunwala
Foundation of Mathematics in Indian Tradition	1991-94	DST	5.34	Ashok Jhunjunwala
Fibre Optics Railway Signaling and Communication System	1993-94	DOE	17.00	Ashok Jhunjunwala and Bhaskar Ramamurthi
Mangrove Ecosystem Information Services	1993-94	M.S. Swaminathan Research Foundation, Madras	1.50	Ashok Jhunjunwala and Bhaskar Ramamurthi
FDDI Station Management Protocols & Ethernet Bridge	1993-94	DOE	27.00	Ashok Jhunjunwala and Bhaskar Ramamurthi

#### 4.7.15 Major Consultancy Assignments

S.No.	Title	Organisation	Amount (Rupees in lakhs)
1.	Feasibility studies on the application of Blue/Green lasers for underwater weapon	NSTL, Vizag	5.0
2.	OH monitoring in optical fibre using special purpose laser diodes	Swiss Development Corporation	12000 Swiss Franks
3.	LPCVD polysilicon on large area single/poly crystalline silicon solar cells	BHEL, Corporate R&D, Hyderabad	0.60
4.	Thermal Equilibrium studies in doped and undoped amorphous silicon	DST	1.65
5.	Development of Electronic Thermostat for waterheater	Standard Electric Appliances, Madras	0.10
6.	Development of cos converter	Krishna Electronics, Madras	0.10
7.	Graphite beneficiation plant consultancy (for Instrumentation)	TAMIN India Ltd.	6% of 18 lakhs (Project cost)
8.	Wireless local loop	Analog Devices	126.00 + Royalty
9.	Design & Development of New DSP-based products	Analog Devices	7.875
10.	Digital telephone answering machine	BPL/Analog Systems	Royalty
11.	Design of Bedside ECG Monitor	Siemens	6.0
12.	Development of a Neuron based distributed control SCADA system	Alacrity Electronics, Madras	15.00
13.	6 Channel ADPCM Mux with D&I for Railways and 60 channel ADPCM transcoder	W.S. Telesystems, Bangalore	7.5 + Royalty
14.	Ethernet Twisted Pair Remote Bridge	Citi Bank, Madras	2.5
15.	Networked Library Information systems	International Ocean Institute, Malta	1.5

#### 4.7.16. Honours and Awards

S.No.	Name of Faculty	Honours/Awards
1.	V.V. Sastry	Bimal Bose Award by IETE

#### 4.7.17. Books/Monographs Published

Sl. No.	Name of Faculty	Title	Publisher
1.	Ashok Jhunjunwala	Indian Mathematics - An Introduction	Wiley Eastern, New Delhi

#### 4.7.18. Research Publications

1. P.Agarwal, S.C.Agarwal, E.Battacharya, S.Kumar and A.Kumar, "Search for thermal equilibrium in cheleogenide glasses", Ind. Journal of Pure & Appld.Physics, 31 pp.367-370, 1993.

2. A.K.Sinha, M.Malhotra, S.Kumar, E.Battacharya and S.C.Agarwal "Subband gap Absorption in Amorphous silicon using constant photocurrent method", *Ind. Journal of Pure & Appd. Physics*, 31, pp.548 -551, 1993 .
3. N.Dasgupta, R.Reimenshneider and H.L.Hartnager, "Electrochemical Capacitance-Voltage Profiling: A new technique to study Plasma damage during a Plasma-enhanced chemical vapor deposition", *Journal of Electrochem. Soc.*, vol.140, pp 2038-2041, 1993.
4. V.G.K.Murti, Design note "Phase measurement using an Oscilloscope" *Meas.Science & Technology*, 4, IOP Pub. Ltd. UK, PP191-192, 1993.
5. K.M.M. Prabhu and A. Nagesh, "New Radix-3 and 6 decimation in frequency fast Hartley transform algorithms", *Can. J. of Electron. & Comp. Engg.* vol. 18, pp.65-69, 1993.de192, 1993.
6. V.S.Subramanian and K.M.M.Prabhu, "Performance of a Compensating phase meter with a switched capacitor allpass network, *Meas.Science & Tech.*, UK, vol.4, pp 170 -177, 1993.
7. K.M.M.Prabhu and V.Lakshmi, "A set of windows for high resolution spectral analysis", *Int.Journal of Electronics*, vol.75, pp 425 -431, 1993.
8. H.A.Tafti, K.K.Kamath, G.Abraham, F.N.Farokhrooz and P.R.Vaya, "Circuit modelling of multimode semiconductor lasers and study of Pulse Broadening Effects", *Electronics Letters*, vol.29 No.16, 1443-45, 1993.
9. A. Dasgupta and N. Dasgupta, "An analytical expression for short carrier concentration versus gate voltage for HEMT modelling *Solid state electron*, Vol.36, No.2, pp.201-203, 1993.
10. N. Rajkumar, V.Jagadeesh Kumar, and P. Sankaran, "Fiber Sensor for the simultaneous measurement of current and voltage in a high-voltage system", *Applied Optics*, vol.32, No.7, pp.1225- 1228, March, 1993.
11. Aradhana Mehta and Ashok Jhunjunwala, "ISDN in Indian context", *Journal of IETE*, Vol.39, no.2, pp 69-75, Mar-Apr 1993.
12. P.P. Kumar, R. Parimelagan and B. Ramaswami, "A Microprocesor based DC drive control scheme using predictive synchronization", *IEEE Trans. on Industrial Electronics*, Vol.40, No.4, PP 445-452, Aug. 1993.
13. Ashok Jhunjunwala, Ranjani Parthasarathy and Jegannathan, "Computer implementation of the straight division algorithm", *Journal of IETE*, Vol.39, No. 5, pp 281-290, Sept-Oct 1993.
14. Sanjay Gupta and Ashok Jhunjunwala, "Fibre optic local loop", *Journal of Optics*, Vol. 22, no.2, pp. 43-50, 1993.
15. Mathew Thomas, Bhaskar Ramamurthi and Ashok Jhunjunwala, "Design and performance evaluation of a low bit-rate packet radio networks", *Journal of IETE*, Vol.39, no.5, pp. 281-290, Sept- Oct 1993.
16. Ranjani Parthasarathy and Ashok Jhunjunwala, "Implementation considerations of symbolic substitution in digital optical computing", *Journal of CSIR, Special issue on Photonics*, accepted for publication.
17. M. Archana Rao, B. Murugesh, Timothy A. Gonsalves, Bhaskar Ramamurthi and Ashok Jhunjunwala, "A reliable fibre- optic ring network for process control", *International journal of Optoelectronics*, vol.8, no.4, pp. 477-491, 1993.
18. S. Kaliyugavaradan, P. Sankaran, and V.G.K. Murti, "A New Compensation Scheme for Thermistors and Its Implementation for Response Linearization Over a wide Temperature Range", *IEEE Trans. Instrumentation and Measurements*, Vol.42, pp 952-956, Oct. 1993.
19. Dr. P.A. Janakiraman and K.V. Ranga Rao, "A New Algorithm for frequency Estimation in the presence of Phase Noise", *Digital Signal Processing*, Oct.1993.
20. K. Vijayan Asari and C. Eswaran, "Optimization technique for the design of multiple valued PLA'S, *IEEE Transactions on Computers*, Vol.42, No.10 Oct. 1993.
21. V. Vasudevan and J. Vasi, "A two dimensional numerical simulation of Oxide charge build up due to radiation in MOS transistors", *IEEE Trans. on Electron Devices*, March 1994.
22. V. Jayan, S. Srikanth, and P.R. Vaya, "Studies on S- Passivated GaAs-SiN interfaces", *Applied Surface Science*. 74, No.2, pp. 197- 200, 1994.



23. Bhaskar Ramamurthi, Atul B. Mahamuni, Timothy A. Gonsalves, "Efficient Load Information Management for Load Sharing in Distributed Systems", Computer Networks, Architecture and applications (C-13), 1993.

**(b) Papers presented In Conferences/Symposia:**

1. P.R. Vaya, "Lattice Mismatched Epitaxy", The fifth National Seminar on Crystal Growth, Anna University Madras, 1993.
2. K. Vijayan Asari, C. Eswaran, "Self Organising Neural Network for M.V. Patterns, Int. Conf. on Computing, New Delhi.
3. V. Prahlad and M.V.C. Rao, "Fuzzy Logic Controllers - A case study with variable plant parameters", 17th National Systems Conference, IIT Madras, pp.248-252, Feb.1993
4. M. Mukunda Rao, M.M. Danaei Ahmadi and V.C. Ravichandran, "Signal to Noise degradation in free space optical data links due to background radiation", Int. Conf. on Electrical Engineering, ICEE 93, Tehran, Iran, pp 18-28, May 1993.
5. G. Abraham, K. Kishore, H.A. Tafti and P.R. Vaya, "Circuit Modelling of a Fibre Optical Link", The 1993 Iranian Conf. on Elec. Engg. Tehran, Iran, May 1993.
6. K. Vijayan Asari and C. Eswaran, "A supervised learning neural networks for the prediction of m.v. patterns", Int. Conf. on Signals, Moscow, June 1993.
7. K. Vijayan Asari and C. Eswaran, "Back Propagation learning Algorithm for m.v. neural network, II Int. Conf. of Modelling and Simulation, Melbourne, July 1993.
8. V.V. Sastry, D. Metzker and D. Schroder, "An Integrated approach to Simulation of Power Electronics Circuits & Systems", Int. Conference on Mathematics & Computers in Simulations IMAS, Montreal, pp 663-667, July 1993.
9. M.V.C. Rao, A.V.A. Ravikiran and M.R.K. Murthy, "A new recursive Formulation for Generalized Predictive Control", 2nd International Conference on Modelling and Simulation, Melbourne, Australia, pp 649-657, July 1993.
10. M.V.C. Rao, A.V.A. Ravikiran and M.R.K. Murthy, "A new and simplified Approach to the Formulation for Generalized Predictive Control", 2nd International Conference on Modelling and Simulation, Melbourne, Australia, Vol.2 pp 659-667, July 1993.
11. H.A. Tafti, F.F. Papa and P.R. Vaya, "Effect of Gain Compression, Spontaneous Emission Coupling Coefficient and Driver parasitics on the response of the single-mode semiconductor laser", 2nd Int. Mat. Conf. on Lasers and their Applications, Tehran, Iran, Aug. 1993.
12. K. Srinivasan and K.M.M. Prabhu, "Application of FHT to Transmultiplexing", Proc. of the Intl. Conf. on ICSPAT-93, Santa Clara, Calif, U.S.A., pp. 213-219, Sept. 1993.
13. V.P. Haneefa, A. Saimanohara and K.M.M. Prabhu, "Some results on AMTD Based on AR Map Method", Proc. of the ICSPAT- '93, Santa Clara, Calif. U.S.A., pp. 1212-1216, Sept.1993.
14. P. Sivakumar and K.M.M. Prabhu, "A set of new fast algorithms for DCTs and DSTs", Proc. of the 27th Asilomar Conf. on Signals, Systems and Computers, Calif., U.S.A., Nov. 1993.
15. B. Surendra Kumar, S. Raghu Ramakrishna and K.M.M. Prabhu, "Implementation of FHT on DSP Chips", Proc. of the ICSPAT-93, Santa Clara, U.S.A., pp. 478-483, Sept. 1993.
16. K. Ramar and M.S. Raviprakash, "Reactive power management in log a.c. transmission lines for maximum power transfer limited by voltage stability", Proc. of CAPACIT-93, the 3rd Int. Seminar on Capacitors, Bombay, Sept. 1993.
17. K. Ramar and M.S. Raviprakash, "Design of series and shunt compensation schemes for long a.c.transmission lines for maximum power transfer limited by voltage stability", Proceedings of CIGRE Regional Meeting on "Meeting the Power requirements of a developing country", New Delhi, Sept. 1993 .
18. V.G.K. Murti, "Circuit Theory: A perspective", National Conf. on Systems, IIT Madras, Oct. 1993.
19. E. Prakash and K. Radhakrishna Rao, "Design of a programmable VLSI analog filter", National Symposium on Systems, IIT Madras, Oct.1993.
20. M.R. Karthikeyan and K. Radhakrishna Rao, "A Software tool for analog filter design", National Symposium on Systems, IIT Madras, Oct. 1993.

21. S. Srinivasan, Elwin Chandra Monie, G. Vijaya Krishna Prasad, "Design of a real-time image compression system using multiple DSP 56000/96000 processors", 27th Annual Asilomar conference on signals systems and computers, California, USA, Nov. 1993.
22. Ranjani Parthasarathy and Ashok Jhunjunwala, "Recent Research in Indian Integral Algorithms", Congress on Traditional Sciences and Technologies of India, IIT Bombay, Nov-Dec. 1993.
23. Ashok Jhunjunwala, "An introductory tutorial on Indian mathematics", Congress on Traditional Sciences and Technologies of India, IIT Bombay, Nov-Dec. 1993.
24. H.A. Tafti, F.F. Papa, K.K. Kamath and P.R.Vaya, "Circuit modelling of laser frequency; chirp and pulse broadening"
25. H.A. Tafti, F.F. Papa, K.K. Kamath and P.R. Vaya, "A New Approach to modelling of laser frequency chirp", Seventh National Systems conference NSC-93, 1993.
26. K.N.Bhat and P. Venugopal, "Studies on the conductivity of heavily doped LPCVD polysilicon films", proceedings of the VII International Workshop on Physics of Semiconductor Devices, New Delhi, pp 271-278, Dec. 1993.
27. V.K. Bhasin, K. Remashan, P.R.S. Rao and K.N.Bhat, "Methods to restore the surface properties of silicon subjected to RVE" proc. of VII International Workshop on Physics of Semiconductor Devices, New Delhi, pp 312-314, Dec. 1993.
28. A.V.N. Tilak and K.N. Bhat, "Phosphorus dopant profiles and diffusion coefficients in Silicon when diffused through LPCVD polysilicon layer", Proc. of VII International Workshop on Physics of Semiconductor Devices, New Delhi, pp 369-371, Dec. 1993.
29. K. Ponnuraju, "MBE growth of  $\text{In}_x\text{Ga}_{1-x}\text{As}$  multi quantum well (MQW) structures", 7th Int. Workshop on Physics of Semiconductor Devices, New Delhi, Dec. 1993.
30. K. Ponnuraju and A. Kaliswamy, "Hall effect study on n-Si and n- GaAs samples", 5th National Seminar on Crystal Growth, Anna Univaersity, Madras, Nov.1993.
31. V. Seshadri and P. Odiayappan, "High Reliability target identification strategies based on Fourier Descriptor studies on peculiar polygonal patterns", VII National Systems Conference, IIT Kanpur, Dec.1993.
32. V. Seshadri and G. Parthasarathy, "Design for variable structure Model following system using observer approach", VII National Conf. IIT Kanpur, Dec.1993.
33. M. Mukunda Rao, M.M. Danaei Ahmadi, S.P.V. Kumar, "Propagation characteristic for satellite optical communication links", ECSC-3, III European Conference on Satellite Communication, IEE Proceedings, Manchester, U.K. pp 309-314 Nov.1993.
34. S. Yogesh, S. Radhakrishnan and K. Radhakrishna Rao, "Microcontroller based communication kit for Spastic children", proceedings of the International Conference on Recent Advances in Biomedical Engineering, Hyderabad, Jan. 1994.
35. H.C. Nagraj, S. Radhakrishnan and S.Srinivasan, "Acquisition and analysis of brainstem auditory evoked responses", Proceedings of the International Conference in Recent Advances in Biomedical Engineering, Osmania University, Hyderabad, Jan. 1994.
36. S.K. Lahiri, M.K. Das, A. Dasgupta and I. Mauna, "3-D effects in VLSI/VLSI MOSFAETS: A novel analytical approach to model threshold voltage", Proc. 7th International Conference on VLSI Design, Calcutta, pp 328-332, Jan 1994.

## 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 :

- \* Undergraduate courses in Humanities and Social Sciences.
- \* M.Tech. courses in Industrial Management
- \* 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, Theoretical Linguistics, Teaching of English as a Second Language (T.E.S.L), Sociolinguistics, Generative Phonology, English for Specific Purpose (ESP) and Psycholinguistics.

### 4.8.2 Details of Faculty

Name & Qualification	Major area of Specialisation
<b>Professors</b>	
S.Ambirajan,, Ph.D.(Andhra) Ph.D.(Manchester)	Economics, Economic History, Development Economics
Dipak Chaudhuri,, Ph.D.(IIT Kharagpur)	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)[Head]	Science and Technology, Production Management, Group Technology Policy, German
L.V.L.N.Sarma,, Ph.D.(IISc)	Financial Management, Business Policy & Corporate Strategies
<b>Associate Professors</b>	
T.T. Narendran,, Ph.D.(IIT Madras)	Operations Management, Decision Support Systems, Group Technology
C. Ramachandran,, Ph.D.(IIT Madras)	Modern Indian History, Labour History
R.N.Anantharaman,, Ph.D.(Bangalore)	Organisation and Consumer Behaviour, Social Psychology, Psycholinguistics
S.C. Chaudhary,, Ph.D.(CIEFL Hyderabad)	Theoretical Linguistics, ELT & Need Based Courses in English
L.S. Ganesh,, Ph.D.(IIT Madras)	Technology Forecasting, Multicriteria Decisions, Project Management and Applied Systems Analysis
<b>Assistant Professors</b>	
(Mrs)Elizabeth Nainan Kurian,, Ph.D.(IIT, Madras)	American Fiction
(Ms)Evangeline Manickam,, Ph.D.(Madras)	English, French

**Name & Qualification**

T.J. Kamalanabhan,,Ph.D.(Madras)

V.S. Kumar,,M.A.(Andhra)

(Mrs) Malathy Duraisamy,,Ph.D.(Madras)

V.R. Muraleedharan,,Ph.D.(IIT Madras)

C. Rajendran,,Ph.D.(IIT Madras)

B. Subramanian,,Ph.D.(Karnatak)

D.Veeraraghavan,,Ph.D.(IIT Madras)

M. Durgaprasada Rao,,M.B.A(Andhra)

S. Mohan,,M.A.(Madras)

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

G. Srinivasan,,Ph.D.(IIT Madras)

**Major area of Specialisation**

Industrial Psychology, Organisational Behaviour

English, Technical Communication

Applied Economics/ Econometrics, Labour Economics, Economics of Science and Technology

Health Economics, Public Policy, History of Healthcare in South India

Production Management, Scheduling, Computer Simulation

German and Philosophy

Social and Economic History, Labour Movements.

Management Accounts, General Management

English, Science Fiction

Marketing Management

Group Technology, Production Management, Operations Research.

**Visiting Faculty**

(Mrs) Zoya Abraham

German Language Teaching

**4.8.3 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	2	6	1	2	2	5	2	1	2	16	9	25
M.S.	4	-	2	2	-	1	-	-	-	-	6	3	9
M.Tech.	22	1	-	-	-	-	-	-	-	-	22	1	23
<b>Total</b>	<b>28</b>	<b>3</b>	<b>8</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>5</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>44</b>	<b>13</b>	<b>57</b>

**4.8.4 Number of Scholarships/Fellowships holders**

Programme	Institute	CSIR	Others	Total
Ph.D	15	1	3(QIP)	19
M.S.	7	-	-	7
M.Tech.	20	-	1(QIP)	21
<b>Total</b>	<b>42</b>	<b>1</b>	<b>4</b>	<b>47</b>

**4.8.5 Number of Degrees Awarded**

Programme	Number
Ph.D	4
M.S.	3
M.Tech.	20
<b>Total</b>	<b>27</b>

**4.8.6 New Facilities added and Major Equipment procured**

A Xerox machine

**4.8.7 Short-term Courses/Workshops/Seminars/Symposia/Conference organised**

Sl.No.	Co-ordinator(s)	Title of Course/Workshop/ Seminar/ Symposia/ Conf.	Period
1.	Dr S.C. Chaudhary Shri S Mohan	Short Course in Professional Communication	July 1993
2.	Dr T T Narendran	Cellular Manufacturing - the Competitive edged to batch production	1 day

**4.8.8 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 Elizabeth N. Kurian	Female Consciousness in Edith Wharton's 'House of Mirth' IAAS Conference, Goa	1993
2.	Dr D Malathy	Workshop on Access to and Financing of Education	-
3.	Dr B Subramaniam	'Cultural Key-Concepts and the Problem of their Translatability' Symposium at JNU, Delhi	29-31.12.93
4.	Dr R N Anantharaman	International Training Programme on Social Gerontology at Malta	14-26.2.94

**4.8.9 Invited Lectures Deltivered by the Faculty in Academic Institutions / Public Bodies**

Sl.No.	Name of the Faculty	Topic of the Lecture	Delivered at	Date
1.	Dr S.C. Chaudhary	Poetry in the Age of Electronics	Loyola College, Madras	04.8.93
2.	- do -	Sound and Sense Teaching Poetry	Bharathidasan University, Trichy	11.2.94
3.	Dr Elizabeth N.Kurian	Talk on Pragmatics of Spoken & Written English, (Course in Professional Communication)	IIT Madras	Sept.'93
4.	Dr D Malathy	Women's Education & Economic Development	Meenakshi College for Women, Madras	July'93
5.	Dr B. Subramaniam	"Tropicity Procedures Centre for German in Translating Cultural Studies Concepts"	JNU, New Delhi	29.12.93
6.	Dr RN Anantharaman	Psychological Aspects of Accidents	Regional Labour Institute, Madras	10.10.93
7.	Dr RN Anantharaman	Stress and its Management	Regional Labour Institute, Madras	14.02.93
8.	Dr RN Anantharaman	Motivating Subordinates	Indian Airlines, Madras	15.12.93
9.	Dr RN Anantharaman	Participative Safety Forum	Regional Labour Institute, Madras	09.02.94
10.	Dr RN Anantharaman	Quality Circles in Education	NKT College of Education, Madras	20.12.93
11.	Dr RN Anantharaman	Significance of Family in Mental Health	Loyola College, Madras	5.02.94

Sl.No.	Name of the Faculty	Topic of the Lecture	Delivered at	Date
12.	Dr RN Anantharaman	Industrial Relations	Anna University	18.03.94
13.	Dr S Ambirajan	Meet the Economist Programme	Ethiraj College, Madras	13.12.93
14.	Dr S Ambirajan	Environment and the Village Economy	Institute for Social Education and Development,, Madras	22.02.94
15.	Dr S Ambirajan	Reforming Industrial Policy: The Indian Experience	Ethiraj College, Madras	04.03.94
16.	Dr S Ambirajan	The Union Budget	The Exnora Symposium, Madras	6-03-94
17.	Dr S Ambirajan	Some Thoughts on the present Economic Situation	Standard Chartered Bank	17.03.94

#### 4.8.10 Sponsored Projects

S.No.	Title	Period	Funding Agency	Amount (Rs. in Lakhs)	Co-ordinator(s)
1.	Business of Better Writing	1993-94	ISTE Resources Development	0.15	Prof A V Krishna Rao Dr S C Chaudhary
2.	Female Labour Supply and Allocation of Time: Causes and Consequences	-	ICSR New Delhi	0.75	Dr.D.Malathy
3.	Development of a Decision Writing	-	MHRD	6.00	Dr G Srinivasan Dr R Rajagopalan Dr T T Narendran

#### 4.8.11 Major Consultancy Assignments

S.No.	Title	Organisation	Amount	Co-ordinator(s)
1.	Development of a Decision Support System for Production	M/S Bharat Dynamics Ltd. Hyderabad	2.00 lakhs	Prof R Rajagopalan Dr T T Narendran Dr G Srinivasan

#### 4.8.12 Honours and Awards

Name of Faculty	Honours/Awards
Dr D Malathy	Rockfeller Foundation Fellowship Summer May-June 1993 Yale University, U.S.A

#### 4.8.13 Books

Name	Title	Publisher
Dr Shreesh Chaudhary	A Course in Better Spoken English	Sterling Publishers Pvt Ltd, New Delhi

#### 4.8.14 Research Publications

1. Dr S Ambirajan, 'Relevance and Professionalism', Economics and Social Sciences Review, January 1993, Vol.1, No.3.
2. Dr S Ambirajan, 'Nobel Prize for the Economic Imperialist' Philosophy and Social Action, Vol.19, No.3, July-September 1993
3. Dr S Ambirajan, 'The Content of Technical Education in South India'to appear in Roy McLeod & Deepak Kumar (Eds) Science and Empire (Sage Publications, New Delhi 194
4. Dr S Ambirajan, 'The Origins of Econometrics' in Ingrid Rima (Ed) An Epistemology of Measurement and Quantification in the Development of Economic Analysis (Routledge London 1994) forthcoming.
5. Dr S Jayachandran and Dr R N Anantharaman (1993) "Conflict Resolution Styles in the Purchasing Decision-making Process", Journal of Psychological Researches, 37, 2, Pp.95-103.
6. Dr K. Rangaswami and Dr R N Anantharaman (1993) "Development of a Scale to Measure Quality of Life of People with Epilepsy", Journal of Psychological Researches 37, 3, Pp.140-146.
7. Dr S.C. Chaudhary "Those Who Make it to the IIT..."Newstime, Vol. 27th May, 1993
8. Dr S.C. Chaudhary "Teaching Drama, Focus on English", Vol. 8:3, June 1993, 8-15.
9. Dr S.C. Chaudhary "A Top Up Model: A Course in English Pronunciation for the Linguistic Diversity of India", Speakout, Vol no.12 August, 1993, .28-31.
10. Dr S.C. Chaudhary "A case for Teaching Spoken English", English Association Journal, Vol. VII, Summer 1993, Pp.162-80.
11. Dr S.C. Chaudhary "Forum" IATEFL News Letter, Vol.121 Nov, 1993, P.15
12. Dr S.C. Chaudhary "Relationship between Language Learning Strategies, Good Language Learner & Learner Training, Journal of English Language Teaching, Vol. 27:6, Nov-Dec, 1993, Pp.156-71.
13. Dr S C Chaudhary, Higher Education at the Crossroads, University News, 20 Dec, 1993, Pp.5-11
14. Dr S C Chaudhary, "Issues on Indian English Phonology", World Englishes, Vol. 12(3), Nov 1993, Pp.375-84.
15. Venugopal, V. and Narendran, T.T. 1993 "Design of Cellular Manufacturing Systems based on asymptotic forms of a Boolean matrix", European Journal of Operational Research, Vol. 67, No. 405-417.
16. Mahadevan, B. and Narendran, T.T. 1993, "Buffer levels and choice of Material Handling Device on Flexible Manufacturing Systems", European Journal of Operational Research, Vol.69, Pp.166-176.
17. Kochikar, V.P. and Narendran, T.T. 1993, "A State-space approach for qualitative analysis of flexible manufacturing systems", Computer-Integrated Manufacturing Systems Vol.6, No.1, Pp.9-18.
18. Mahadevan B, and Narendran, T.T.1993, "Estimation of number of Automated Guided Vehicles for a Flexible Manufacturing System", International Journal of Production Research, Vol.31, No.7, 1655-1679..
19. Sudipta Lahiri, Rajendran C and Narendran T.T., 1993. "Evaluation of heuristics for scheduling in flowshop - A case study", Production and Planning Control, Vol.4, No. 2, 153-158.
20. Venugopal V. and Narendran, T.T.,1993, "A genetic algorithm approach to the machine-component grouping problem with multiple objectives", Computers and Industrial Engineering, Vol22, No.469-480.
21. Venugopal, V. and Narendran, T.T. 1993 "Design Retrieval in group technology using Hopfield neural networks" Modelling, Measurement and Control, D. Vol.6, No.2, 1-15, 1993.
22. Bhaskar Ghanta and Narendran, T.T. 1993. "Group Technology in the automatic assembly of PVCBGs - A Graph Theoretic Approach" Proceedings of th Eighth ISME Conference on Mechanical Engineering, March 5-6, 1993, New Delhi, Pp.593-598.
23. Thangamani, G, Narendran, T.T. and Subramanian, R. "Estimation of system unavailability for a fluid catalytic unit through simulation" Proceedings of the Eighth ISME approach for designing cellular manufacturing systems". Advances in Modelling & Analysis, C, 32, No.2, 13 - 26.

#### 4.8.15 Any Other Relevant Details

1. Dr S C Chaudhary      (a) External Faculty Member, CIEFL, Hyderabad  
                                  (b) Member  
                                  (c) M.Phil and Ph.D, Thesis Examiner, University of Madras  
                                  (d) Reviewer. Journal of Modern English Teacher



## 4.9 Mathematics Department

### 4.9.1 Introduction

Department of Mathematics was established in 1959. Now Ph.D. and M.Sc. Programmes in Mathematics are offered. In addition, the Department teaches courses in Mathematics to B.Tech., M.Tech. and Ph.D. students of this institute. The major areas of teaching and research of the department are:

- |  |                            |
|--|----------------------------|
| 1. Continuum Mechanics                         | 5. Operations Research     |
| 2. Stochastic processes and their applications | 6. Functional Analysis     |
| 3. Graph Theory                                | 7. Mathematical Modelling  |
| 4. Cosmology                                   | 8. Approximation theory    |
|  | 9. Application of Algebras |

### 4.9.2 Details of Faculty

#### Name and Qualification

#### Professors,

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)[Head]

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

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

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

U.N.Srivastava, Ph.D.(IIT Madras)

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

R.Subramanian, Ph.D.(IIT Madras)

#### Major area of Specialisation

Fluid Mechanics, Suspension Rheology Polar Fluids, Low Reynold's number, flows

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.

Applied Probability and Stochastic Processes, Operations Research

Fluid Mechanics, Bio-fluid mechanics, Mathematics Modelling

Applied probability and Stochastic models, Mathematical ecology, Operations research, Statistical inference

Graph theory, Net-work

Electricity, Piezoelectricity, Wave propagation, Bio-medical, Engineering

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

Numerical Analysis, Approximation theory, Computational fluid dynamics

Applied Probability, Stochastic Processes, Operations Research, Queues, Inventory and Reliability

**Name and Qualification****Major area of Specialisation****Associate Professors**

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

Hydrodynamic stability and wave, propagation problems, Magnatohydrodynamics, Dust gas, dynamics

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

Fluid Mechanics, Variational Methods, Dual variation principles, Approximation methods

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

Functional analysis and Numerical analysis

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

Fluid mechanics, Numerical methods in fluid mechanics

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

Fixed point theory and applications, Fuzzy Sets

**Assistant Professors**

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

Theoretical Physics, Elementary Particle Physics

Y.Nagendra, Ph.D.(IIT Kharagpur)

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).

A.Rangan, Ph.D.(IIT Madras)

Probability theory, Stochastic Processes, Operations research, Application to Biological Sciences, Neural models, Inventory controls, Ecology, Reliability

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

Group Theory, Ring rings, theory, Group Lattice theory, Semi groups, coding theory, Application of Algebra

P.Veeramani, Ph.D.(IIT Madras)

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

R.Usha, Ph.D. (IIT Madras)

Fluid Mechanics

S.A.Choudum, Ph.D.(IIT Madras)

Graph Theory, Combinatorics.

**4.9.3 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.	1	2	2	-	6	2	7	2	5	2	21	8	29
M.Sc.	16	12	15	13	-	-	-	-	-	-	31	25	56
<b>Total</b>	<b>17</b>	<b>14</b>	<b>17</b>	<b>13</b>	<b>6</b>	<b>2</b>	<b>7</b>	<b>2</b>	<b>5</b>	<b>2</b>	<b>52</b>	<b>33</b>	<b>85</b>

**4.9.4 Number of Scholarship/Fellowship holders**

Programme	Institute Scholarship	Others	Total
Ph.D.	20	12 (7 CSIR + 1 QIP)	32

**4.9.5 Degrees Awarded**

Programme	No. Awarded
Ph.D	29
M.Sc.	56
<b>Total</b>	<b>85</b>

#### 4.9.6 Short term courses/Workshops/ Seminars/ Conferences organised

S.No.	Title	Date	Co-ordinator
1.	A One day symposium on Mathematical methods and Applications	22-12-1993	Dr.S.N.Majhi
2.	Forays-94 Inter collegiate Mathematics Meet	28-29-01-1994	Dr.S.H.Kulkarni

#### 4.9.7 Lectures delivered

S.No.	Faculty	Title	Venue	Date
1.	Prof.V.B.Johri	Invited Talk at IMS Conference	BHU Varanasi	23-25-03-93
2.	Prof.V.B.Johri	Invited Talk at William Fair Bank Conference		
3.	Prof.K.R.Parthasarathy	Two problems in Graph Theory	IIT Madras	22-12-93
		Algebraic Graph Theory	MIT Manipal	04-10-04-94
		Analytical and Numerical solution of the transient behaviour of multiserver Poisson Queue with balking, Paper presentation in Int.national Conference on Stochastic Modelling	New Delhi	10-14-01-94
		Compartmental model with Prendville grown mechanics	(Paper presented in National Conference on Stochastic Processes, Ramanujan Inst. Madras	
		Six lectures on Stochastic Processes in a refresher course for college teachers of statistics	Cochin University, Cochin	Dec. 93
		Six lectures on Stochastic Population Models in a refresher course for college teachers of Mathematics	Bharathidasan Univ. Trichy	Mar. 93
3.	Prof.S.N.Majhi	Mathematical Modelling	Ann. Univ.Madras	Mar. 93
		Lectures on 'Queues' in a Summer School for College Teachers	IIT Kharagpur	
		Presented 3 papers on Fluid Mechanics and Pade approximation One-day Symposium (OSMMA)	IIT, Madras	22-12-93
		Presented one paper on Fluid Mechanics 2nd Annual Conference of ISIAM	Anna. Univ. Madras	24-2-93
4.	Prof. Sankara Narayanan	Three Endowment Lectures	Annamalai Univ.	17-18-03-93
5.	Prof.V Subrahmanyam	Presented two papers on Fuzzy Sets In the Symposium conducted by Dept.of Mathematics	Madras	22-12-93
6.	Dr.S.A.Choudam	Factors in Graphs with edge capacities	Dept. of Mathematics, Annamalai Univ.	5-7-1-93

S.No.	Faculty	Title	Venue	Date
7.	Dr.R.Usha	Lecture delivered on Dynamics of Particles	Academic Staff College, Bharathidasan Univ. Trichy	28-12-93
		Lecture delivered on 'Dynamics of rigid body motion' at UGC refresher course for college teachers	UGC	01-04-93
8.	Dr.W.B. Vasantha	Presented 4 papers at the Two-day National seminar on Algebra and its Applications	Bharathidasan Univ. Trichy	17-18-4-93
		1. Orthogonal ideals in Lattices and its application to codes.		
		2. A new definition for lattices		
		3. 'Orthogonal ideals in the loop ring $Z_2 L$ and its application to codes'		
		4. 'On some linear codes using semi group rings'		
		Presented four papers at the One-day Symposium on Mathematical methods and applications	IIT Madras	22-12-93
		1. 'Semi idempotents in loop algebras'		
		2. 'On inner commutative groups		
		3. 'On the Two sided ideals of the group ring $Z_2 S_3$		
		4. 'On Rank Distance codes and their covering radius'		

#### 4.9.9. Books and Monographs

Sl.No.	Name of Faculty	Title	Publisher
1.	S.N.Majhi P.Achuthan	Monographs on Mathematical Modelling in Sciences and Technology	
2.	K.R.Parthasarathy	Basic Graph Theory	Tata-McGraw-Hill New Delhi
3.	P.V.Subrahmanyam	A course on analytical	IGNOU Delhi
4.	T.VS.Jagannathan	Izhar	Hussain and Parveen Sinclair
5.	R.Subramanian	Guest Editor for Nos. 5x6 of vol.25. Oct. Dec.1991 issue Released in Nov.93	Jl of Mathematical and Physical Sci.

#### 4.9.8 Research Publications

1. A. Avudainayagam and J. Geetha, Oscillatory Singularities of Stokes', flows, Int. J. of Engineering Science vol.31, 1993, 1295-99.
2. R.Sudarshan and V.B.Johri, Cosmological Models with particle creation, and Bulk Viscosity, GRG Journal.
3. V.B.Johri, Cosmological Models with constant g in Nordtredt's Theory, Pramana.

4. S.Kalpakam and K.P. Sapna, A control policy of an Inventory System with compound Poission Demand, Stochastic Analysis and Applications, 11 (4), 1993, 459-482.
5. S.Kalpakam and G.Arivarignan, A co-ordinated Multi-commodity (r,s) Inventory System, Math. Comp. Modelling, 18 (11), 69-73 (1993).
6. S.Kalpakam and K.P. Sapna, A Modified (r,s) Inventory System with, Lost Sales and Emergency Orders, Opsearch 30(4), 321-335 (1993).
7. S.Kalpakam, On the quasi-stationary distribution of 'the Residual, life time; IEEE Trans Rel. 43 (1993).
8. P.R.Parthasarathy and V.Vijayalakshi, Transient solution of state, dependent queues - a continued fraction approach. Neural, Parallel and Scientific Computations 1(1993), 97-107.
9. P.R.Parthasarathy and M.Sharafali, An Intermittently used two unit system with semi Markov need process, Math and Comp Mod., 17 (1993), 83-90.
10. P.R. Parthasarathy and B.Krishnakumar, On the total sojourn time of particle in semi-Markov compartmental system with branching particles, Comm. in Stat. Theory and Methods, 22 (1993), 1207- 1220.
11. P.R.Parthasarathy and B. Krishna Kumar, Density-dependent birth and death processes with controlled immigration. Stoch Anal. Applications, 11 (1993), 181-196.
12. P.R.Parthasarathy and B Krishnakumar, Density - dependent birth and death processes with immigration, International Journal, Math. Edu., Sci. and Tech. 24 ( 1993 ), 55-62.
13. P.R.Parthasarathy and B.Krishnakumar, Transient solution of an M/M/1 queue with balking, Queueing systems theory and Applications., 13 (1993), 441-448.
14. P.R.Parthasarathy and B.Krishnakumar, Semi Markov compartmental systems with branching particles Int. J. Edu. Sci. Tech. 24, (1993), 875-882.
15. G.Thangamani, T.T. Narendran and R.Subramanian., Estimation of system availability for fluid catalytic cracking unit through Simulation, Emerging Trends in Mechanical Engg., Proceedings of the Eighth ISME Conference on Mechanical Engg., 1993 New Delhi, (Eds) R S AGARWAL, DR. P.AGARWAL, S.G.DESHMUKH 626-631.
16. R.Subramanian and N.Ravichandran, Generl Analysis of a two unit warm stand by redundant repairable system with preventive maintenance, Jour. Math. Phy. Sci. Vol.25 No.5-6 1991 (529-550).
17. S.H.Kulkarani and S.Arundhathi, A note on the metric topology on, Gleason parts of a real function algebra. Bulletin of Calcutta, Math Soci. 85 (1993) 413-418.
18. S.G.Kamath, The Conformal Anomaly for the non-relativistic problem, J. Phys. A. Math. Gen. 126 15167-72 (1993).
19. S.A.Choudum, Edge-chromatic critical graphs and the existence of factors. Journal of Graph Theory Vol.17 (1993), 23-29.
20. R.Usha and S.Vasudevan, A similar flow between two rotating disks in the presence of a magnetic field, Trans. of the ASME - Journal, of Applied Mechanics, Vol.60, 1993, 707-714.
21. R.Usha and Rukmani Sridharan, On the motion of a liquid film on, an unsteady stretching surface. Proc. of the ASME Fluids Eng. Conf. vol.180, 43-48, 1993.
22. R. Usha and S.D. Nigam, Flow in a spherical cavity due to a Stokeslet, Fluid Dynamics Research, Vol. 11, 1993, 75-78.
23. R.Usha and K. Hemalatha, A note on plane stokes' flow past a shear free impermeable cylinder, ZAMP, Vol.44, 73-84, 1993.
24. (Mrs.) W.B.Vasantha, Zero divisors in Group semi near ring, Riaz J. Kar. Math. Soc. (1992) Vol. 25-28.
25. (Mrs) W.B.Vasantha, Zero square group semi rings, Bule Inst. Bucures Tomul 42 No.3-4 (1990) 7-9 (Romania).
26. (Mrs) W.B.Vasantha, A note on Group near rings which are p-near rings. Acta (in Indica vol XVIII (1992) 175-176 (India).
27. (Mrs) W.B. Vasantha, Semi vector spaces over semifield, NR 118 Matematiya Fisyka, Vol(118), (1993) 43-51. Poland.

28. (Mrs) W.B.Vasantha, On loop Semirings, Fuusiko Mxthematica, T.P.E.A. Sci. Vol.42 (1993) 347-349 (Russia).
29. (Mrs) W.B.Vasantha, Modularity and Supermodularity of subsemigroups in Finite semi-groups Proc. Pakistan Acad. Sci.Vol. 30 (1993) (45-47 (Pakistan).
30. (Mrs) W.B.Vasantha, Units in loop Rings, Ult. S.P.S. Vol.5, (1993) (86-88) (India).
31. (Mrs) W.B.Vasantha, Strong Right S-Rings. J.of Fuzhou Univ. Vol.21 (1993) (6-8), China.
32. (Mrs.)W.B.Vasanha, Semi rings in rings. J. of Inst. Math. and Comp. Sci. Vol.5 (1992) (379-380), India.
33. (Mrs) W.B. Vasantha, On near loop rings which are marot near loop rings Vol.119 (1993) ata,atyka (55-58) Poland.
34. (Mrs) W.B.Vasantha, n-ideal ring. Journal of South east Univ. (1992) Vol. 8 (109-111), China.
35. (Mrs) W.B.Vasantha, On quasi-super modular lattices, Ult J.S.P.S. Vol.5 (1993) (218-219) India.
36. (Mrs) W.B.Vasantha, On generalized semi ideals of a group ring. J. of Qufu Normal Univ. Vol.18 (1992) (25-27), China.
37. (Mrs) W.B.Vasantha, Integral loop seminear rings, Mathematyka, Vol. (119) 19-23 (1993) Poland.
38. (Mrs.) W.B.Vasantha, Semigroup rings which are chinese ring. J. of Math. Research Exposition Vol. 13 (1993), China (375-376).

## 4.10 Mechanical Engineering Department

### 4.10.1. Introduction

The Department of Mechanical Engineering was established in 1959. The 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

Internal Combustion Engines

Machine Elements

Manufacturing Engineering Section

Mechanical Handling

Precision Engineering and Instrumentation

Refrigeration and Air Conditioning

Thermal Turbo Machines

Thermodynamics and Combustion

### 4.10.2. New courses Introduced

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

Sl.No.	Course No.	Title	Faculty
1.	ME 780	Design of Cryogenic Equipment	Dr.G.Venkatarathnam
2.	ME 781	Combustion Theory & Application	Dr.R.Natarajan Dr.K.Ramamoorthy(VSSC)

### 4.10.3. Details of Faculty

#### Name and Qualification

#### Major area of Specialisation

#### Professors

Ajit Kumar Kolar, Ph.D.

Fluidized Bed, Combustion and Heat Transfer

Bhaskaran K.A Ph.D.

Combustion and Propulsion

Ganesan V, Ph.D.

I.C.Engines

Gopalakrishnan, K.V, Ph.D.

Alternative Fuels for I.C.Engines

Gopinath K, Ph.D.

Machine Design

Krishnaiah Chetty O.V, Ph.D.

Manufacturing Engineering

Krishnamurthy R, Ph.D.

Metal Cutting, Gear Tribology

Krishna Sastri V.M., Ph.D.

Energy, Heat Transfer

Lakshminarayana K, Ph.D.

Machine Design

Madhusudana Rao M, Ph.D.

Mechanical Handling

Nagalingam B, Ph.D.	I.C. Engines
Nagarajan T, Ph.D.	Precision Engg. & Robotics
Natarajan R, Ph.D. <b>[Head]</b>	Thermal Engineering
Parameswaran M.A, Ph.D.	Mechanical Handling
Philip P.K, Ph.D.	Machining, Tools, CAD/CAM
Premananda Shet U.S, Ph.D.	Combustion Engineering
Prithvi Raj D, Ph.D.	Turbomachines
Radhakrishnan V, Ph.D.	Metrology, Manufacturing Engineering, CIM
Raman R, Ph.D.	Precision Engineering
Ramamohana Rao A, Ph.D.	Machine Design
Seetharamu K.N, Ph.D.	Heat Transfer, Fluid Flow
Shunmugam M.S, Ph.D.	Metrology
Sriramulu V, Ph.D.	Combustion, Solar Energy
Srinivasa Rao P, Ph.D.	Fuels
Srinivasa Murthy S, Ph.D.	Refrigeration and Air-conditioning
Veluswami M.A, Ph.D.	Mechanical Engineering
Venkatrayulu N, Ph.D.	Turbomachines
Venkatesh A, Ph.D.	Thermal Sciences
Venkateshan S.P, Ph.D.	Heat Transfer
Vijay R.Raghavan, Ph.D.	Heat Exchangers, Fluidized Beds
<b>Associate Professors</b>	
Balabaskaran V, Ph.D.	Combustion and Propulsion
Kumaraswamy S, Ph.D.	Hydroturbomachines
Pramod S.Mehta, Ph.D.	I.C.Engines
Singaperumal M, Ph.D.	Fluid Power, Precision Engg.
Siva Prasad N, Ph.D.	Finite Element Analysis, Design Engineering
Srinivasa Y.G, Ph.D.	Instrumentation and Control
<b>Assistant Professors</b>	
Gopalan K.N, Ph.D.	Analysis Simulation and Dynamics
Govinda Mallan K.R, Ph.D.	I.C. Engines
Govardhan M, Ph.D.	Flow Studies in Turbomachines
Jayaprakash V, Ph.D.	Stress Analysis
Krishna Kumar R, Ph.D.	CAD/CAM, Finite Element Computational Methods
Krishnamurthy S, Ph.D.	Machine Design
Kuppuswamy G, Ph.D.	Machine Tools & Manufacturing
Mayuram M, Ph.D.	Design, Surface Engineering
Mani A, Ph.D.	Refrigeration & Air Conditioning, Conservation, Solar Energy
Muthuveerappan G, Ph.D.	Structural Vibration in Fluids
Narayanasamy K, Ph.D.	Surface Topography, Manufacturing Method
Padiyar K.S, M.Tech.	Thermodynamics
Rajan V.N, M.S.	Energy Engineering
Ramakoteswara Rao K, Ph.D.	Machine Design, Mechanical Handling Equipment
Ramalingeswara Rao D.V, M.Tech.	Instrumentation and Control Engineering



Ramamoorthy B, Ph.D.	CAI, QC, Image Processing
Ramesh Babu N, Ph.D.	Manufacturing, CIM
Sitaram N, Ph.D.	Thermal Turbomachines
Thyagarajan K.V, Ph.D.	Machine Design
Vijayaraghavan L, Ph.D.	Metal Cutting, CAD
Prakash M.Maiya, Ph.D.	Thermal Sciences
Venkatarathnam G, Ph.D.	Refrigeration and Air Conditioning, Cryogenics
<b>Chief Design Engineer</b>	
Chennabasavan T.S, M.S.	Machine Design
<b>Senior Design Engineer</b>	
Kalander Saheb S.D, M.Tech.	Design and Production
<b>Senior Scientific Officer</b>	
Boopathy S, M.E	Production Engineering
<b>Senior Maintenance Engineer</b>	
Arun A, B.E	Refrigeration Engineering

#### 4.10.4 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.	15	1	12	-	23	-	15	2	11	1	76	4	80
M.S.	19	-	10	-	8	-	2	-	-	-	39	-	39
M.Tech.	77	-	55	1	-	-	-	-	-	-	132	1	133
B.Tech.	78	-	79	1	76	1	70	2	-	-	303	4	307
<b>Total</b>	<b>189</b>	<b>1</b>	<b>156</b>	<b>2</b>	<b>107</b>	<b>1</b>	<b>87</b>	<b>4</b>	<b>11</b>	<b>1</b>	<b>550</b>	<b>9</b>	<b>559</b>

#### 4.10.5. Number of Scholarship/Fellowship holders

Programme	Institute Scholarship	Others	Total
Ph.D.	37	13 (QIP)	50
M.S.	30	1 (CSIR)	31
M.Tech.	60	9 (QIP)	69
<b>Total</b>	<b>127</b>	<b>23</b>	<b>150</b>

#### 4.10.6. No. of Degrees Awarded

Programme	Number
Ph.D.	18
M.S.	16
M.Tech.	70
B.Tech.	59
<b>Total</b>	<b>163</b>

#### 4.10.7. Instruments/Equipment Designed and Developed

1. Rolling contact fatigue test rig

2. Modified intermittent solar refrigerator
3. Two fluid pumpless continuous absorption refrigerator
4. A PC based data acquisition unit for hot wire measurement of analysis
5. Magnetic abrasive grinding machine
6. Surface roughness monitoring using Pulse jet capacitance method
7. Calibration tunnel for calibrating hot wire probes
8. Moire Deflectometer set-up

#### 4.10.8. New Facilities added and Major Equipment procured

1. Shock tube dump chamber for carrying out propellant ignition studies
2. PCB type pressure transducers
3. 3D Surface Roughness Measuring System
4. Precision Measuring Instruments
5. Electronic Comparator
6. CAD/CAM Workstation with Integrated CAD/CAM Software
7. Dec Alpha Workstation
8. Programmable Logic Controller
9. PC-AT 486 (i) Vision System
10. Hot wire welding unit

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

S.No.	Co-ordinator(s)	Title of Course / Workshop/Seminar/ Symposia/Conference	Period
1.	Dr.A.K.Kolar	One-day get-together with Boiler industry representatives	18.04.93
2.	Dr.K.N.Seetharamu	ASI on computational methods for engineering analysis and design	2-11 Aug 1993
3.	Dr.S.Kumaraswamy	PUMPS Application Engg. under the technology appreciation programme	24.9.93
4.	Dr.N.Siva Prasad Dr.M.A.Parameswaran	Advances in design Engg.	1-5 March 1993
5.	Dr.N.Siva Prasad	Computer graphics for design and manufacture	7-18 June 1993
6.	Dr.A.Ramamohana Rao	Industrial failures, analysis and prevention	June 28- July 2'93
7.	Dr.Paramanand Singh Dr.K.Gopinath	Workshop on advanced powder metallurgy	16-17 March'94
8.	Dr.M.Singaperumal	Workshop on condition monitoring in fluid power systems jointly with FPSI Bangalore	2 days
9.	Dr.S.Srinivasamurthy	Industry-user get-together on high temperature industrial heat pumps	28.5.93
		Workshop on alternate refrigeration technologies	28.1.94
10.	Dr.R.Krishnamurthy	National Seminar on Frontier of Tribology and Condition Monitoring	June 93
11.	Dr.R.Natarajan	"One-Week Appreciation Programme for Senior Executives of State and Central Governments in New and Renewable Sources of Energy"	Jan.3-7,,1994
		"Entrepreneurship Development Programme in New and Renewable Energy Technologies"	Jan.31-Feb.26, 1994

**4.10.10 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.K.N.Seetharamu	International Symp./workshop on boiling, condensation and two phase flow heat transfer at Visak, India	10 - 11 Jan'94
		National Conf.on IC Engines and combustion, Bangalore	18 - 20 Jan'94.
		II Annual Conference of Indian Society for Industrial and Applied Mathematics, Madras	23 - 25 Feb'94
2.	Dr.S.Kumaraswamy	Small hydro developers under World Bank link of credit organised by CBIP and sponsored by IREDA at Hyderabad	30 - 31 July'93
		National Symp. on Pumping equipment in Nuclear Industry and thermal power plants BARC, Bombay	24 - 25 Feb'94
3.	Dr.A.Ramamohana Rao	Xth National Conf. on Industrial Tribology, Indian Institute of Petroloeum, Dehradun	24 - 26 March '93
4.	Dr.A.Venkatesh	Workshop & Exhibition on NCES arranged by MNES and Lakshadweep Andaman.	4 - 5 jan ' 94

**4.10.11. Special Lectures Delivered**

Sl.No.	Name of Faculty	Topic of Lecture	Delivered at	Date
1.	Dr.S.Kumaraswamy	Cavitation in pumps	IIT Madras	24.9.93
		Modification of design methods to suit	BARC Bombay	24 - 25 Feb'94
		CAD of pumps Computer Aided Hydraulic design of axial flow pump impeller	BARC Bombay	24 - 25 Feb'94
2.	Dr.B.Balabaskaran	Selection and Operation of pumps	IIT Madras	24.9.93
3.	Dr.A.K.Kolar	Energy efficient technologies and devices	NPC New Delhi	27.1.94
4.	Dr.K.N.Seetharamu	Predictions of two phase flows	Int.Symp on Boiling Condensation & 2 Phase flows HT at Vizag	10 - 11 Jan '94
5.	Dr.M.A.Veluswami	Optimisation techniques in design	Brakes India Ltd, Ms	Six months
		Pressure vessels and piping design	MRL, Ltd Madras	
		Mechanical design of heat exchangers	BHEL Trichi	
		Optimum design	Summer School at IITM,	
6.	Dr.V.Jayaprakash	Computer Graphics in design of form and generating tools to machine serrated profiles	ISTE Summer School on Comp.graphics IIT Ms	June 1993
7.	Dr.K.Gopinath	Wear Failure analysis	Summer School IIT Madras	
8.	Dr.V.Radhakrishnan	Sensors for Automated Manufacturing at the National Symp. on Instrumentation	S.V.Univ.Tirupathi	9 - 12 Jan'94

Sl.No.	Name of Faculty	Topic of Lecture	Delivered at	Date
	Dr.V.Radhakrishnan	Invited Seminar Talks in the broad area of Metrology and Mfg.	Villanova Univ. PA.PurdueUniv.,IN.NCS Univ NC.Nebraska Univ,LN.Lehigh Univ,PA.	Dec 93
9.	Dr.R.Krishnamurthy	Recent advances in Manufacturing technology	JCE ISTE-STEP Prog	July-Aug.993
10.	Dr.O.V.Krishnaiah Chetty	Petrinets in Mfg.	Society of Prodn Engrs Anna Univ. Ms	31.3.93
		Group Technology	MIT Ms	6.4.93
		Applications of GT to CAPP	ISTE Summer School on REC Warrangal	2.6.93
11.	Dr.N.Ramesh Babu	Computer Numerical Control	ISTE Summer School	June 1993
		Sculptured Surface Machining	- do -	- do -
		CAD/CAM Integration	ATI Ms	Oct.'93
12.	Dr.M.P.Maiya	Free and evaporative cooling	Workshop on Alternate refrigeration technologies	28.1.94
13.	Dr.T.Sundararajan	Automatic and Adaptive mesh generation	IIT Madras	10.3.94
14.	Dr.P.S.Mehta	Basis of Prediction of Aerodynamic valve noise	FCRI Palghat	12.1.94
15.	Dr.D.Prithvi Raj	Stream and gas turbines	MRL Resort Centre Madras	09.12.93
16.	Dr.N.Venkatrayulu Dr.D. PrithviRaj	Conversion of 2nd hand condensing turbine to back pressure for the sugar industry	New Delhi	10-11 Sept'93
17.	Dr.R.Natarajan	"An Assessment of the Goals and Directions of Engg. Education in India for meeting the Challenges of the Twenty-First Century"	New Delhi	July 23, 1993
		National Seminar on "Quality and Productivity in Engineering and Management Education"	-	-
		"Commercialization of Sustainable and Environment-friendly Energy Systems"	Anna Univ. Madras	Nov.23,24 1993
		"Current Status and Future Directions for Engineering Education in India"	IEEE Hyderabad	Nov.25-27 1993
		"The Nature and Scope of Continuing Education for Engg. Manpower"	Surathkal	Dec.26-28, 1993

#### 4.10.12 Visits Abroad

Sl.No.	Name of Faculty	Country visited	Date	Purpose of visit
1.	Dr.A.K.Kolar	USA	May-June 1993	NSF Project discussion attended Int.Conf.on FBC San Diego
2.	Dr.B.Nagalingam	Netherlands	April 1993	Sabbatical leave
3.	Dr.V.Ganesan	Japan	Sept.1993	Attended Conf.
4.	Dr.M.Madhusudana Rao	Sweden	Aug 1993	Conf./consultancy
5.	Dr.M.A.Parameswaran	Malaysia	Nov.1993	Guest lecture

Sl.No.	Name of Faculty	Country visited	Date	Purpose of visit
6.	Dr.V.Radhakrishnan	Malaysia	2-25 Sept'93	Visiting Prof.
		London	3 - 9 Oct'93	Intl.Board Meeting (IEE London)
		Germany	12-16 Oct'93	Indo German Project
		USA	Nov-28 Dec.3 1993	Paper presented at ASME Winter Annual Meeting
7.	Dr.K.Narayanaswamy	Germany	July-Sept.1993	DAAD Reinvitation programme
8.	Dr.S.Srinivasamurthy	Hungary, Czech Republic, Germany	Aug.Sept.1993	Confs & IGP
		Malaysia	Dec.1993	Workshop
9.	Dr.N.Venkatrayulu	USA	June'93	38th ASME IGTE
10.	Dr.R.Natarajan	JAPAN	Sept.20-24, 1993	To present paper at the XI Int.Symp. on Air-Breathing Engines
		SRILANKA	Oct. 93	Member of an Indian Govt. Project Team to establish an Inst.of Technology in Sri Lanka.

#### 4.10.13 Distinguished visitors to the Department (Important Dignitaries)

Sl.No.	Name of the Visitor and Occupation	Date of visit	Purpose of visit (Lecture/Discussion)
1.	Prof.Dr-Ing.Manfred Groll	Director, HTC Forschungs Zentrum Stuttgart, 10.1.94	Germany Lecture and discussion
2.	Prof.Jean U.Thoma Former Director. Univ.of Waterloo, Canada	29.11.93	Lecture and discussion
3.	Dr.Dr-Ing.Manfred Groll, Director, HTC Forschungs Zentrum Stuttgart, Germany	8.1.94	Lecture and discussion
4.	Dr.Shivaram P.Gogineni, Florida State Univ.USA	3.2.94	Lecture on Particle Image velocimetry study of transitional plane wall-jet
5.	Prof.Dr-Ing.A.Weckenmann, Erlangen-Nuernberg Univ.Germany	Jan.'94	Lecture on CMM and discussion
6.	Prof.Dr.-Ing.H Von Puttkamer, Techn.Fachhochschule Berlin, Germany	22.3.94	Lecture on Inspection of Machine tools and CMM using Laser Interfero-meter
7.	Mr.Sanjai Parthasarathi Lead Engineer, Concurrent Technologies Corpn, USA	24.3.94	Lecture on Advanced Sensors & Intelligent Processing of Materials
8.	Dr.V.C.Patel, Dist.Prof. of Mech. Engg. Univ. of IOWA, USA	12.1.93	Discussion

#### 4.10.14. Sponsored Projects

Sl.No.	Title	Period	Funding Agency	Amount (Lakhs)	Coordinator(s)
1.	Circulating Fluidized bed boiler	1993-94	NPC	5.00	Dr.A.K.Kolar
2.	Development of auxiliary gear box for LCA	1993-94	CVRDE Madras	7.46	Dr.A.Ramamohana Rao

Sl.No.	Title	Period	Funding Agency	Amount (Lakhs)	Coordinator(s)
3.	CAD of gear cutting tools	1993-94	CSIR	2.00	Dr.V.Jayaprakash
4.	Development of interactive computer based information and guidance package for educational and employment planning	1993- 94	MHRD	10.00	Dr.V.Jayaprakash Dr.M.S.Shunmugam
5.	LPCVD Poly crystalline silicon MOSFET technology for 3D Integration	1993-94	DOE	48.00	Dr.K.Gopinath
6.	Upgradation of undergraduate laboratory	1993-94	MHRD	15.00	Dr.Y.G.Srinivasa
7.	Development of continuous solar refrigerator operating with transfer tank	1993-96	CSIR	4.20	Dr.A.Mani Dr.S.Srinivasamurthy
8.	High Temp. industrial heat pumps	Eighth plan	MHRD	33.00	Dr.S.Srinivasamurthy Dr.A.Mani Dr.G.Venkatathnam Dr.M.P.Maiya Dr.A.R.Balakrishnan
9.	Design and development of climatic chamber	3 Years	MHRD	10.00	Dr.A.Mani Dr.Srinivasamurthy
10.	Design of perforated plate matrix heat exchangers	1993-95	DST	1.60	Dr.G.Venkatathnam
11.	Development of Solar operated pumpless continuous absorption refrigerators	2 Years	DNES	11.50	Dr.Srinivasamurthy Dr.M.P.Maiya
12.	Hydrogen combustion in supersonic flows	1994-96	ISRO	5.66	Dr.U.S.P.Shet Dr.T.Sundararajan
13.	Propellant ignition studies	1993-96	ISRO	4.60	Dr.K.A.Bhaskaran Dr.Job Kurian
14.	Testing of Ramjet combustors	1993-94	ISRO	1.50	Dr.V.Sriramulu Dr.Job Kurian(AE)
15.	Acoustic Emission for process monitoring	-	ARDB	8.00	Dr.R.Krishnamurthy Dr.L.Vijayaraghavan
16.	Inlet distortion in compressors	1989-93	ARDB	9.00	Dr.N.Venkatrayulu Dr.M.Govardhan
17.	Tip clearance flows in compressors	1992-95	ARDB	5.00	Dr.N.Venkatrayulu Dr.N.Sitaram
18.	Computer Assisted Flexible Automated Assembly Systems	1993- 95	MHRD	15.00	Dr.V.Radhakrishnan
19.	CAD/CAM of Dies	1992-95	DST	17.59	Dr.R.Krishna Kumar Dr.V.Radhakrishnan
20.	Studies on the mixing & combustion phenomena in ramjet combustion chambers	1989-92	ARDB Panel	4.98	Dr.R.Natarajan Dr.B.H.L.Gowda
21.	Numerical predictions of 2D reacting flows with application to ramjet combustion	1991-94	ARDB Panel	5.796	Dr.R.Natarajan Dr.V.Ganesan, Dr.B.H.L.Gowda
22.	Interference & turbulence effects in spray combustion	1991- 94	ISRO-IIT	7.412	Dr.R.Natarajan Dr.B.H.L.Gowda
23.	Computer Aided Instruction for Continuing education in energy science & Tech.	1993-95	IIT(M) & BMFT Germany	-	Dr.S.S.Gokhale Dr.V.Ganesan Dr.V.M.K.Sastri Dr.R.Natarajan

#### 4.10.15. Major Consultancy Assignments

S.No.	Title	Organisation	Amount
1.	Steam flow in tyre presses	L&T Mc Neil	Rs.40,000
2.	Performance characteristics of cooling tower fills	Hytech Cooling Towers	Rs. 1,50,000
3.	150 TPD Pressurized fluidized bed gasifier	BHEL	Rs.12,00,000
4.	Determination of temperature distribution in the propellant grain	DRDL,,Hyderabad	Rs.15,000
5.	Two dimensional conduction coal	DRDL,,Hyderabad	Rs.50,000
6.	Analysis of process.. boiler furnaces	BHEL,,Hyderabad	Rs.1,50,000
7.	Additive evaluation	Project Dev.Orgn., Bombay	Rs. 1,00,000
8.	Failure analysis and design upgradation of a helical gear unit	Tamil Nadu Sugar Corpn	
9.	RCF Testing of bearing steels	TISCO	Rs.1,97,000
10.	Design of a low relaxation PC line	JCT,,Hoshiarpur	Rs.1,25,000
11.	Testing of clutch coupling	Wellman Incandesant India Ltd, Bangalore	Rs.15,000
12.	Analysis of transients in steam deaerator	BHEL, Hyderabad	Rs. 1,70,000
13.	Design of bucket elevator	KCP Ltd	Rs.30,000
14.	Seismic test-handling	BHEL, Hyderabad	Rs.12,000
15.	Retainer consultancy	Magtorq powder clutches, Hosur,	
16.	Retainer consultancy	Machine Build Industries Ltd Madras	
17.	Software development for gear efficiency testing	Rane (Madras) Ltd	Rs.34,500
18.	Evaluation of role of sulphur grinding	Carborundum Universal Ltd	Rs.1,00,000
19.	CMM calibration by laser interferometer	Ashok Leyland Ltd. Madras	Rs.20,000
20.	Solid modelling of fixtures	Black Stone Group of India	Rs.30,000
21.	Modification of expansion jack of MTU Engine	CVRDE Avadi	Rs.60,000
21.	Design,,development,,prototype testing	Jay Em Exports	Rs.30,000
22.	Productivity improvement	Giri Brothers	Rs.15,000
23.	Development of a AS/RS software	BHEL R&D Hyderabad	Rs.45,000
24.	Study of part & equipment feasibilities	Aurofood Ltd. Pondicherry	Rs.22,000
25.	Design of solar evaporation ponds	TALCO, Madras	Rs.45,000
26.	Development of 5 MVA super conducting generator	BHEL R&D,,Hyderabad	Rs.2,50,000
27.	Absorption Refrigeration system development	Stirling Strips Ltd. Bombay.	Rs.1,25,000
28.	Energy Efficient Buildings	TCS,,Pune	Rs.1,00,000
29.	Development of refrigerant compressor test rig	ICF, Madras	Rs.75,000
30.	Design and development of a Schileren system	LPSC,,ISRO Trivandrum	Rs.1,60,000

S.No.	Title	Organisation	Amount
31.	Performance testing of an axial flow compressor	Daulat Ram Industries Bombay	Rs.25,000
32.	Performance testing of an centrifugal compressor	NADI Madras	Rs.15,000
33.	Design, Fabrication and calibration of 2D and 3D pressure probes	BHEL R&D Hyderabad	Rs.50,000
34.	Design and development of energy efficient Axial cooling fins for cooling tower applications	Paharpur Cooling Towers,,Calcutta	Rs.80,000
35.	Design and development of centrifugal fans for retrofit applications	Andrew Yule & Co. Ltd.,Calcutta	Rs.90,000
36.	Design of backward curved centrifugal impellers for high efficiency	Andrew Yule & Co. Ltd.Calcutta	Rs.71,000
37.	Design of multi stage back pressure steam turbine	DharampurSugar Mills Ltd. U.P.	Rs.60,000

#### 4.10.16. Honours and awards

S.No.	Name of Faculty	Honours/Awards	Purpose
1.	Dr.V.Ganesan	Institution of Engineers Award	Best paper of the year
2.	Dr.P.S.Mehta	Best paper award at XIII National Conf.on IC Engines and Combustion IISc Bangalore	Best paper
3.	Dr.U.S.P.Shet	Elected as Chairman, The Combustion Institute, Indian Section for 94-95.  Member in the Research Advisory Committee of LPG Equipment Research Centre, Bangalore of Major Oil Companies	Coordinate the activities of Combustion and its applications  To assist R&D work in the field of LPG and allied areas
4.	Dr.R.Raman	Sir R.N.Mookerjee Memorial Prize of Institution of Engineers India	Best paper
5.	Dr.V.Radhakrishnan	Session Chairman at ASME Winter Annual Meet  Member in Editorial Board JI on Qlty & Reliability  Member in Editorial Board JI on Mfg. Technology and Management  Member, Academic Council Rajiv Gandhi Centre for Dev.of Edn. Sc. & Tech. Trivandrum,  Member Task Force, All India Council for Technical Education	

#### 4.10.17. Books/Monographs Published

SI.No.	Name of Faculty	Title	Publisher
1.	Dr.V.Ganesan	Internal Combustion Engines	TATA McGraw Hill
2.	Dr.K.N.Seetharamu	Finite Element Method in Heat Transfer	John Wiley & Sons Ltd



Sl.No.	Name of Faculty	Title	Publisher
3.	Dr.S.Srinivasamurthy Dr.A.R.Balakrishnan (Editors)	Heat and Mass Transfer Proc. of 11th HMTC	Tata McGrawHill
4.	Dr.T.Sundararajan (One of the five authors & co-editor)	Computational Fluid Dynamics	Narosa Publishing House

#### 4.10.18. Research Publications

1. Naresh Kumar, R, Sundararajan, T and Seetharamu, K.N. "Automatic mesh generation using transfinite interpolation",  
Proc.II Annual Conf. of Indian Soc. Industrial and Applied Mathematics, Madras, February 23-25, pp. 2-2 to 2-10, 1994.
2. Krishna Kumar, V, Sundararajan, T and Seetharamu, K.N. "Automatic mesh generation using advancing front scheme", Proc.II Annual Conf. of Indian Soc. Industrial and Applied Mathematics, Madras, February 23-25, pp. 3-1 to 3-10, 1994.
3. Krishne Gowda, Y.T, Aswatha Narayana, P.A, Nithiarasu, P, Sundararajan, T and Seetharamu, K.N. "Mesh generation using Delaunay triangle", Proc.II Annual Conf. of Indian Soc. Industrial and Applied Mathematics, Madras, February 23-25, pp. 4-1 to 9, 1994.
4. Vasanth Kumar, K.S, Sundararajan, T and Seetharamu, K.N. "Automatic mesh generation using Poisson grid generation equations", Proc.II Annual Conf. of Indian Soc. Industrial and Applied Mathematics, Madras, February 23-25, pp.5-1 to 9, 1994.
5. Satya Sai, B.V.K, Seetharamu, K.N, Aswatha Narayana, P.A. and Reddy, J.N. "Finite Element Analysis of the effect of radius ratio on natural convection in an annular cavity", Int. Journal of Numerical Methods for Heat & Fluid flow, Vol.3, pp.305- 318, 1993.
6. Prashanth, K.V. and Seetharamu, K.N. "FEM Predictions for two- phase flow in a vertical pipe without the use of any external correlations", Int. Journal of Numerical Methods for Heat & Fluid flow, vol 3, 565-575, 1993.
7. Krishna Satya Sai, B.V, Seetharamu, K.N. and Aswatha Narayana, P.A., "Solution of transient laminar natural convection in a square cavity by an explicit finite element scheme", Numerical Heat Transfer, Part A, 25, 1994.
8. Kumaraswamy, S, and John Tharakan, T. "Prediction of pre-rotation and cavitation in a centrifugal pump" Proc. of 4th Asian Int. Conf. on Fluid Machinery, Vol.II, Suzhou, China, Oct. 1993, pp.634-638.
9. Kumaraswamy, S, "Modification of design methods to suit CAD of pumps" Proc. of National Symp. on Pumping equipment in Nuclear Industry and Thermal Power Plants, (NSPE 94), BARC, Bombay, Feb.24 and 25, 1994.
10. Sridhar, B.K, Kumaraswamy, S, and Rao, A.S.L.K, "Computer aided hydraulic design of axial flow pump impeller", Proc. of National Symp. on pumping equipment in Nuclear Industry and Thermal Power Plants, (NSPE 94), BARC, Bombay, Feb.24 and 25, 1994.
11. John Tharakan, T, and Kumaraswamy, S, "Effect of vane passage modification on performance and cavitation characteristics of a centrifugal pump, Indian JI of Engg and Material Sciences, Vol.I, Feb. 94, pp.11-16.
12. Kumaraswamy, S, and Vijayan Babu, E, "Computer Aided Selection of pumps, Proc. of National Conf. and Workshop on Fluid Machinery, K.J. Somaiya College of Engg., Bombay, 11 - 13 March, 1994.
13. Ravindran, M, Balabaskaran, V, and Swaminathan, G, "Comparison of performance of constant and varying chord wells turbine rotors for wave energy applications", paper presented at the 1993 European wave energy Symp. held at Edinburgh, UK, on 21-24 July 1993.
14. Baby Chacko, Balabaskaran, V, Tulapurakara, E.G. and Radhakrishna, H.C, "Performance characteristics of S-blade profiles with cut off trailing edges", paper accepted for publication in the ASME JI of Fluids Engg., USA.
15. Ramesh Babu, N, and Radhakrishnan, V, "A study on laser declogging of loaded grinding wheels, Proc. of Advanced Materials, 3, 1993, p.25-30.

16. Venkateswara Rao, P, Ramamoorthy, B and Radhakrishnan, V, "Effect of plating and temperature on the strength of shrink fitted assemblies, *Int. JI. of Mech. Tools Manufact.*, Vol.33, No.3, 1993, pp.475-481.
17. Ramamoorthy, B and Radhakrishnan, V, "Statistical approaches to surface texture classification, *Wear* 167, 1993, pp.155-161.
18. Raghunath, V.J. et al and Radhakrishnan, V, "Performance evaluation of a new crankshaft grinding wheel, *Proc. 5th Int. Grinding Conf. Ohio (SME)*, 1993.
19. Rajmohan, B, and Radhakrishnan, V, "Approaches for grinding wheel condition monitoring in practical environment, *Proc. 2nd Int. Conf. on Computer Integrated Manufacturing, Singapore, Vol.2, World Scientific & Global Publication Services*, 1993, pp.956-962.
20. Saji Varghese, Suryanarayana, J.V and Radhakrishnan, V, "A study on inductance monitoring of surface roughness, *Proc. 2nd Int. Conf. on Computer Integrated Manufacturing, Singapore, Vol.2, World Scientific & Global Publication Services*, 1993, pp.726-732.
21. Ramesh Babu, N and Radhakrishnan, V, "Laser - A versatile dressing tool for grinding wheels", *Proc. of ASME Winter Annual Meet, Manufacturing Science and Engg.*, PED-Vol.64, pp.809-821.
22. George, K.K and Ramesh Babu, N, "CNC code generation for pockets bounded by free form surfaces", *Advances in Model-ling and Analysis, AMSE Press, Vol.14, No.1*, 1993, pp.1-12.
23. Phanindranath, V and Ramesh Babu, N, "Theoretical modeling of laser dressing of grinding wheels", *Poster paper presented at the National Laser Symp. at IIT Madras, Feb.17-19, 1993*.
24. Chincholkar, A.K, Krishnaiah Chetty, O.V and Kuppuswamy, G, "Stochastic coloured petrinets for modelling and performance evaluation of automated storage and retrieval systems" - accepted for 8th Conf. of Indian Society of Mechanical Engineers IIT Delhi, March 93.
25. Sridhar, T.R, and Krishnaiah Chetty, O.V, "Design and simulation of JIT in FMS", *Proc. of 8th Conf. of Indian Society of Mechanical Engineers IIT Delhi, March (1993)*.
26. Venkatesh, K and Krishnaiah Chetty, O.V, "Petrinets : An efficient modelling tool for implementing JIT in Flexible Manufacturing Systems", *Institution of Engineers (India), Production Engg.*, V.73, March (1993), pp.44-48.
27. Ravi Raju, K and Krishnaiah Chetty, O.V, "Addressing design and control issues of AGV based FMSs with Petrinet aided simulation", *Int. J. of Computer Integrated Manufacturing Systems*, Vol.6, n.2, May (1993), pp.125-134.
28. Ravi Raju, K and Krishnaiah Chetty, O.V, "Design and evaluation of automated guided vehicle systems", *Int. J. Prod. Res.*, Vol.31, n.5, (1993), pp.1069-1096.
29. Krishnaiah Chetty, O.V and Raghava Rao, K, "Intelligent Scheduling of Flexible Manufacturing Systems using object- oriented programming", - accepted for *Int. Conf. on CAD/CAM, Robotics and Factories of the Future, St. Petersburg, Russia, May 17-18, (1993)*.
30. Ravi Raju, K and Krishnaiah Chetty, O.V, "Priority nets for scheduling in flexible manufacturing systems", *Jl. of Manufacturing Systems*, Vol.12, n.4, (1993), pp.326-340.
31. Chincholkar, A.K, Krishnaiah Chetty, O.V and Kuppuswamy, G, "Analysis of Automated Storage and Retrieval Systems using stochastic coloured petrinets", *Accepted for Int. Conf. on Signals, Data & Systems'93, AMSE, Dec. (1993)*.
32. Gopal, R, K.J.L Iyer and Vijayaraghavan, L, "Surface improve-ment by fluidised bed boronishing", *paper presented in 47th Annual Technical Meeting, The Indian Institute of Metals, Hyderabad, Nov.17-19, 1993*.
33. Sunil Kumar Kakade and Vijayaraghavan, L, "On-line tool wear monitoring in fall milling using acoustic emission and cutting force", *Proc. of All India Seminar on Emerging Trends in Metal Machining, Organised the Institution of Engineers (India), Indore Centre, Dec. 25-26, 1993*, pp.145-155.
34. Ghobadian, B, Jain, S.C, Bhattacharya, M, and Mehta, P.S, "Acquisition and processing of cylinders and sound pressure signals of a single cylinder engine", *Int. Congress on Computational Methods in Engg.*, Shiraz Univ, Iran, May 1993.
35. Mehta, P.S, Malik, K.A and Gupta, C.P, "An analytical model and parametric investigation of a small two stroke SI Engine", *SAE Small Engine Technology Conf. Pisa, Italy, No.931484, Dec 1993*.
36. Ghobadian, B, Jain, S.C, Bhattacharya, M, Singh, N and Mehta, P.S, "A comprehensive solution approach to engine noise investigation *SAE small Engine Technology Conf. Pisa, Italy, No.931571, Dec 1993*.

37. Ramesh Babu, P, Nagalingam, B and Mehta, P.S, "Hydrocarbon modelling for two stroke SI engine", SAE paper No.940403, Int. Congress and Exposition, Detroit, Michigan Feb 28-March 4, 1994 (Appears in SAE special publication SP-1019, "Two stroke engines theoretical and experimental investigations).
38. Mehta, P.S and Chaturvedi, A, "Modeling of intake port swirl", Proc. 13th National Conf. on IC Engines and Combustion, Bangalore, Jan 1994, pp.157-163.
39. Dinesh Kumar, Pundir, B.P and Mehta, P.S, "Air flow visualization in the cylinder of two stroke engine", Proc.13th National Conf. on IC Engines and Combustion, Bangalore, Jan 1994, pp.207-213.
40. Lionel Christopher, G, Ramaswamy, M.C. and Mehta, P.S, "Modeling of transient spray mixing process in diesel engine combustion chamber", Proc. 13th National Conf. on IC Engines and Combustion, Bangalore, Jan 1994, pp.188-197.
41. Ganesan, V, Devapaul, G and Seetharama Rao, T.L, "Modelling of confined auxiliary flow stabilized premixed Flames Indian Journal of Technology, Vol.31, Feb.1993, pp.59-66.
42. Balagurunathan, K, Nedunchezian, N, Srinivasa Rao, P and Ganesan V, "Reduction of oxides of Nitrogen in a diesel engine exhaust using copper coated alumina catalyst.
43. Varaprasada Rao, R, Nehru K.V.K and Ganesan, V, "Evaluation of S/I Engine combustion parameters", A new approach internal journal of combustion Science and Technology, Vol.89, 1993, pp.47-55.
44. Mahalakshmi, N.V, Pawar, C.N.B, Ramachandra Raju, V and Ganesan V, "Theoretical investigation in annular diffusers of two different configurations - a comparative study" Journal of Institution of Engineers, Vol.73, 1993, pp.297-303,
45. Ram Reddy, P, Mohan Krishna, D, Govinda Mallan, K.L.R and Ganesan, V, "Evaluation of combustion parameters in direct injection diesel engine - An easy and reliable method", SAE paper No. 930605, 1993, pp.159-165.
46. Balagurunathan, K, Nedunchezian, N, Srinivasa Rao, P and Ganesan V, "Comparative study of copper coated alumina and iron ore catalysts in the reduction of oxes and nitrogen in a direct injection diesel engine exhaust".
47. Ravichandran, M and Ganesan, V, "A study on SD velocity distribution of iso thermal flows behind and after burner flames stabiliser, Proc. of the 11th Int. Symposium on air breathing engines, Tokyo, Japan, Sept 1994, pp.20-22.
48. Ganesan V, "Experimental investigation of turbulent scales in an open and swirl combustion chamber of a diesel engine", Journal of Institution of India, 1993.
49. Subramanyam, S, Srinivasa Rao, P and Ganesan, V, "Measurement of Unsteady of flow velocities in IC engines using the principle of Heat Transfer from the electrically heated wires", Proc. of the Foirst ISHMT-ASME Heat and Mass Transfer conference and Twelfth National Heat and Mass Transfer Conf., India, Jan.5-7, 1994, pp.991-994.
50. Balagurunathan, K, Nedunchezian, N, Srinivasa Rao, P and Ganesan V, "Control of NOx and smokme in a direction injection diesel engine using methanol diesel engine using methonol diesel emulsion as fuel", Proc. of the XIII National conference on IC Engines and combustion, IISc, Bangalore, Jan 18-20, 1994, pp.14- 23.
51. Mohan Krishna, D and Ganesan, V, "Swirl Ratio influence of the flow field in a compression ignition engine - A numerical study and experimental comparison", Proc. of the XIII National conference on IC engines and combustion, IISc, Bangalore, Jan. 18-20, 1994, pp.164-168.
52. Gopinath, R and Ganesan, V, "Numerical study of gas turbine combustor flows", Proc. of the XIII National Conf. on IC Engines and combustion, IISc, Bangalore, Jan 18-20, 1994, pp.164-168, 303-311.
53. Subramanyam, S, Srinivasa Rao, P and Ganesan, V, "Flow investigations in open and swirl combustion chamber of IC Engines - A comparison", Indian Journal of Tech, Vol.1, Feb.1994, pp.26-34.
54. Gopinath, R and Ganesan V, "Numerical predictions Tempe-rature and species concentrations in three dimensional reacting flows - a new approach", Int. journal of Institute of Energy, UK, March 1994.
55. Gopinath, K and Ganesan, V, "Numerical investigation of the combined effect of swirler and primary jets on the recirculation zones of a can-type combustor by means of orthogonal array technique", Int. Journal of Numerical methods for Heat and Flow Flow, UK , April 1994.

56. Mohan Krishna, D, Rajagopal K, Srinivasa Rao, P and Ganesan, V, "Three dimensional Modelling of fluid flow in a four stroke compression ignition engine", Indian Journal of Technology, 1994.
57. Jabez Dhinagar, S, Nagalingam, B and Gopalakrishnan, K.V, "Experimental investigations on the combustion of ethanol in a LHR engine using different methods", SAE paper No. 930931.
58. Ramesh Babu, P, Nagalinga, B, and Gopalakrishnan, K.V, "A study of new scavenging system to reduce the loss of fresh charge of three different types of two stroke S.I engines", SAE paper No.931505.
59. Bhaskar, T, Nagalingam, B and Gopalakrishnan, K.V, "The effect of two ignition improving additives on the performance of Jatropa oil in a low heat rejection diesel engine", Proc. of the IV Int. Conf. on Small Engines and their fuels, Thailand, Sept. 1993.
60. Ramesh Babu, P, Nagalingam, B, Gopalakrishnan, K.V, and Mahadevan, R, "The effect combustion chamber insulation on the performance of a small two-stroke S I engine", Proc. of the IV Int. Con on Small Engines and their fuels, Thailand, Sept.1993.
61. Jabez Dhinagar, S, Nagalingam, B and Gopalakrishnan, K.V, "A comparative study of the performance of a low heat rejection engine with four different levels of insulation", Proc. of the IV Int.Conf. of Small Engines and their fuels, Thailand, Sept. 1993.
62. Parthasarathy, S, Nagalingam, B and Gopalakrishnan, K.V, "The effect of biomass fuel derived additives on the performance of a four stroke lean burn S I engines", Proc. of the X Int. Symp. on Alcohol Fuels, Colorado, USA Nov. 6-10, 1993.
63. Bhaskar, T, Ramesh Babu, P, Nagalingam, B and Gopala-krishnan, K.V, "Use of different pilot fuels for methanol inducted dual fuel operation in a low heat rejection diesel engine, Proc. of the X int.Symp. on Alcohol fuels, Colorado, USA, Nov. 6-10, 1993.
64. Ramesh Babu, P, Nagalingam, B and Gopaklakrishnan, K.V, "The effect of thermal insulation and in-cylinder catalyst on the performance of at two stroke SI engine with methanol as the fuel", Proc. of the X Int. Symp. on Alcohol Fuels, Colorado, USA Nov. 6-10, 1993.
65. Jabez Dhinagar, S, Ramesh Babu, P, Nagalingam, B and Gopalakrishnan, K.V, "Spark assisted alcohol operation in a single cylinder low heat rejection engine", Proc. of the X Int. Symp. on Alcohol fuels Colorado, USA, Nov. 6-10, 1993.
66. Ramesh Babu, P, Nagalinga, B and Gopalakrishnan, K.V, "A study of a new scavenging system to reduce the loss of fresh charge in three different types of two-stroke SI engines", SAE paper No. 931505, presented at the Small Engine Technology Conf., Plazzo Die Congressi, via Matterotti, Pisa, Italy, Dec. 1-3, 1993
67. Ghobadien, B, Jain, S.C, Bhattacharya, M and Mehta, P.S, "Acquisition and processing of cylinder and sound pressure signals of a single cylinder engine. Int. Congress on computational methods in Engineering", Shiraz Univ. Iran, May 1993
68. Metha, P.S, Malik, K.A and Gupta, C.P, "An analytical model and parametric investigation of a small two stroke S I engine", SAE small engine Technology conference, Pisa, Italy Paper No. 931484, Dec.1993.
69. Sumathy, K, Venkatesh, A and Sriramulu, V, "Experimental observations on a Solar Thermal Water Pump", 5th Int. Energy Conf. Energox 93.
70. Sumathy, K, Venkatesh, A and Sriramulu, V, "Effect of discharge head on the performance of a solar water pump" Accepted for publication, ENERGY.
71. A review of Prof.K.A.Bhaskaran's publications in the field of "Shock tube techniques in Chemical Kinetics" carried out by Argonne National Laboratory, Illinois was published in the Annual Review of physical chemistry, 1993.
72. Ramachandran, G and Shet, U.S.P, "Unified correlations for prediction of turbulent burning velocity data", Proc. of the XIII National Conf. on I.C.Engines and Combustion, IISc, Bangalore, Jan 18-20, 1994.
73. Shet, U.S.P, Ramanadh, K, Swarnamani, S and Rao, B.V.A, "Combustion noise of LPG free jet flames from A nozzle - Mix Swirl Burner", to appear in the journal of acoustical society of India, New Delhi.
74. Jaiswal, A.K, Sundararajan, T and Chhabra, R.P, "Hydrodynamics of creeping flow of Power law fluids through particle assemblages", Int.J.Eng.Sc. Vol. 31, Jan.1993, pp.293-306.
75. Sinha, S.K and Sundararajan, T, "A study of the effects of macrosegregation and buoyancy driven flow in binary alloy solidification", Int.J.HMT Vol.36, June 1993, pp.2349-2358.

76. Jaiswal, A.K, Sundararajan, T and Chhabra, R.P, "Slow non Newtonian flow through packed beds: Effect of zero shear viscosity", *Can. J. Chem. Engg.*, V-71, Aug.1993, pp.646-651.
77. Moustafa, G.H, Sundararajan, T and Rathakrishnan, E, "Mean Stream-wise velocity measurements in a triple jet of equilateral triangular configuration", *J.Fluids Engg. (ASME)*, Vol.115, Sept.1993, pp.534-537.
78. Mukhopadhyay, A, Sundararajan, T and Biswas, G, "An explicit transient algorithm for predicting incompressible viscous flows in arbitrary geometry", *Int.Jl.Num.methods in fluids*, Vol. 17, Nov. 1993, pp.975-993.
79. Manjunath, M, Tripathi, A, Sundararajan, T and Chhabra, R.T, "Numerical simulation of the quasi study rise of a bubble waran through a liquid bath", accepted for publication in *Int. J. Engg. Science*, 1993.
80. Tripathi, A, Chhabra, R.T and Sundararajan, T, "Power law fluid flow over spheroidal paraticles" accepted for publication in *Int.Eng.Chem.Researarch* 1993.
81. Shet, U.S.P, Ramanadh, K, Swarnamani, S and Rao, B.V.A, "Combustion noise of LPG free jet flames from A nozzle - Mix Swirl Burner", to appear in the *Jl. of Acoustical Society of India*, New Delhi.
82. Ramamohana Rao, A, and Mohan Ram, P.V, "A study of mixed lubrication parameters of journal bearings", *WEAR* 160, 1993, pp.111-118.
83. Veluswami, M.A. and Ch.Ratnam, "Dynamic behaviour of spur gears on vibro impacts" *Int. design conf.*, Dec. 1993, IIT New Delhi.
84. Veluswami, M.A and Venkataraman, A, "Dynamic effects on the stiffness of shafts in spur gear drive subjected to vibro- impacts", *Int. design conf.* Dec. 1993, IIT New Delhi.
85. Sundar, B, Jayaprakash, V, Shunmugam, M.S, "Computer aided design of gear shaping cutter", *Jl. of the National design and research forum*, April 1993, pp.19-23.
86. Subba Rao, B., Suryanarayan, B.V, Jayaprakash, V, Shunmugam, M.S, "Computer aided design of gear cutting tools", *Int. conf. on CAD/CAM, Robotics and Autonomous Factories, INCARF 93*, New Delhi, pp.47-57.
87. Nalluveetil, S.J. and Muthuveerappan, G, "Finite element modelling and analysis of a straight bevel gear tooth", *computers and structure*, Vol.48, No.4, 1993, pp.739-744.
88. Ramamohana Rao, Ch. and Muthuveerappan, G, "Stress analysis of spiral bevel gears, "A novel approach to tooth modelling", *American Gear Manufacture Association (AGMA) Fall Technical Meeting 93 FTM4* 1-4.
89. Ramamohana Rao, Ch. and Muthuveerappan, G, "Geometry, load distribution and stress analysis of helical gears using three dimensional FEM", *Int. conf. on Int. conf. on CAD/CAM, Robotics and Autonomous Factories, INCARF 93*, New Delhi, pp.649-658.
90. Ramachandran, S, Nagarajan, T and Siva Prasad, N, "Finite element approach to dynamics of a machining robot", *Int. Jl. of computer applications in technology*, Vol.6, No.4, pp.240-244, 1993.
91. Siva Prasad, N and Rajagopal, C.J, "An adaptive mesh generation scheme for 2D domains for finite element analysis", *Int. conf. on CAD/CAM, Robotics and Autonomous Factories, INCARF 93*, New Delhi, pp.22-36.
92. Sankaranarayanan, T.K and Siva Prasad, N, "Finite element analysis of temperature distribution during arc welding using adaptive grids", *National conf. on Machines and Mechanisms NACOMM 93*, IIT Kharagpur, Dec. 23-24, 1993.
93. Ramachandran, S, Nagarajan, T and Siva Prasad, N, "Finite element approach to dynamics of a machining robot", *Int. Jl. of computer applications in technology*, Vol.6, No.4, 1993, pp.240-244,
94. Gowri, S, Narayanasamy, K and Krishnamurthy, R, "Recent development in ceramic-materials processing and application", *Jl. of materials processing technology*, 37, 1993, pp.571-582.
95. Gowri, S, Narayanasamy, K and Krishnamurthy, R, "Role of diamond precision machining of plasma sprayed fine ceramics", *Proc. JFCC Int. Workshop on fine ceramics*, Japan, 1994.
96. Narayanasamy, K, "Microjoining technology", *Project report submitted to DAAD*, Germany, 1993.
97. Sadashivappa, K, Singaperumal, M and Narayanasamy, K, "Some performance aspects of micro-hydraulic actuators", *Proc. 1st IFToMM Int. Micromechanism symp.* Tokyo, 1993, pp.161-171.
98. Junaid Basha, A.M, Singaperumal, M and Narayanasamy, K, "Studies on hydrostatic steering system of armoured fighting vehicles", *Trans. SAE* 1993, SAE 933065.

99. Kethara Pasupathy, T.M, and Singaperumal, M, "Damping of hydraulic servo systems using cylinders with sealless pistons", Proc. NACOMM 1993, pp.185-189.
100. Asokan, T and Singaperumal, M, "Active impedance control in robotics using electrohydraulic servo system", Proc. NACOMM 93, pp.190-194.
101. Ramachandran, S, Nagarajan, T and Siva Prasad, N, "Finite element approach to the dynamics of a machining robot", Int. J. computer application in technology, Vol.6, No.4, pp.240-244.
102. Ramachandran, S, Nagarajan, T and Siva Prasad, I.I, "Reliability studies on assembly robots using the finite element method", Advanced robotics, 1993, Vol.7, No.4, pp.385-394.
103. Gaul, L, Nagarajan, T and Ramachandran, S, "Numerical and experimental determination of fundamental resonant frequencies of platform manipulators for varying geometry", Proc. of Int. Symp. on Intelligent Robotics, ISIR-93, Bangalore Jan 1993, pp.883-897.
104. Srinivasa, Y.G, Ravindra, H.V, and Krishnamurthy, R, "Tool wear monitoring in turning using a pattern recognition technique", JI of Materials Processing technology, Vol.37, pp.731-740.
105. Srinivasa, Y.G, Ravindra, H.V, and Krishnamurthy, R, "Modelling of tool wear based on cutting forces in turning", Vol.169, 1993, pp.25-32.
106. Srinivasa, Y.G, Ravindra, H.V, Raghunandhan, M, and Krishnamurthy, R, "Tool wear estimation method by group method data handling in turning" Int. JI. of Production Research, 1993.
107. Srinivasa, Y.G and Purushothaman, S, "A back-propagation algorithm applied to tool wear monitoring, Int. JI of Machine tools and manufacture, 1993.
108. Srinivasa, Y.G, and Ramaswamy, C.R, "Adaptive control of an electro-hydraulic servosystem using a non-linear stabilizing controller, AMSE modelling, simulation and control, Vol.27, 1993, pp.25-35.
109. Srinivasa, Y.G, Ravindra, H.V, and Krishnamurthy, R, "Multi- sensory approaches to tool wear monitoring in turning", Int. Conf. on fault diagnosis, France, April 1993, pp.322-331.
110. Srinivasa, Y.G, Ravindra, H.V, and Krishnamurthy, R, "On-line detection of tool failure in turning using acoustic emission", ASPE, Nov 1993, Annual Meeting, Washington.
111. Srinivasa, Y.G, and Purushothaman, S, "Application of a modified back-propagation algorithm for pattern classification in turning", ASPE, Nov 1993, Annual Meeting, Washington.
112. Radhakrishnan, T.V, Mehta, R.C, Seetharamu, K.N, and Aswatha Narayana, P.A, "Explicit and Implicit Finite Element Methods for Inverse Heat Conduction Problems", Proc. 8th Int. Conf. on Numerical Methods in Thermal Problems, Swansea, July 12-16, 1993, pp.177-188.
113. Matcharajan, B and Seetharamu, K.N, "Finite element analysis of heat transfer in a cooled gas turbine rotor blade", Proc. 8th Int. Conf. on Numerical Methods in Thermal Problems, Swansea, July 12-16, 1993, pp.1520-1530.
114. Krishna Satya Sai, B.V, Seetharamu, K.N, Aswatha Narayana P.A and Reddy, J.N, "Non-darcy natural convection in a porous cavity with constant heat flux on one vertical wall", Proc. Int. Heat Transfer Conf., Brighton, U.K. August 1994.
115. Seetharamu K.N, and Prashanth, K.V, "Prediction of two phase flows", Int. Symposium/Workshop on Boiling, Condensation and Two-phase Flow Heat Transfer, Visakapatnam Jan 10-11, 1994.
116. Ravishankar, M.S, Srinivas, M, Seetharamu, K.N, Aswatha Narayana, P.A and Reddy, J.N, "Turbulent flow and heat transfer over a backward facing step - comparison with experiments results", National Heat Transfer Conf., ASME held at Atlanta GA, USA, October, 1993.
117. Seetharamu, K.N, Aswatha Narayana, P.A and Ravishankar, M.S, "Finite element analysis of turbulent flow and heat transfer in internal geometries", Proc. Indo - German Workshop on Space Heat Transfer held at IISc. Bangalore, March 29-31, 1993. pp.1-25.
118. Aswatha Narayana, P.A and Seetharamu, K.N, "Design Considerations and Field Measurements in Wind Turbine Arrays", Presented at Indian Wind Energy - The Potential of Wind Energy, held at New Delhi, November 1993, pp.1-25.
119. Krishna Satya Sai, B.V and Seetharamu, K.N, "Numerical prediction of turbulent natural convection in a square cavity using Eulerian fractional step method", Proc. First ISHMT-ASME Heat and Mass Transfer Conf. and 12th National Heat and Mass Transfer Conf., Bombay, 5-7, January 1994.
120. Athmalingam, S, Chetal, S.C and Seetharamu, K.N, "FEM in process design and analysis of heat exchangers in decay heat removal circuit of PFBR", Proc. First ISHMT - ASME Heat and Mass Transfer Conf. and 12th National Heat and Mass Transfer Conf., Bombay, 5-7, January 1994.

121. Balaraju, M.S, Seetharamu, K.N and Natarajan, R, "Numerical study of interference effects in binary sphere systems under forced convection conditions", Proc. XIII National Conf. on IC Engines and Combustion, Bangalore, 18-20, January, 1994.
122. Swaminathan, N, Sanjay, P.R, Sundararajan, T and Seetharamu, K.N, "Automatic finite element mesh generation : A quadtree approach", Proc. II Annual Conf. of Indian Soc. Industrial and Applied Mathematics, Madras, February 23-25, 1994, pp.1- 19.
123. Madhusudana Rao, M, Venkateswara Rao and Ramakrishnan, T, "The slope stability of powder material beds percolated by a fluid", Advanced powder technology, 1993.
124. Ramakrishnan, T, Ramakoteswara Rao, K, Parameswaran, M.A, and Sivakumar, S, "Experimental investigation of a dense-phase pneumatic transport system", Chem. Engg & Processing, 1993.
125. Ramakrishnan, T, Ramakoteswara Rao and K, Parameswaran, "Experimental studies on a turboflow system : A pneumatic conveying system with economical power consumption", Advanced powder technology, 1993.
126. Ramakoteswara Rao, K and Ramakrishnan, T, "Investigations into dense-phase pneumatic conveying", Proc. RELPOWFLOW- II, 1993.
127. Madhusudana Rao, M, Parameswaran, M.A and Ch.Sathish, "Effect of moisture content on flow of bulk solids through chutes".
128. Parameswaran M.A and Ch.Sathia, "Flow of bulk solids through chutes", Proc. RELPOWFLOW-II, 1993.
129. H.A.E. Elezz and Vijay R. Raghavan, "RTD Studies in a Race-Track Fluidized Bed", Fifth Int. Conf. on Energy, Seoul, Korea, Nov. 1993.
130. Nayak, A.K., Prithvi Raj , D. and Venkatrayulu, N., "Finite Element Analysis of Two-Dimensional Turbulent Asymmetric Near and Far Non-periodic and Periodic Wakes by k-e Model of Turbulence", ASME Paper No. 93-GT-403, 38th ASME Int. Gas Turbine and Aeroengine Congress Exposition, Cincinnati, Ohio, USA, May 24-27, 1993
131. Nayak, A.K., Prithvi Raj , D. and Venkatrayulu, N., "Two Dimensional Viscous Flow Analysis Through 90 and 180 Degrees Bend Channels by Finite Element Method", Proc. of the Second Int. Conf. on Fluid Mechanics, Beijing, China, July 7 - 10, 1993.
132. Nayak, A.K., Prithvi Raj , D. and Venkatrayulu, N., "Two- Dimensional Viscous Flow Analysis In A Linear Compressor Cascade by Finite Element Method", Proc. 4th Asian Int. Conf. on Fluid Machinery, Suzhou, China, October 1993.
133. Nayak, A.K., Prithvi Raj , D. and Venkatrayulu, N., "Numerical Solution of Some Bench-Mark Flow Problems by Adaptive Finite Element Method", Proceedings of 20th National Conf. on Fluid Mechanics and Fluid Power, Palghat, India, December 15-17, 1993.
134. Sitaram, N. and Govardhan, M., "Large Angle Calibration of Five Hole Probes", 4th Asian Int. Conf. on Fluid Machinery, Hefei, China, July 28-31, 1993.
135. Murali, K.V., Govardhan, M., Sitaram, N. and Venkatrayulu, N., "Radial Distortion Effects in a Centrifugal Compressor", Second Int. Conf. on Fluid Mechanics, Chinese Society of Theoretical and Applied Mechanics, Beijing, China, July 7-10, 1993.
136. Vishnubhotla, V.S., Govardhan, M., and Venkatrayulu, N., "Interaction of Tip Clearance Flow with Passage Flows in a High Deflection Rotor Blade Cascade", Second Int. Conf. on Fluid Mechanics, Chinese Society of Theoretical and Applied Mechanics, July 1993, Beijing, China.
137. Vishnubhotla, V.S., Govardhan, M., and Venkatrayulu, N., "Tip Clearance Effects on the Flow Field of an Axial Turbine Rotor Blade Cascade", XI ISABE Conf., Sept. 1993, Tokyo.
138. Vasanthakumar, P., and Govardhan, M., "Effect of Radial Distortion on the Flow Field of an Axial Fan Stage", Proceedings of 20th National Conf. on Fluid Mechanics and Fluid Machinery, Palghat, India, Dec. 15-17, 1993.
139. Govardhan, M., Venkatrayulu, N. and Vishnubhotla, V.S., "Influence of Tip Clearance on their Inter Blade and Exit Flow Field of a Turbine Rotor Cascade", Paper Accepted for 39th ASME - Int. Gas Turbine and Aeroengine Congress, to be held at Hague, the Netherlands during June 13-16, 1994.
140. Sitaram, N. and Ravinder Reddy, B., "Boundary Layer Measurements on an Axial Turbine Rotor Cascade", VI Asian Int. Conf. on Fluid Machinery, Hefei, China, July 28-31, 1993.
141. Venkatrayulu, N., Balaji Rao, N. and Prithvi Raj, D., "Study of Wake Characteristics behind an Axial Flow Fan Rotor", Int. Conf. on Aero-Hydro Elasticity, Beijing, China, July 7-10, 1993.

142. Venkatrayulu, N., Balaji Rao, N. and Prithvi Raj, D., "Improved Measurement Technique for measuring Unsteady Wake Characteristics of An Axial Flow Fan Rotor Blade", Second Int. Conf. on Fluid Machinery, Beijing, China, August 1993.
143. Venkatrayulu, N., Balaji Rao, N. and Prithvi Raj, D., "New Method for Measuring Turbomachinery Flows", Proceedings of 20th National Conf. on Fluid Mechanics and Fluid Machinery, Palghat, India, Dec. 15-17, 1993.
144. Balaji Rao, N., Venkatrayulu, N. and Prithvi Raj, D., "Flow Field Behind an Axial Flow Fan Rotor Blade", Presented at 6th Int. Conf. on Flow Measurement, Seoul, Korea, during October 26-29, 1993.
145. Sitaram, N. and Dhote, R.E., "Effect of Free Stream Turbulence Level on the Boundary Layer Measurements on an Axial Turbine Rotor Cascade", Second Int. Conf. on Fluid Mechanics, Chinese Society of Theoretical and Applied Mechanics, July 1993, Beijing, China.
146. Sitaram, N. and Hari Babu, R., "A Four Hole Probe for Accurate Measurements in Three Dimensional Shear Layers", Proceedings of 20th National Conf. on Fluid Mechanics and Fluid Machinery, Palghat, India, Dec. 15-17, 1993.
147. Sitaram, N. and Hari Babu, R., "Effect of Incidence Angle on the Boundary Layer Development of a Turbine Rotor Cascade", National Conf. on Fluid Machinery, K.J. Somaiya College of Engineering, Bombay, March 11-13, 1994.
148. Nayak, A.K., Venkatrayulu, N., and Prithvi Raj, D., "Two dimensional Viscous Flow Analysis through 90 and 180 Bend Channels by Adaptive Finite Element Method", National Conf. on Fluid Machinery, pp. D1-1 to D1-6, K.J. Somaiya College of Engineering, Bombay, March 11-13, 1994.
149. Nayak, A.K., Venkatrayulu, N., and Prithvi Raj, D., "Pre -and - Post Processing in CFD", National Conf. on Fluid Machinery, pp. F1-1 to F1-5, K.J. Somaiya College of Engineering, Bombay, March 11-13, 1994.
150. Ramana Murthy, G.V., and Venkatrayulu, N., "Development and Growth of Secondary Flows in a Linear Turbine Cascade", National Conf. on Fluid Machinery, pp. C3-1 to C3-6, K.J. Somaiya College of Engineering, Bombay, March 11-13, 1994.
151. Vijaya Vithal Bongale, Prithvi Raj, D., and Venkatrayulu, N., "Some Experimental Investigations in a Vaneless Diffuser of a Centrifugal Compressor", National Conf. on Fluid Machinery, pp. B2-1 to B2-6, K.J. Somaiya College of Engineering, Bombay, March 11-13, 1994.
152. Sivanandan and A.Mani, Estimation of viscosity and Thermal conductivity of R142b and R152a., Int. Journal of Energy Research., Vol.18, 1994
153. Mani Kumari, A.Mani, V.M.K.Sastri and Gunabushnam, Heat Transfer in the rotor field Lead annulus of the superconducting Generator, First ASME - ISHMT Conf., BARC, Bombay, Jan. 1994
154. Karthikeyan, G, Mani, A and Srinivasa Murthy, S., "Cooling effect of water flow path on the Performance of a Vapour Absorption Refrigeration System operated on a transfer tank, National Solar Energy Convention, Baroda, 1993.
155. Ravikumar, K.V., Somayajulu, N.V.S., Venkatarathnam, G., Mukherjee, D. and Sarangi, S. "CRESPA steady state simulator for Cryogenic Process Plants", Proc.of Cryogenic Engg.Conf., Albuquerque, USA, June'93.
156. Subhakar, D. and Srinivasa Murthy, S., "Saturated solar ponds: 1.Simulation procedure Solar Energy", Vol.50, No.3, 1993, pp. 275 - 282.
157. Subhakar, D. and Srinivasa Murthy, S., "Saturated solar ponds: 2.Parametric studies", Solar Energy, Vol.50, No.4, 1993, pp. 320 - 328.
158. John M. George and Srinivasa Murthy, S., "Effects of different temperature levels at generator and evaporator on the performance of vapour absorption heat transformers Int. J. of Energy Research, Vol.16, 1992, pp 373-380.
159. John M.George and Srinivasa Murthy, S., "Experiments on a vapour absorption heat transformer, Int. J. of Refrigeration, Vol.16, No.2, 1993, pp. 107 - 119.
160. Sugathan, N. Srinivasan, K. and Srinivasa Murthy, S., "Experimental assessment of heat transfer correlations for thermal design of thrust chambers of cryogenic engines, J. of Propulsion & Power (AIAA), Vol.9, No.2, 1993, pp. 240 - 245.
161. Chinnappa, J.C.V. Crees, M.R. and Srinivasa Murthy, S., and Srinivasan, "Solar assisted vapour compression/absorption cascaded airconditioning system Solar Energy, Vol. 50, No.5, 1993, pp 453 - 462.



162. Ram Gopal and Srinivasa Murthy, S., "Prediction of heat and mass transfer in annular cylindrical metal hydride beds, *Int. J. of Hydrogen Energy*, Vol.17, No.10, 1993, pp 795-805.
163. Fatouh, M. and Srinivasa Murthy, S., "Comparison of R22-absorbent pairs for absorption cooling based on P-X-T data, *Int. Jr. of Renewable Energy*, Vol.3, 1993, pp 31-37.
164. Fatouh, M. and Srinivasa Murthy, S., "Comparison of R22-absorbent pairs for absorption cooling based on H-X-T data, *Int. Jr. of Renewable Energy*, Vol.3, 1993, pp 262-271.
165. Fatouh, M. and Srinivasa Murthy, S., "Comparison of R22-absorbent pairs for vapour absorption heat transformers based on P-T-X-H data, *Heat Recovery Systems and CHP*, Vol.13, No.1,1993, pp. 33 - 48.
166. Srinivasa Murthy, S. and Sastri, M.V.C., Thermodynamic analysis of two-stage metal hydride heat pumps *Hydrogen Energy*, Vol.17, No.9, 1993, pp. 731-735.
167. Ram Gopal and Srinivasa Murthy, S., "Influence of heat and mass transfer effectiveness on metal hydride heat pump performance *Hydrogen Energy*, Vol.18, No.1, 1993, pp.31-37.
168. Ram Gopal and Srinivasa Murthy, S., "Parametric studies on heat and mass transfer in metal hydride beds *Chemical Engineering and Processing*, Vol.32, 1993, pp. 217 - 223.
169. Karthikeyan, G. Mani, A. and Srinivasa Murthy, S., "Analysis of absorption refrigeration system with transfer tank *Int. Jr. of Renewable Energy*, Vol.4, 1994, pp. 129 - 132.
170. Srinivasa Murthy, S., "Environmentally friendly working fluids for vapour compression refrigeration and heat pump applications *Workshop on Environmentally Sound Technologies for Heating and Cooling Technologies in Human Settlements*, Townsville, Australia, 28 Sept.-2 Oct. 1992.
171. Srinivasa Murthy, S., "Vapour absorption heat pumps and heat transformers *Workshop on Environmentally Sound Technologies for Heating and Cooling Technologies in Human Settlements*, Townsville, Australia, 28 Sept.-2 Oct. 1992.
172. Fatouh, M. and Srinivasa Murthy, S., "Experimental studies on a R22-DMETEG absorption cooling system suitable for solar energy utilisation, *ISES Solar World Congress; Budapest, Hungary*, August 23 - 27, 1993
173. Narasimham, J. and Srinivasa Murthy, S., "R22 based double effect vapour absorption refrigeration systems for solar energy applications, *ISES Solar World Congress; Budapest, Hungary*, August 23 - 27, 1993
174. Narasimham, J. and Srinivasa Murthy, S., "Double-effect absorption heat pump performance: A comparative study *11th Int. Congress of Chemical Engg., CHISA'93, Praha, Czech Republic; Aug. 29 - Sept. 3, 1993*
175. John M. George and Srinivasa Murthy, S., "Mass transfer in the falling film absorber of a vapour absorption heat transformer *11th Int. Congress of Chemical Engg., CHISA'93, Praha, Czech Republic; Aug. 29 - Sept. 3, 1993*
176. Prakash Maiya, M. and Srinivasa Murthy, S., "A comparative study of solid sorption refrigerators *National Solar Energy Conf., New Delhi, 28-30 December, 1992.*
177. Karthikeyan, G. Mani, A. and Srinivasa Murthy, S., "Analysis of absorption refrigeration system with transfer tank *National Solar Energy Conf., New Delhi, 28-30 December, 1992.*
178. Fatouh, M. and Srinivasa Murthy, S., "Experiments on a R22-DMETEG vapour absorption refrigeration system suitable for solar energy applications, *National Solar Energy Conf., New Delhi, 28-30 December, 1992.*
179. Fatouh, M. and Srinivasa Murthy, S., "Experimental studies on R22-DMA vapour absorption refrigeration system working with solar energy as heat source, *5th Int. Energy Conf., Seoul, Korea, 18-22 October 1993.*
180. Mahalingam, M. and Ajit Kumar Kolar, "Experimental Investigation on Heat Transfer at the Wall of a Circulating Fluidized Bed", *12th Int. Conf. on Fluidized Bed Combustion, San Diego, California, pp. 341, May 1993.*
181. Venkata Ramayya, A., Venkateshan, S.P. and Ajit Kumar Kolar, "Large Particle Fluidization Studies with a Differential Pressure Fluctuation Record", *12th Int. Conf. on Fluidized Bed Combustion, San Diego, California, pp. 877, May 1993.*
182. Annamalai, V.E, Sornakumar, T, Krishnamurthy, R and Gokul-rathnam, C.V, "Efficient grinding of Ce-TZP with SiC wheels", *Jl. of European Ceramic Society*, 11, 1993, pp.463-469.

183. Annamalai, V.E, Sornakumar, T, Krishnamurthy, R and Gokul-rathnam, C.V, "Cutting tool application of Ceria-Zirconia", *Jl. of European Ceramic Society*, 12, 1993, pp.227-239.
184. Sornakumar, T, Krishnamurthy, R and Gokulrathnam, C.V, "Thermal shock resistance of composites of Alumina and Partially stabilized Zirconia", *Jl. of Material Science Letters*, 12, 1993, pp.1253-54.
185. Sornakumar, T, Krishnamurthy, R and Gokulrathnam, C.V, "Mechanical properties of composites of alumina and partial-ly stabilized zirconia", *Jl. of Material Science Letters*, 12, 1993, pp.1283-85.
186. Sornakumar, T, Krishnamurthy, R and Gokulrathnam, C.V, "Machining performance of phase transformation toughened alumina and PSZ composite cutting tools", *Jl. of European Ceramic Society*, 12, 1993, pp.455-460.
187. Ramasubramanian, N, Krishnamurthy, R and Malhothra, S.K, "Tribological characteristics of filled ultrahigh molecular weight high density polyethylene", *Wear*, 162-164, 1993, pp.631-635.
188. Santhanakrishnan, G and Krishnamurthy, R, "Tool wear studies during machining of glass", *Carbon an Kelvar Fibre Reinfor-ced Plastics using HSS Tools*, *Jl of Aeronautical Society of India*, Vol.45, No.1, Feb 1993, pp.96-105.
189. Ravindra, H.V, Srinivasa, Y.G and Krishnamurthy, R, "Acoustic emission as artificial intelligence in metal cutting", 2nd Int. Conf. on CIM, ICCIM 93, Singapore, 6-10 Nov. 1993.
190. Santhanakrishnan, G, Krishnamurthy, R and Malhothra, S.K, "Tool wear studies during machining of glass, carbon and kelvar fibre thermoset plastic matrix composites using HSS tools", *Proc. of the X National Conf. on Industrial Tribology*, Mar 25-26, 1993, Dehradun, Tata McGraw Hill Pub. Co. Ltd, Vol.1, pp.119-124.
191. Santhanakrishnan, G, Krishnamurthy, R and Malhothra, S.K, "Priliminary investigations on machining of advanced fibrous composites", accepted for presentation and publication at the 38th Int. SAMPE Symp. and Exhibition, 10-13 May, 1993, Anaheim, California, USA.
192. Santhanakrishnan, G and Krishnamurthy, R, "Tribo materials with emphasis on ceramics and composites", *Proc. of the National seminar on Frontiers of Tribology and Condition Monitoring*, June 19, 1993, IIT Madras, Tata McGraw Hill Publications, pp.77-84.
193. Santhanakrishnan, G, Krishnamurthy, R and Malhothra, S.K, "Investigations on the dynamics of machining of composites", 9th Int. Conf. on Composite Materials (ICCM-9), 12-16 July, 1993, Madrid, Spain.
194. Santhanakrishnan, G, Krishnamurthy, R and Malhothra, S.K, "Mechanism of tool wear during machining of advanced fibrous composites", *Int. Conf. on Machining of Advanced Materials*, 20-22 July, 1993, Gaitersburg, Md.USA.
195. Santhanakrishnan, G, Krishnamurthy, R and Malhothra, S.K, "Flank wear and spalling of ceramics during machining of polymeric composites", *Proc. of Symp. on Machining of Composites materials-II*, 1993, ASM Materials Week, Pittsburg, Pennsylvania, USA, Oct. 17-21, 1993.
196. Natarajan, R, et al. "Utilization of Wood as Fuel Re-source", *Energy Management*", National Productivity Council, April 1993, pp.5-13.
197. Ramesh, N.R and Natarajan, R, "Performance Characteristics of a Stem-Jet type Twin-Fluid Acoustic Burner", *Energy Management Bulletin*, V.1, 5, April-June 1993.
198. Ramanujachari, V and Natarajan, R, "Two-way coupling and Modulation Effects in Particle-laden Turbulent Round Jets", *Indian Jl. of Technology*, V.31, 1993, pp.555-562
199. Natarajan, R, "Energy Policy and Planning for Future : Some Essential Considerations", in *Energy Options for the 21st Century*, Ed.R.N.Subudhi, Ashish Publishing House, New Delhi, 1993.
200. Natarajan, R, "Factors Promoting Industry-Institute Symbiosis", *Indian J.Tech. Education*, V.16, No.3, 1993, pp.15-25.
201. Natarajan, R, "Combustion-Generated Air Pollution", *J. Institution of Engineers (India) : Mechanical Engg. Division*, V.74, 1994, pp.157-161.
202. Chandrakant, L.S, Seetharama Rao, K, Ramakrishnan, A, and Natarajan, R, "The Response of Indian Industry to Current Engg. Curricula" *J.Scientific and Industrial Research*, V.3, 1994, pp.210-225.
203. Ramanujachari, V and Natarajan, R, "Investigations of the Response of Particles to Gas-Phase Turbulence in a Two-Phase Turbulent Round Jet", *Proceeding II Int. Symposium on Engineering Turbulence Modelling and Measurements*, Florence, Italy, May 31-June 2, 1993.
204. Ramanujachari, V and Natarajan, R, "Flow field predictions of an evaporating spray", *XI International Symposium on Air Breathing Engines*", Tokyo, Japan, Sept. 20-24, 1993.

## 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 Details of Faculty

Name and Qualification	Major area of Specialisation
<b>Professors</b>	
K.Anantha Padmanabhan, Ph.D.(Cantab)	Metal forming (rolling, sheet metal, forging), mechanical metallurgy, Superplasticity.
D.R.Gopalakrishna Achar, Ph.D.(IIT Madras)	Metal joining, (welding technology) failure analysis, corrosion, industrial metallurgy.
K.J.Lakshminarayana Iyer, Ph.D.(IIT Madras) <b>Head</b>	Material science, failure analysis, physical metallurgy.
O.Prabhakar, Ph.D.(IIT Madras)	Non-destructive testing and process modeling.
V.M.Radhakrishnan, Ph.D.(IIT Madras)	Fracture mechanics, high temperature materials, fatigue and creep.
H.Md.Roshan, Ph.D.(IIT Madras)	Metal casting (foundry technology)
S.K.Seshadri, Ph.D.(London)	Chemical metallurgy, surface technology utilisation of renewable agricultural resources.
K.Srinivasa Raghavan, Ph.D.(Pensilvaniya)	Materials science, physical metallurgy and electron microscopy.
S.Sundaresan, Ph.D.(IIT Madras)	Metal joining, welding metallurgy, mechanical behaviour.
R.Vasudevan, Dr.-Ing.(Aachen)	Physical metallurgy, heat treatment, X-ray diffraction and un-conventional processes
<b>Associate Professors</b>	
C.V.Gokularathnam, Ph.D.(Florida)	Physical metallurgy, X-ray diffraction, advanced ceramics, SEM & TEM.
S.D.Pathak, Ph.D.(IIT Madras)	Materials science and technology, mechanical behaviour, material testing, metal casting
K.Prasad Rao, Ph.D.(IIT Madras)	Metal joining, corrosion.
S.Raghavan, Ph.D.(IISc)	Physico-chemical aspects of process metallurgy, extractive metallurgy.
S.Ramakrishna Iyer, Ph.D.(IIT Madras)	Furnace technology, extraction metallurgy, hot corrosion.
P.Venugopal, Ph.D.(IIT Madras)	Metal forming, extrusion of metals and metallic powder, metal forming equipment and tool

**Name and Qualification****Major area of Specialisation****Assistant Professors**

D.Ganapat Ram Sharma, Ph.D.(IIT Madras)

Metal casting, nondestructive testing, process modelling.

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

Physical metallurgy, X-ray diffraction.

Paramanand Singh, Ph.D.(IIT Bombay)

Powder metallurgy, ceramics and composites.

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

Metal forming, materials science

**Lecturers**

V.Sampath, Ph.D.(IISc)

Materials technology, electroslag refining.

Senior Scientific Officers Gr II

S. Annamalai, M.S.(IIT Madras)

Metal forming

S.S.Bhattacharya, B.Tech.(IIT Madras)

Metal forming

B. Guha, Ph.D.(IIT Madras)

Mechanical testing, metal joining

G.Jothinathan, M.Tech.(IIT Madras)

Non-destructive testing ceramics

S.Kumaran, M.Sc.(Madras)

Non-ferrous extraction metallurgy, corrosion and chemical metallurgy.

**Technical Officer**

B. Raghunatha Rao, Ph.D.(IIT Madras)

Heat treatment, failure analysis.

**4.11.3 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.	6	-	8	1	7	-	4	1	7	-	32	2	34
M.S.	2	-	1	-	3	-	1	-	1	-	8	-	8
M.Tech.	8	-	5	-	-	-	-	-	-	-	13	-	13
B.Tech.	30	1	26	2	26	1	23	1	-	-	105	5	110
<b>Total</b>	<b>46</b>	<b>1</b>	<b>40</b>	<b>3</b>	<b>36</b>	<b>1</b>	<b>28</b>	<b>2</b>	<b>8</b>	<b>-</b>	<b>158</b>	<b>7</b>	<b>165</b>

**4.11.4 Number of Scholarships/Fellowships holders**

Programme	Institute	Others	Total
Ph.D.	18	1 (SAIL)	19
M.S.	3	-	3
<b>Total</b>	<b>21</b>	<b>1</b>	<b>22</b>

**4.11.5 Instrument/Equipment Designed and developed**

One disc type wear testing apparatus

**4.11.6 New facilities added and major equipment procured**

1. Microprocessor Controlled horizontal diffractometer with 60 kV, 2.5 kW X- ray Generator
2. Fritsch planetary mill pulverisette - 5, with timer and speed control for grinding metallic and ceramic powder.

#### 4.11.7. Short term courses/ Workshops/ Seminars/ Symposia/Conferences organised

S.No.	Co-ordinator(s)	Title of Course /Workshop/ Seminar/ Symposia/ Conference	Period
1.	Dr. P.Kesavan Nair	Residual Stresses	6.11.93
2.	Dr. Paramanand Singh & Dr K Gopinath	Curriculum Development work on Advanced Powder Metallurgy	16 & 17th March 1994

#### 4.11.8. Short term courses/ Workshops/ Seminars/ Symposia/Conferences/Training attended by the faculty in recognised Academic Institutions

Sl.No.	Name of Faculty	Title	Date	Venue
1.	Dr.S.K.Seshadri	Chemical Engg. Conference	15-17 Dec. 1993	IIT. Bombay
2.		Workshop on Nucleation and growth	13-14 Mar. 1994	IISc. Bangalore

#### 4.11.9. Invited Lectures delivered by the Faculty in Academic Institutions and Public bodies.

Sl.No.	Name of the faculty	Topic of the Lecture	Date	Delivered at
1.	Dr.D.R.G. Achar	Failure of welding joints	6.7.93	Mech.Engg. IIT Madras Workshop
	-do-	Welding Technology	2.7.93	T.N.P.L.
	-do-	Welding Technology and Inspection	1.9.93	Refinery Engg. School of Training RESOT Centre Madras
	-do-	Advances in Welding Technology	8.10.93	Advance Trg. Centre Madras (Workshop)
2.	Dr.R.Vasudevan	Ultrasonics	15.10.93	ISNT Madras
	-do-	Basic Metallurgy	July, 1993	TI Group.
	- do -	Heat Treatment	July, 1993	AB Consultancy

#### 4.11.10. Distinguished visitors to the Department (Important dignitaries above the level of Professors)

Sl.No.	Name of the Visitor and Occupation	Date of visit	Purpose of visit (Lecture/Discussion)
1.	Dr Helmut Wolf Feodar Lynnen Fellow of Alexander von Humboldt Foundation Bonn	29.4.93	Creep of Technologically relevant alloys
2.	Prof.T.R.Anantharaman Emeritus Scientist National Physical Lab. New Delhi	27.7.93	A possible crystallographic Approach to Quasi Crystals
3.	Dr.K.Sadananda Head Deformation and Fracture Group Naval Research Lab. Washington D.C. USA	26.8.93	A Re-evaluation of the Fatigue Crack Phenomenon
4.	Dr.K.Venkatachari Institute for Self-propagating High Temperature Synthesis New York State College of Ceramics at Alfred New York 14802	4.10.93	Fabrication of Mullite Based Fibres

Sl.No.	Name of the Visitor and Occupation	Date of visit	Purpose of visit (Lecture/Discussion)
5.	Dr.V.Seshadri Professor Federal University of Brazil Brazil	3.12.93	Characterisation of Iron ore sinters and studies on their low temperature degradation properties
6.	Dr.Richard D.Wood University College of Swansea U.K.	15.12.93	Some Recent Development in the Numerical Simulation of Superplastic Forming
7.	Prof.A.K.Mukherjee Univeristy of California Davis Campus, USA	31.12.93	Superplasticity in Intermetallics and Ceramics
8.	Prof.Dr.-Ing.H.Wohlfahrt Director Institute for Welding Technology and Materials Science Technical University Braunschweig, Germany	02.03.94	Possibilities of improving the fatigue strength of welded joints taking into accunt residual stresses
9.	Dr.Harmut Cords Research Centre Julich (GmbH) Institute for Materials in Energy Systems (IWE-I) Germany	17.2.93	Results of a Stress Strain Finite Element Calculation Applied to a Cylindrical Notched Bar Specimen under Uni-Axial Load

#### 4.11.11. Sponsored Projects

S.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	1988-93	ISRO	6.00	Prof.R.Vasudevan
2.	Indo-German project on Materials Testing	1986-93	GTZ Germany	DM 3.2 millions	Prof.K.A.Padmanabhan
3.	Fatigue behaviour & fatigue crack growth studies crack on Mg & Al alloys	upto Mar.93	ARDB	6.62	Prof.V.M.Radhakrishnan
4.	CAD in Metal casting face to and modeling of metallurgical microstructure	1990-93	DST	10.332	Prof.O.Prabhakar
5.	Welding of titanium alloys	3 years	DST	11.98	Prof.S.Sundaresan
6.	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
7.	Studies on plasma sprayed ceramic coatings	3 years	DST	4.09	Dr.K.Prasad Rao Dr.C.V.Gokularathnam
8.	Design & Development of a gasget for fatigue testing of welds at ultrasonic frequencies	1 Year	ICSR	0.80	Dr.R.Vasudevan
9.	Sheet metal formability and its correlation with texture profile in EDD steels	July '93 to June '96	SAIL	6.21	Dr.K.A.Padmanabhan Dr.K.Srinivasa Raghavan

#### 4.11.12. Major Consultancy Assignments

S.No.	Title	Organisation	Amount	Co-ordinator(s)
1.	Piston problems	I.P.Rings Ltd.Madras	0.45	Prof.O.Prabhakar

S.No.	Title	Organisation	Amount	Co-ordinator(s)
2.	Failure analysis	Tamilnadu Petroproducts Manali Madras	0.15	Dr.K.J.L. Iyer Dr.B.R.Rao Mr.R.Murugesan
3.	Chemical and Met. analysis	Nagarjuna Fertilizers, Kakinada	0.25	Prof.K.J.L.Iyer Dr.B.R.Rao Mr.R.Murugesan
4.	Residual stress analysis	Rane Brake Linings, Madras	0.14	Dr.P.K.Nair Prof.R.Vasudevan
5.	Modelling and Solidification	D.M.R.L. Hyderabad	1.85	Prof.O.Prabhakar
6.	Fatigue test	Dev Fasteners Madras	0.10	Dr.S.D.Pathak
7.	Microstructure and Hardness Analysis	Team and Co., Madras	0.12	Dr.K.J.L.Iyer Dr.B.R.Rao Mr.R.Murugesan
8.	Failure analysis of Ni-Cr-Nb cast alloys	Madras Refineries Ltd., Madras	0.13	Dr.K.J.L.Iyer Dr.B.R.Rao Mr.R.Murugesan
9.	Failure analysis of impeller	Nagarjuna Fertilizers, Kakinada	0.25	Dr.K.J.L.Iyer Dr.B.R.Rao Mr.R.Murugesan
10.	Heat treatment	B.S & B Safety Systems Madras	0.10	Dr.K.J.L.Iyer Dr.B.R.Rao Mr.R.Murugesan
11.	Evaluation of cracking of stainless steel pressure cookers	T.T.Ltd.Bangalore	0.10	Dr.K.A.Padmanabhan Dr.P.Venugopal
12.	Fatigue test of PVC tube	Polytrusion Ltd. Madras	0.12	Dr.S.D.Pathak
13.	Fracture toughness KIC value	Titanium Equipment & Anode Mfg. Co. Madras(TEAM)	0.10	Dr.S.D. Pathak
14.	Warm heading of push rod	Susira (P) Ltd.Madras	0.15	Dr.P.Venugopal Dr.V.Radhakrishnan Dr.O.V.K.Chetty
15.	Design assistance for stainless deep drawing and bellow drawing for cryogenic application	Jayam Company	0.35	Dr.P.Venugopal Dr.V.Radhakrishnan Dr.O.V.K.Chetty

#### 4.11.13. Honours and Awards

S.No.	Name of Faculty	Honours/Awards	Purpose
1.	K.A.Padmanabhan	CDC-DSIR Award (Certificate of merit)  Indian Academy of Sciences, Bangalore  Indian National Academy of Engg. New Delhi	For setting up of a major superplasticity forming facility at VSSC Trivandrum  Election to a fellowship of the Indian Academy  Election to a Fellowship of the Indian National Academy of Engg.
2.	O.Prabhakar	MRSI Medal of the Materials Research Society of India	For outstanding contribution in the Materials Science
3.	V.M.Radhakrishnan	Indian Inst.Metals Calcutta	Best paper award Oral session prize for the best oral paper at the 47 ATM.

S.No.	Name of Faculty	Honours/Awards	Purpose
4.	A.Selvam	-do-	Best paper award among the poster paper presented at 47 ATM
5.	T.R.Ramachandran	-do-	Vidyabharathi Award (Top student in Met.Engg.IIT Madras)

#### 4.11.14 Research Publications

##### a. In Periodicals

1. P.P. Date and K.A. Padmanabhan, On the deformation and fracture behaviour of low pressure gas (LPG) grade steel and two aluminium alloys, *J. Materials Processing Technol*, 39 (1993), pp 153-164.
2. S. Ganesh Sundara Raman and K.A. Padmanabhan, Tensile deformation included martensitic transformation in AISI 304 LN austenitic stainless steel, *J. Mater. Sci. Letters*, 13 (1994), pp 389 - 392.
3. V. Sampath, A study of the Fatigue, Impact and Fracture Toughness characteristics of Electroslag Refined IS : 7670 Alloy, *Canadian Metallurgical Quarterly*, 32 (1) (1993) 57-67.
4. S. Sundaresan, Friction Welding of Aluminium to Austenitic Stainless Steel, *Int. J. Joining of Materials*, 5 (2), (1993) 66 - 70.
5. E.P. Rajiv and S.K. Seshadri, A study of the tribological properties of cobalt- titania composites, *J. Materi. Sci.* 28, (1993), 1758 - 64.
6. C.S. Ramesh, S.K. Seshadri and K.J.L. Iyer, Fatigue behaviour of Nickel-flyash composite coatings, *J. Mater. Sci. Letters*, 12, (1993) 746.
7. S. Balathandan and S.K. Seshadri, High temperature oxidation behaviour of electroformed nickel- ceria composite. *Trans. SAEST*, 28 (1993) 26-28.
8. P.B.S.N.V. Prasad, R. Vasudevan and S.K. Seshadri, Wear characteristics of nickel electro deposits in ultrasonically agitated bath, *J. Materi. Sci. Letters*, 12 (1993) 902 - 903.
9. P.B.S.N.V. Prasad, R. Vasudevan, S.K. Seshadri, Ultrasonic agitation during electrodeposition, *Trans. J.J.M.* 46 (1993), 247 - 250.
10. O. Prabhakar, Solidification Modelling, *Bull. Mater. Sci.* 16 (6), Dec. 1993, 543-560.
11. T. Jayakumar, Baldev Raj and O. Prabhakar, Influence of Mc- type carbides on Acoustic Emission Generated during Tensile Deformation in a Nimonic Alloy, *J. Acoustic Emission*, 11, (1993) 43-51.
12. K.S. Kannan, R. Krishnakumar and O. Prabhakar, Finite Element Crack Growth Algorithm for Dynamic Fracture, *Computational Mechanics*, 12, (1993) 349 - 359.
13. B. Guha, Effect of specimen geometry on fatigue of welded joints, *Eng. Fracture Mechanics*, 46 (1), (1993), 35 - 39.
14. M. Kumar and B. Guha, Fatigue characteristics of based on plate of aluminium and Al-Zn-Mn alloy, *Theoretical & Applied Fracture Mechanics*, 19 (1993), 151 - 156.
15. P.B.S.N.V. Prasad, R. Vasudevan, S.K. Seshadri and S. Ahila, Corrosion resistance of Zinc electrodeposits prepared in Ultrasonically agitated bath, *J. Mat. Sci. (letters)*, 12 (1993) pp 1752-54.
16. P.B.S.N.V. Prasad, R. Vasudevan, S.K. Seshadri and S. Ahila 'The Effect of ultrasonic vibration of nickel electrodeposition', *J. Mat. Sci. (letters)*, 17 (1993) 357 - 359.
17. S. Raghavan 'Electrochemical determination of Gibbs energies of formation of Lanthanum niobates' April 1993.
18. J. Swaminathan and S. Raghavan, 'Effect of vanadic corrosion on Creep rupture of superni 600 at 650 - 750°C' *Materials at high temperature* 10 (4) 1992 pp 242 - 250.
19. J. Swaminathan, S. Raghavan and S. Ramakrishna Iyer 'Studies on the hot corrosion of some Nickel - Base superalloys by vanadium pentoxide'. *Trans IIM*, 46 (), 1993 pp 175-181.
20. S. Ahila, S. Ramakrishna Iyer, S. Raghavan and V.M. Radhakrishnan 'Thermodynamic Phase stability diagram for Hot corrosion reaction of 2.25 Cr-1Mo steel in the presence of a slat mixture. *Trans IIM* 46 (3), 1993, 193-197.



21. S. Raghavan, K. Palanivelu, S. Esakku, S.K. Seshadri, Thermodynamic activities at 1256 K in the system nickel oxide - magnesium oxide - Zinc oxide using a solid state galvanic cell'. *J. Mater. Sci. Lett.* 12 (1993) pp 1927 - 1929.
22. M. Balasubramanian, S.K. Malhotra and C.V. Gokularathnam, Sol-gel processing of Alumina based ceramic composites, *Indian Journal of Engineers*, Vol.22, 1992 Annual Issue, p 41.
23. S. Ahila and S. Ramakrishna Iyer, Fusion characteristics of  $\text{Na}_2\text{SO}_4 - \text{K}_2\text{S}_2\text{O}_7$  and  $\text{Na}_2\text{SO}_4 - \text{K}_2\text{S}_2\text{O}_7$  systmes, *J. Mater. Sci. Lett.* 12 (1993) pp 318 - 319.
24. S. Ahila, S. Ramakrishna Iyer and V.M. Radhakrishnan, Creep deformation and Rupture of induction pressure welded 2.25 Cr-1Mo steel in hot corrosion, Part I - Mechanical behaviour, *Trans. Ind. Inst. Met.*, 46 (4) (1993) pp 215 - 223.
25. S. Ahila, S. Ramakrishna Iyer and V.M. Radhakrishnan, Creep deformation and rupture of induction pressure welded 2.25 Cr-1Mo steel in hot corrosion, Part II- Microstructural aspects, *Trans. Ind. Inst. Met.* 46 (4) (1993) pp 225 - 235.
26. S. Ahila, S. Ramakrishna Iyer and V.M. Radhakrishnan, Effect of corrosive coating on creep rupture properties of 2.25 Cr-1Mo steel, *Ind. J. Technol.* 31 (1993) pp 653 - 659.
27. S. Ahila, S. Ramakrishna Iyer and V.M. Radhakrishnan, A comparative study of hot corrosion of welded and unwelded 2.25 Cr - 1 Mo steel, *Mater. Lett.*, 16 (1993) pp 130 - 133.
28. S. Ahila, S. Ramakrishna Iyer, and V.M. Radhakrishnan, Assessment of high temperature performance of induction pressure welded 2.25 Cr - 1 Mo steel in corrosive environment, *Scripta Metall. et Mater.*, 28 (1993) pp 1223 - 1228.
29. S. Ahila, S. Ramakrishna Iyer and V.M. Radhakrishnan, Effect of temperature on microstructure of 2.25 Cr - 1 Mo steel during creep testing, *J. Mater. Sci. Lett.*, 12 (16) 1993, pp 1296 - 1298.
30. S. Ahila, V.M. Radhakrishnan and S. Ramakrishna Iyer, Hot Corrosion behaviour of 2.25 Cr - 1 Mo steel in sulphate - chloride atmosphere, *J. Mater. Sci. Lett.*, 12 (15) 1993, pp 1191 - 1192.
31. S. Ahila, S. Ramakrishna Iyer and V.M. Radhakrishnan, Creep deformation of induction pressure welded 2.25 Cr - 1 Mo steel, *Intl. J. Pressure vessels piping*, 57 (1994) pp 327 - 330.
32. S. Ahila and S. Ramakrishna Iyer, Fire-side corrosion of super heaters and reheaters in coal fired boilers, *Tool and alloy steels*, 26 (2 & 3) 1992, pp 45 - 50.
33. S. Ahila, P.B.S.N.V. Prasad, S. Ramakrishna Iyer and V.M. Radhakrishnan, Acceleration of high temperature oxidation of manual metal arc welded 2.25 Cr-1 Mo steel by sulphate - chloride mixture, *Mater. Lett.*, 17 (1993) pp 155 - 158.
34. S. Ahila and S. Ramakrishna Iyer, Creep rupture behaviour of 2.25 Cr - 1 Mo steel in sulphate - pyrosulphate mixture, *J. Mater. Sci. Lett.*, 12 (1993) pp 1925 - 1926.
35. S. Ahila, S. Ramakrishna Iyer and V.M. Radhakrishnan, Melting point determination of  $\text{K}_2\text{SO}_4 - \text{NaCl}$  system, *J. Mater. Sci. Lett.*, 12 (1993) pp 1733 - 1734.
36. S. Ahila, S. Ramakrishna Iyer and V.M. Radhakrishnan, Temperature dependence of hot corrosion of 2.25 Cr - 1 Mo steel and its weldments, *Mater. Forum*, IT (2) 1993, pp 1 - 5.
37. S. Ahila, S. Ramakrishna Iyer and V.M. Radhakrishnan, Creep life estimation of 2.25 Cr - 1 Mo steel weld joints by a parametric method, *Indian J. Engg. Mat. Sci.* (1994) pp 48 - 52.
38. S. Ahila, S. Ramakrishna Iyer and V.M. Radhakrishnan, Comparative study of creep behaviour of 2.25 Cr - 1 Mo steel and its weldments, *Intl. J. Pressure vessels Piping* - 58, 1994 pp.
39. P.B.S.N.V. Prasad, S. Ahila, R. Vasudevan and S.K. Seshadri, Electrochemical impedance study of nickel electrodeposits in ultrasonically agitated bath, *Ind. J. Chem. Technol.*, 1 (1994) pp 127 - 128.
40. P.B.S.N.V. Prasad, S. Ahila, R. Vasudevan and S.K. Seshadri, Fatigue strength of nickel electrodeposits prepared in ultrasonically agitated bath, *J. Mater. Sci. Lett.*, 13 (1994) pp 15 - 16.
41. R. Ponraj and S. Ramakrishna Iyer, A simple preparation method to determine fracture toughness using the single edge notched beam technique for porcelain ceramics, *J. Mater. Sci. Lett.*, 12 (1993) pp 417 - 419.
42. V.K. Saxena, M.S. Gopalakrishna, P.S. Chhaunker and V.M. Radhakrishnan, Fatigue and Fracture behaviour of a nickel - chromium free austenitic steel, *Intl. J. Pressure vessels and piping* 60 (1994).
43. V.M. Radhakrishnan, Sreeramesh Kalluri and Gary R. Halford, An analysis of isothermal, bithermal and thermomechanical fatigue data of Haynes 188 & B 1900 + Hf by energy considerations, NASA Technical Memorandum 106359.

## b) Conferences and Proceedings

1. P.B.S.N.V. Prasad, R. Vasudevan and S.K. Seshadri, Effect of ultrasonics on wear resistance of electrodeposits, Int. Conf. on Surface Engineering, Bremen, Germany, March 9-11, 1993.
2. P.B.S.N.V. Prasad, R. Vasudevan and S.K. Seshadri, Ultrasonics a boon in nickel electroplating, Int. Conf. on Energy, Environment and Electrochemistry, Karaikudi, Feb. 1993.
3. R. Vasudevan, Alternate technology using an unfamiliar concept, 25th National Seminar on Energy, Madras, Jan 29-31, 1993.
4. R. Vasudevan and N. Karuna, A novel solid state engine based on the shape-memory effect, 25th National Seminar on Energy, Madras, Jan 29-31, 1993.
5. R. Vasudevan and Y.M. Fazil Marikar, X-ray crystallographic study of urinary stones from Kerala, Fifth National Seminar on crystal growth, Madras, Nov. 18-20, 1993.
6. S. Sindu, Y.M. Fazil Marikar and R. Vasudevan, Crystallographic purity of phosphate crystals grown in vitro, Fifth National Seminar on crystal growth, Madras, Nov. 18-20, 1993.
7. R.K. Vathsala, Y.M. Fazil Marikar and R. Vasudevan, study of effect of different agents on urine crystal growth pattern. Fifth National Seminar on crystal growth, Madras, Nov. 18-20, 1993.
8. S. Sundaresan, Effect of heat input on structure and properties of HSLA steel weld metal, 47th IIM Annual Technical Meeting, 1993.
9. S. Sundaresan, Influence of an external magnetic field on the solidification structure of weld metals. 47th ATM-NMD, Hyderabad, Nov. 1993.
10. S. Sundaresan, Evaluation of hot cracking in austenitic stainless steel weld metals, National Welding Seminar, 1993.
11. S. Sundaresan, Effect of weld energy input and post-weld heat treatment on structure and properties of Ti-6Al-4V., National Welding Seminar, 1993.
12. P. Sampath Kumar and P. Kesavan Nair, Studies on electroless Ni-P deposits on stainless steel substrates, Proc. Int. Conf. on advances in materials and processing, ICamps 92, Feb. 1992, Bombay, India. P.548.
13. P. Sampath Kumar and P. Kesavan Nair, Crystallisation behaviour of Electroless Ni-P deposits, Proc. Int. Conf. on Advances in Materials Processing Technology, ACMPT'93. Dublin City University, Vol.II, 1993, P. 843.
14. M. Balasubramanian, S.K. Malhotra and C.V. Gokullarathnam, Sintering and Transformation behaviour of Spray dried Alumina- Zirconia Composite Powders. Symp. on Composites for High Temperature Applications. Recent Developments, DRDL, Hyderabad, Feb. 6, 1994.
15. M. Balasubramanian, S.K. Malhotra and C.V. Gokullarathnam, Phase Transformations in Spray dried Alumina-Zirconia Composite Powders, Int. Conf. Adv. Phys, Metallurgy, BARC, Bombay, Mar. 9- 11, 1994.
16. K. Madhusudana and O. Prabhakar, Contribution of Fluid flow calculations in solving metal casting problems, Proc. of Conf. on Modelling of Casting, welding and Advanced Solidification Processes VI, Florida, USA, 1993.
17. R. Ambardar, O. Prabhakar and S.D. Pathak, Ultrasonic test techniques to characterize the fatigue properties of materials - An overview, presented at National Seminar and Technical Exhibition NDE-93, 2-4 Dec. 1993, Madras.
18. O. Prabhakar, Solidification Modelling, MRSI Medal Lecture delivered at Thiruvananthapuram, 1993.
19. Kocak, M., Petrovski, B., Achar D.R.G and Evans, G.M., Fracture Mechanics and Wide-plate tests for Analysis of Nitrogen and strain aging effects on Weld Metal Fracture Properties, Proc. of 12th Int. Conf. on Offshore Mechanics and Arctic Engineering (OMAE'93), 20-24, June 1993, Glasgow, Scotland and IIW Doc. X- 1285-93.
20. V. Sampath, Dynamic strain ageing in electroslog refined IS:7670 Alloy, 47 ATM-NMD, Hyderabad, Nov. 1993.
21. G. Devaraj and S.K. Seshadri, Addition agents on the electro deposition of copper with pulse current, 4th National Convention of Electrochemists, Madras, 5-6 July 1993.
22. E.P. Rajiv, Amita Iyer and S.K. Seshadri, Corrosion resistance of cobalt - silicon Nitride composite coatings, 4th National Convention of Electrochemists, Madras, 5-6, July 1993

23. E.P. Rajiv, Amita Iyer and S.K. Seshadri, Electrolytic co-deposition of Co-Si<sub>3</sub>N<sub>4</sub> composites, 4th National Convention Electrochemists, Madras, 5-6 July 1993.
24. Amita Iyer, E.P. Rajiv and S.K. Seshadri, Corrosion resistance of cobalt-ceria composite coating, National Seminar on Int. and Surface Phenomenon in Metallurgy, varanasi, 30 Sept. - 1st Oct. 1993.
25. E.P. Rajiv and S.K. Seshadri, Frictional properties of co-Si<sub>3</sub>N<sub>4</sub> composite, 47 ATM of IIM, Hyderabad, 17-19, Nov. 1993.
26. E.P. Rajiv and S.K. Seshadri, Oxidation resistance of Co-Si<sub>3</sub>N<sub>4</sub> Electrocomposite, 47 aTM of IIM, Hyderabad, 17-19, Nov. 1993.
27. S.B. Senthil Kumar, M.V. Gopalakrishnan, C.V. Gokularathnam, R. Krishnamurthy, Machining performance of Zirconia cutting Tools, JFCC Int. Workshop on Fine Ceramics '94, Japan Fine Ceramics Center, Mikawa Heights, Japan, March 17-18, 1994.
28. S.B. Senthil Kumar, C.V. Gokularathnam, R. Krishnamurthy, Metallurgy of ceramic cutting tools, Int. Conf. on Advances in Physical Metallurgy, Bombay, March 9-11, 1994.
29. S. Ahila, S. Ramakrishna Iyer and V.M. Radhakrishnan, An analysis of Creep -m Environment Interaction of manual metal arc welded 2.25 Cr-1Mo steel at Intermediate Temperatures, 8th National Convention of Metallurgists and Material Scientists and National seminar on Materials for Thermal power plants 11-12 Sept 1993, Bhopal, India (org.) The Institution of Engineers (India).
30. D.V. Ravi, S. Ahila and V.M. Radhakrishnan, Selection of Materials and Design of piping for high temperature applications in Thermal power plants, 8th National Convention of Metallurgists and Materials Scientists and National Seminar on Materials for Thermal power plants, 11-12 Sept. 1993, Bhopal, India (org.) The Institution of Engineers (India)
31. S. Ahila, P.B.S.N.V. Prasad, S. Ramakrishna Iyer and V.M. Radhakrishnan, Study of creep failure of 2.25 Cr-Mo steel and its welded joints, 31st National Metallurgical Day and 47th Annual Technical Meeting, 17-19, Nov. 1993, Hyderabad, India (org.) The Indian Institute of Metals.
32. S. Ahila, V.M. Radhakrishnan and S. Ramakrishna Iyer, Environmental attack of 2.25 Cr-1Mo Steel, Intl. Seminar on Energy, Environment and electrochemistry 10-12, Feb. 1993, Karaikudi (org.) Central Electrochemical Research Institute, Karaikudi, and Society for Advancement of Electrochemical Science and Technology, Karaikudi.
33. S. Ahila and S. Ramakrishna Iyer, Investigation of Hot corrosion and creep of 2.25 Cr-1Mo Steel. Seminar on Failure Analysis and Industry, 23-24, April 1992, Materials Science Division, National Aeronautics Laboratory, Bangalore (org.), Council of Scientific and Industrial Research.
34. S. Ahila, P.B.S.N.V. Prasad, S. Ramakrishna Iyer and V.M. Radhakrishnan, Electrochemical Studies of corrosion Behaviour of 2.25 Cr-1Mo steel in Aqueous Solutions, 4th National Convention of Electrochemists, 5-6 July 1993, Central Leather Research Institute, Madras (org.) Society for Advancement of Electrochemical Science and Technology, Karaikudi.
35. S. Ahila, S. Ramakrishna Iyer, and V.M. Radhakrishnan, High temperature performance of 2.25 Cr-Mo steel, Material Advancement in Science and Technology - 93, 4-6 Jan. 1993, Regional Engineering College (REC), Tiruchirappalli, (org.) REC, Tiruchirappalli.
36. S. Ahila, S. Ramakrishna Iyer and V.M. Radhakrishnan, Enhanced Oxidation of 2.25 Cr-1Mo Steel in sulphate-chloride Mixture, 12th Intl. Corrosion Congress, 19-24, Sept. 1993, Houston, Texas, U.S.A. pp. 245
37. S. Ahila and S. Ramakrishna Iyer, Creep Rupture properties of cr-Mo steel, 8th Int. Conf. on fracture (ICF-8), 8-14 Jun 1993, Kiev, Ukraine, pp 126F
38. S. Ahila, V.M. Radhakrishnan and S. Ramakrishna Iyer, Influence of K<sub>2</sub>SO<sub>4</sub>-NaCl Mixture on Creep Rupture properties of 2.25 Cr-1Mo steel, 10th European corrosion Congress (ECC), 161st Event of the European Federation of Corrosion. 5-8 July 1993, Barcelona, Spain, (org.), soceded Espanola Dequmca Industrial.
39. S. Ahila, V.M. Radhakrishnan and S. Ramakrishna Iyer, Creep Testing and Life prediction of 2.25 Cr-1Mo steel in Sulphate - Chloride Mixture. Conf. on Standardization, Testing and Quality control of Materials, 3-4 Dec. 1992, Regional Research Laboratory, Trivandrum, (org.) Indian Institute of Metals, Trivandrum Chapter.
40. P.B.S.N.V. Prasad, S. Ahila, R. Vasudevan and S.K. Seshadri, The Effect of Ultrasonic on Resistance of Zinc Electrodeposits. Conf. on Engineering Solutions to Industrial Corrosion Problems, 7-9 June 1993, Sandefjord, Norway.

41. S. Ahila, S. Ramakrishna Iyer and V.M. Radhakrishnan, Life Prediction of welded Joints of Boiler tubes, Seminar on welding in power plants (WIPP-94), 11-12 feb. 1994, Proceedings - Souvenir, pp. 1-8 (org.) The Indian Institute of Welding, Madras Branch at Chola Sheraton, Madras, India.
42. S. Ahila, S. Ramakrishna Iyer and V.M. Radhakrishnan, Creep of Dissimilar Metal Welded Joints in Boiler Applications, Euromat 94 (15th Conf. on Materials Testing in Metallurgy and 11th Congress on Materials Testing 30 May - 1 June 1994 (org.) Hungarian Mining and Metallurgical Society and Scientific Society of Mechanical Engineering, Bala tonszeplak, Hungary.
43. A. Nandy, S.S. Bhattacharya and K. Swaminathan, Elevated temperature flow behaviour of a new Ai-Mg-Mn alloy. 47th ATM- NMD, Hyderabad, 17-19 Nov. 1993.
44. S. Sundara Raman, K.A. Padmanabhan, Bilinear Relationship in the Room temperature cyclic stress-strain and coffin-manson plots of a Ni-base superalloy, 47th ATM-NMD, Hyderabad, 17-19, Nov. 1993.
45. N. Kandaswamy, K.J.L. Iyer and V.M. Radhakrishnan, Effect of Hot Salt Corrosion on the creep repture properties of super Ni 600 AT 750 To 850°C. 47th ATM-NMD, Hyderabad, 17-19 Nov. 1993.
46. Gopal, K.J.L. Iyer and Vijayaraghavan, Surface Improvement of fluidised bed boronising. 47th ATM-NMD, Hyderabad, 17-19 Nov. 1993.
47. V.M. Radhakrishnan, Metal Fatigue - Current status 47th ATM- NMD, Hyderabad, 17-19 Nov. 1993
48. K.G. Samuel, S.L.Mannan, P.Rodriguez and V.M. Radhakrishnan, Creep behaviour of prior deformed type 316LN Austenitic stainless steel AT 873 and 948K, 47th ATM-NMD, Hyderabad, 17-19 Nov. 1993
49. R. Ponraj, S. Ramakrishna Iyer and V.M. radhakrishnan, Comparison of Fracture toughness values of Electrical porcelain ceramic materials determined by different methods. 47th ATM - NMD, Hyderabad, 17-19 Nov. 1993.
50. K. Swaminathan and R. Manoj, Elevated temperature tensile flow behaviour of a French alloy to specification AFNOR 7020, 47th ATM-NMD, Hyderabad, 17-19, 1993.
51. D. Ravikumar and K. Swaminathan, A study of the room temperature forming behaviour of a recent stamping grade Ai-Mg-Mn (ALCAN) alloy, 47th ATM-NMD, Hyderabad, 17-19, 1993.
52. K. Swaminathan, A. Nandy and D. Ravikumar, A study on the Elevated temperature flow behaviour of a new Canadian Ai-Mg-Mn alloy, its room temperature formability and texture profile, Int. Conf. on Superplasticity in Advanced Materails (ICSAM-94), Moscow, May 24-26, 1994.

## 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
- \* Sea bed mining
- \* Underwater instrumentation

### 4.12.2. Details of Faculty

#### Name and Qualification

##### Professors

S.Narasimha Rao, Ph.D(IISC)[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)

##### 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)

SP.Subramanian, Ph.D.(IIT Madras)

S.Meenakshisundaram, Ph.D(IIT Madras)

#### Major area of Specialisation

Marine geotechnical engineering, Seabed soil characteristics understatic and dynamic loads

Analysis and design of offshore and ship structures

Marine geotechnical engineering, Analysis and design of foundation for offshore and onshore structures

Structural-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

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, 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

Geological oceanography, Engineering geology

Measuring techniques connected with ocean engineering studies, Wave force studies.

**Assistant Professors**

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

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

P.Sambandam, M.S(IIT Madras)

R.Sundaravadivelu, Ph.D(IIT Madras)

PaulMarioKoola, Ph.D(IIT Madras)

S.Neelamani, Ph.D(IIT Madras)

**Senior Scientific Officer**

R.Natarajan, Ph.D(IIT Madras)

**Senior Scientific Officer - II**

V.Ananthasubramanian, Ph.D(IIT Madras)

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

Computer aided structural analysis, Analysis of motion floating bodies, Model studies

Modelling of coastal engineering problems, Hydraulic instrumentation

Ship design, Ship structures, Computer Applications in ship design

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

Wave energy, Hydrodynamics, Oceanographic measurements

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

Ship design, Ship production and planning

Naval architecture, Ship model testing

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.	7	-	5	-	4	3	4	1	5	1	25	5	30
M.S.	2	-	2	3	6	-	-	-	-	-	10	3	13
M.Tech	3	-	6	1	-	-	-	-	-	-	9	1	10
B.Tech.	19	2	19	-	16	-	12	-	-	-	66	2	68
<b>Total</b>	<b>31</b>	<b>2</b>	<b>32</b>	<b>4</b>	<b>26</b>	<b>3</b>	<b>16</b>	<b>1</b>	<b>5</b>	<b>1</b>	<b>110</b>	<b>11</b>	<b>121</b>

**4.12.4. Number of Scholarship/Fellowship holders**

Programme	Institute Scholarship	Others	Total
Ph.D	18	20	38
M.S.	12	2	14
M.Tech.	6	5	11
<b>Total</b>	<b>36</b>	<b>27</b>	<b>63</b>

**4.12.5. Number of Degrees Awarded**

Programme	Number
Ph.D	4
M.S.	2
M.Tech	8
B.Tech	9
<b>Total</b>	<b>23</b>

**4.12.6. New Facilities added and Major Equipment procured**

- \* Multielement wave maker in wave Basin
- \* 80m x 2m shallow water flume & wavemaker

#### 4.12.7. Short-term Courses/Workshops/Seminars/ Symposia/Conferences organised

S.No.	Co-ordinator(s)	Title of Course / Workshop/ Seminar / Symposia /Conference	Period
1.	Dr.M.R.Pranesh, Dr.S.Meenakshi Sundaram	Instrumentation for Ocean Engineering Applications (CEP)	May 24 - 27, 1993
2.	Dr.V.S.Raju, Dr.S.Narasimha Rao, Dr. M.R.Pranesh	Joint Organising Secretary (Publication)	January 1994
3.	Dr.V.S.Raju, Dr.SP.Subramanian	UNIDO WORKSHOP on Marine Industrial Technology for the Development of Marine Non-living Resources	27-30th Sept.1993
4.	Dr.V.S.Raju, Dr.SP.Subramanian	IOI Training Programme on Coastal Zone Management as a Sustainable Process	11th Oct. to 17th Dec.'93
5.	Dr.V.Anantha Subramanian	Towing tank and ship Hydrodynamic tests Cochin University	5 - 11 Dec.'93

#### 4.12.8. Special Lecture(s) Delivered

Sl.No.	Name of Faculty	Topic of Lecture	Delivered at	Date
1.	Dr.M.R.Pranesh	Environment, - Electrochemistry- ocean structure interaction. International conference on Energy, Environment and Electrochemistry	CECRI, Karaikudi	Feb 10, 1993
2.	Dr.M.R.Pranesh	NDE of Ocean Structure- Conference organised by Indian. Society for Non- Destructive Testing	Madras	Dec 2 1993
3.	Dr.Paul Mario koola	Ocean Energy & Wave Energy	Public works staff training institute Madras	Feb 8th & Oct.'7, 1993
4.	Dr.V.Sundar	"Introduction to waves, Tides and currents" and "sediment Transport	Coastal Erosion & Protection" for P.W.D. Engineers, Anna University, Madras	8th & 16th Nov'93
5.	Dr.S.Narasimha Rao	"Geo technical Properties of Indian Marine clays"	Regional Engineering college, Calicut	May'93
6.	Dr.S.Narasimha Rao	Ground improvement of Indian Marine clays	Regional engineering college, Calicut	May'93

#### 4.12.9. Visits Abroad

Sl.No.	Name of Faculty	Country visited	Date	Purpose of visit
1.	Prof.V.S.Raju	Germany Univ. Karlsruhe	10-15 May	Under GTZ Assistance Programme
2.	Prof.V.S.Raju	Malta	15-20 May	For attending Centre Directors meeting in IOI Head quarters
3.	Dr.V.Sundar	Bergische Univ. Germany	10.5.93 to 09.07.93	Working Data Acquisition systems

Sl.No.	Name of Faculty	Country visited	Date	Purpose of visit
4.	Dr.S.Neelamani	Bergische Univ. Germany	10.5.93 to 09.07.93	Working Data Acquisition systems
5.	Dr.V.Ananthasubramanian	- do -	-do-	-do-
6.	Shri.M.Santhanam,STA	-do-	-do-	-do-
7.	Prof.S.Narasimha Rao	Singapore	June 6-11	Attended third 8.
9.	Prof.C.Ganapathy	Germany	8.6.92 to 2.6.93	On Sabbatical under a Research Fellowship of the Alxandar von Humboldt Foundation
10.	Prof.M.Ravindran	Edinburgh, U.K.	20.7.93 to 27.7.93	Attended European Wave Energy Symposium
11.	Dr.Paul Mario Koola	Japan	26.08.93 to 31.08.93	Attended International Symposium on Ocean Engg. Development at Muraro, Hokkaido, Japan
12.	Prof.V.S.Raju	Japan	6.9.93 to 15.9.93	Attended PIM XXI in Tokyo, Japan and visit to the Univ. of Malaysia Kuala Lumpur
13.	Dr.V.G.Idichandy	Singapore	10.9.93 to 9.9.95	Appointment Professional Officer at the National Univ. of Singapore
14.	Prof.V.S.Raju	Geneva Germany	22.11.93 to 3.12.93	Attended Meeting on Trainx workshop and visited Germany on V.W.Foundation project on Flyash
15.	Prof.M.Ravindran	Jakarta Indonesia	11.12.93 to 19.12.93	Attended Expert Group Meeting on ocean Energy, organised by UNIDO
16.	Dr.Paul Mario Koola	Denmark	21.5.93 to 27.6.93	Advanced training in Danish Hydraulic Institute on the operation of Multi element wave maker

#### 4.12.10. Distinguished Visitors to the Centre

Sl.No.	Name of the Visitor and Occupation	Date of visit	Purpose of visit (Lecture/Discussion)
1.	Shri.I.G.Jhingran, Secretary to the Govt. of India, Ministry of Mines, New Delhi	15.10.93	Discussion
2.	A team of five Hon'ble, Members of Parliament with officials of Lok Sabha Secretariat and Ministry Non-Conventional Energy Sources	10.2.94	- do -

#### 4.12.11. Sponsored Projects

Title	Period	Funding Agency	Amount (in Lakhs)	Co-ordinator(s)
Disposal of flyash	1993-95	Vokswagon Foundation germany	79.500 DM	Prof.V.S.Raju
CODAPS	1993-94	DOD	12.08	Prof.V.S.Raju
Development of Triaxial equipment	1993-95	Vokswagon Foundation Germanuy	84, 300 DM	Dr.S.Narasimha Rao



Title	Period	Funding Agency	Amount (in Lakhs)	Co-ordinator(s)
Wave and Current Forces on Group of piles with Emphasis on Full- scale Field Measurements"	1993-95	DOD	23.00	Dr.S.Meenakshisundaram, Dr.J.S.Mani
Development of numerical models for prediction of nearshore phenomena	1992-95	DOD	9.0	Dr.V.Sundar, Dr.J.S.Mani
Coastal Marine Aqua Culture	1992-95	DOD	5.0	Dr.J.S.Mani
Sea trial of wave energy system	1989-95	DOD	400	Dr.Paul Mario Koola, Prof.V.S.Raju, Prof.M.Ravindran
Wave Forces on Inclined cylinder	1992-94	Volkswagon foundation, Germany	80,000 DM	Dr.V.Sundar
Finite element analysis of interaction	1991-94	DAE	4.2	Dr.S.K.Bhattacharrya, Prof.C.P.Vendhan
Ultimate Strength of Ships	1988-94	MST	3.15	Prof.C.Ganapathy, Dr.R.Sundaravadivelu
Analysis, Design and development of buoy cable system	1989-94	DOD	3.6	Prof.C.Ganapathy, Dr.R.Sundaravadivelu
Design of standard vessel and performance prediction in west coast canal	1993-95	Inland waterways authority of India NOIDA	5.70	

#### 4.12.12. Major Consultancy Assignments

S.No.	Title	Organisation	Amount(Rs. in Lakhs)	Coordinators
1.	Alumini Refresher Course	International Ocean Institute, Malta	0.45	Prof.V.S.Raju Dr.SP.Subramanian
2.	Physico-Mechanical tests for over burden samples of NLC	Mineral Exploration Corporation Ltd., Hyderabad	5.00	Prof.S.Narasimha Rao
3.	Setting up offshore terminal and berth off Mormugao Harbour	FOMENTO, Goa Mormugao Maritima Limited	1.00	Prof.V.S.Raju
4.	Concrete Mix Design	Indian Railway Construction Co., Ltd., Madras	0.10	Dr.K.Ganesh Babu
5.	Trim and damaged stability	Chokhani International Ltd., Madras	0.20	Dr.V.Anantha Subramanian
6.	Design of seawater intake	Meritech Consultants (India) Ltd., Madras-86	2.00	Dr.R.Sundaravadivelu
7.	Construction of high level causeway		0.03	Prof.S.Narasimha Rao
8.	Model studies for Pipavav Port facilities in Gujarat	Howe(India) Pvt.Ltd., New Delhi through L.& T.,Bombay	5.00	Prof.S. Narasimha Rao Dr.V.Sundar Dr.R.Natarajan
9.	Concrete mix design and evaluation	L&T, Madras	0.20	Dr.K.Ganesh Babu

S.No.	Title	Organisation	Amount(Rs. in Lakhs)	Coordinators
10.	Seawater Intake structure	Magunta Agua Farms Limited	0.80	Prof.M.R.Pranesh, Dr.B.S.Thandaveswara
11.	To carry out impact test	Vadyar Boats (P) Limited	0.16	Dr.S.Meenakshisundaram
12.	Development, Model Testing, verification of underwater devices	DRDL, Hyderabad	7.00	Prof.C.P.Vendhan, Prof.M.Ravindran, Dr.V.G.Idichandy
13.	Foundation consultancy of Anola Expn. Project	IFFCO, Delhi	1.00	Prof.V.S.Raju, Dr.S.R.Gandhi
14.	Model Investigation for powering of 77m Ocean going cargo vessel	SesaGoa Ltd., Goa	1.50	Dr.R.L.Roy Choudhury, Sri.P.Sambandan
15.	Computation of forces for the design of Helicopter Traversing system.	L & T McNeil Ltd., Madras	3.50	Sri.P.Sambandan
16.	Preparation of detailed structural design	Tamil Nadu Adi Dravidar Housing and Development Corporation Limited, Madras	2.25	Prof.S.Narasimha Rao, Prof.P.S.Rao
17.	Design of Deep water berth	Gopalpur Port Project	5.00	Prof.C.Ganapathy, Dr.R.Sundaravadivelu, Dr.V.Sundar, Dr.S.R.Gandhi
18.	Stability investigations on 100 T capacity container barge	TEBMA Engg.Ltd., Madras	0.20	Prof.C.Ganapathy, Dr.V.Anantha Subramanian
19.	Design of Floating crans	Kranes Kraft and controls (P) Ltd.	0.25	Prof.C.Ganapathy
20.	Resistance test for 1000 T non-propelled oiler	Hindustan shipyard Ltd., Visakhapatnam	0.20	Dr.R.Natarajan
21.	Inspection and Advice of foundation work in pond area of Appu hotels site	Appu hotels Ltd., Madras - 18	0.05	Prof.K.Muthukrishnaiah
22.	Analysis and Advice	Consolidated Civil Construction (I) Ltd., Madras	0.10	Prof.K.Muthukrishnaiah
23.	Soil investigation for proposed construction of Roads	Corporation of Madras	0.80	Prof.S.Narasimha Rao
24.	Investigation and Advice	Tuticorin Alkali Chemical and Fertiliser	0.25	Prof.K.Muthukrishnaiah
25.	Design Development of Underwater FRP Radomes	DLDL, Hyderabad	3.50	Prof.C.P.Vendhan, Dr.S.K.Bhattacharrya, Dr.N.G.Nair, FRP Centre
26.	Soil consultancy for Epichloro hydrin project	Tamilnadu Petro products Ltd., Madras	0.50	Prof.V.S.Raju, Dr.S.R.Gandhi
27.	Investigation and Advice	DCM Shriram Consolidated Ltd.	0.10	Prof.K.Muthukrishnaiah
28.	Investigation and Advice on wave characteristics	ONGC	0.40	Dr.V.Sundar
29.	Soil Consultancy for the proposed prawns cultivating unit	Nagarjuna Aqua Exports Ltd., Nellore and Kakinada	2.00	Prof.V.S.Raju, Dr.J.S.Mani, Prof.H.Suresh Rao, Dr.B.S.Thandaveswara, Dr.S.R.Gandhi, Dr.S.Kumaraswamy

S.No.	Title	Organisation	Amount(Rs. in Lakhs)	Coordinators
30.	Trouble shooting advice	Garrison Engineer, Avadi	1.00	Prof.C.Ganapathy, Prof.M.R.Pranesh
31.	Design of VCM pipeline support	DCW Ltd., Sahupuram	0.10	Prof.C.Ganapathy, Dr.R.Sundaravadivelu
32.	Checking of detailed designs in connection with construction of Third oil jetty	Kandla Port Trust	2.00	Prof.V.S.Raju, Prof.P.K.Aravindan, Dr.S.R.Gandhi
33.	Technical evaluation of design and manufactures of floating crafts and port facilities	Gopalpur Port project, Gopalpur	0.50	Prof.C.Ganapathy, Dr.R.Natarajan
34.	3 week Training programme on Design of offshore structures	Engineers India Ltd., New Delhi	1.50	Prof.S.Narasimha Rao, Prof.C.Ganapathy
35.	Model Test of Jackup vessel, 'Seapup'	Baker Marine Energy(P) Ltd.	1.00	Sri.P.Sambandan, Dr.R.L.Roy Choudhury
36.	Soil Investigation for the tunnel construction	A.L.Jazzar, Omar Jazzar Consulting Engineers, Riyadh, South Arabia	\$ 13500	Prof.S.Narasimha Rao
37.	To conduct Towing tank and ship Hydrodynamic test	Cochin University Cochin	0.15	Dr.V.Anantha Subramanian, Dr.R.Natarajan
38.	Design of Dyke wall for Ammonia tank	SPIC, Tuticorin	0.20	Prof.C.Ganapathy, Dr.R.Sundaravadivelu
39.	Consultancy for offshore parameters for effluent disposal	WH Hall Plastics (India) Ltd., Madras	0.20	Dr.V.Sundar
40.	Rehabilitation of factory building	Cethar Vessals Ltd., Trichy	0.25	Dr.K.Ganesh Babu
41.	Design and Development	South India Corpn., Ltd., Madras	1.00	Dr.K.Ganesh Babu
42.	Investigation and advice	Ashok & Lal, 12, Pulla Avenue, Madras	0.05	Prof.K.Muthukrishnaiah
43.	Hydrodynamic towing tests and analysis	DRDL, Hyderabad	5.00	Prof.C.P.Vendhan, Prof.M.Ravindran
44.	Analysis of Guyed mast	Computer design Consultants, Madras	0.06	Prof.C.P.Vendhan, Dr.S.K.Bhattacharrya
45.	Analysis of loadout and Transportation of deck modules	L & T, Bombay	4.00	Prof.V.S.Raju, Prof.C.P.Vendhan
46.	Foundation for storage Effluent tank	The Andhra Petro chemicals Ltd., Visakhapatnam	2.00	Prof.V.S.Raju, Prof.P.K.Aravindan, Dr.S.Gandhi
47.	Expert opinion on foundation problems	DBS Leasing and Finance Ltd., Madras	0.10	Prof.S.Narasimha Rao
48.	Experimental determination of added mass of an underwater body	DRDL, Hyderabad	0.85	Prof.C.P.Vendhan, Dr.V.AnanthaSubramanian
49.	Consultancy for reviewing of Design for mooring dolphins	L & T, ECC, Madras	0.15	Prof.V.S.Raju
50.	Load Analysis of Fermentar system	SPIC, Madras	0.35	Dr.S.K.Bhattacharrya, Prof.C.P.Vendhan
51.	Model Test on Fibre Glass launch	M/s Geav Transmission Pvt. Ltd., Madras	0.275	-do-

S.No.	Title	Organisation	Amount(Rs. in Lakhs)	Coordinators
52.	Stability investigations on 100 T capacity container Barge	M/s Tebma Engg. Pvt.Ltd., Madras	0.4	-do-

#### 4.12.13. Honours and Awards

S.No.	Name of Faculty	Honours/Awards	Purpose
1.	Dr.J.S.Mani	A Merit certificate	The paper entitled "Damping of waves by two rows of closely spaced piles

#### 4.12.14. Research Publications:

1. Dr.S.Meenakahisundaram, M.R.Pranesh, "Principles of underwater sound and instrumentation", sept. 1993
2. R.Pranesh, Technical investigation Report Documentation - Tech and legal aspects - National symposium on soft clay Tech. IGS Visakapatnam Chapter Madras 93
3. M.R.Pranesh and Arvee Sujil Johnson, "Stresses in submarine pipeline on elevated obstructions", Proc. Management of coastal environment April 10-11,, 1993,, Visakapatnam. pp7-16
4. M.R.Pranesh and K.S.Sudheerkumar, "Submarine pipeline dynamics" Proc Management of coastal structures, April 10 - 11, 1993 Visakapatnam, pp7-14
5. M.R.Pranesh and S.Sudheer Kumar, "Reliability approach for submarine pipeline design' Symposium on mathematical methods & applications Dec 22, 1993
6. M.R.Pranesh, Energy structures Audit - Management interaction", National Seminar on Energy structures, Feb. 27- 28, 1993 pp 225-240
7. Dr.S.Meenakshisundaram, Ms. A.S.Rema "Effects of water wave Kinematics uncertainty on Design Criterion for War Forces" Proceedings of All India Seminar on "Management of Coastal Environment" Institution of Engineers, India, Vishakapatnam, April 93
8. J.S.Mani, Damping of waves by two rows of closely spaced piles Journal of the institution of Engineers (India) Vol.73, Jan. 1993, pp.155-162
9. K.Murali, J.S.Mani and C.Govindarajan.Planning of protective structures for future coast along north Madras, Published at the All India Seminar on Management of Coastal Environment, 10-11, Apr.'93, pp.89-99
10. Neelamani,S., Bharatkumar.B.H., Mahadevan.R. and Sundar.V. "Flume Confinement Effect on Wave Induced Dynamic Pressures on Twin Tandem Cylinders", Ocean Engineering, Vol.20, No.3, pp.313-337, 1993
11. Jayakumar, Neelamani, S. and Raju.V.S. " An experimental Investigation of wave forces on an oscillating water column type wave energy caisson" 1993 European Wave Energy Symposium. 21-24 July 1993, Edinburgh, UK.
12. Koola.P.M., Ravindran, M., Raju.V.S., "Design options for a multipurpose breakwater" Proceedings of international symposium on ocean energy development 26-27 August 1993, Muroran, Hokkaido, Japan.
13. Raju.V.S., Ravindran, M., Koola.P.M. "Experiences on a 150 kw Wave Energy Pilot Plant" Proceedings of the 1993 European Wave energy Symposium. 21-24 July 1993, Edinburgh, U.K.
14. Sundar.V, Noethel.H and Holz.K.P "Wave Kinematics in a groin field - Time domain analysis", Journal of coastal research, vol.9, No.3., 1993, pp 831-846
15. Noethel.H, Sundar.V and Holz.K.P, "Kinematics in a groin field data analysis and numerical modeling", Proc. 3rd Intl. offshore and polar engineering conference, Singapore, 6-11, June 1993, pp 76-83
16. Mallayachari.V and Sundar.V "A numerical model for prediction of reflection characteristics of permeable seawalls" proc. 3rd Intl. offshore and polar engineering conference, Singapore, June 6-11, 1993, pp 106-110

17. Neelamani,S., Bharathkumar.B, Mahadevan.R and Sundar.V "Flume confinement effect of wave induced dynamic pressures on twin tanders cylinders" Ocean engineering, Vol.20, No.3, pp 313 - 337, 1993
18. Narasimha Rao, S. and Prasad.Y.V.S.N "Uplift behaviour of Pile Anchors subjected to lateral cyclic loading", Journal geotech engineering Division, American Society of Civil Engineers Vol.119, No.4, April'93
19. Narasimha Rao, S and Mallikarjuna Rao.K "Behaviour of rigid piles in Marine clays under cyclic loading", Ocean Engineering Journal, Pergamon Press, May 93, Vol.20
20. Narasimha Rao, S. and Prasad Y.V.S.N "Behaviour of plate Anchors embedded in two layered clayey soils" Geotechnical Engineering Bangkok, June '93, pp.3-16
21. Narasimha Rao, S., Prasad.Y.V.S.N and Veeresh.C "Behaviour of embedded model screw anchors in soft clays", Geotechnique, London, Vol.43, Dec.93, pp.605-614
22. Narasimha RAo, S and Prasad.Y.V.S.N "Experimental studies on plate anchors in layered Marine soils" 3rd International offshore and polar engineering conference, Singapore, June 1993, pp 554-550
23. Narasimha Rao, S. Rajasekharan.G and Subbarao.K.V. "Strength and Deformation Behaviour of Line treated Marine Clays" 3rd International offshore and polar engineering conference singapore June 1993 pp 585-590
24. Narasimha Rao, S. and Rajasekharan.G "Lime column Method of stablization in a Marine clay" 11th SEA, geotech. Conf., Singapore, May 93, pp 397-402
25. Numerical Simulation of Shoreline evolution using a one line model. Jayakumar and R.Mahadevan (1993) J.Coastal Research V9, pp 915-923
26. S. Neelamani et al Flume confinement effort on wave induced Dynamic pressures on Twin-Tandem cylinders.Ocean Engineering V 20, pp 313 - 337
27. V.Ananthasubramanian, An efficient experimental techniques for free floating body dynamics, Indian Journal of marine sciences Publication 3/4, IJMS-07-12/94 (to appear)
28. V. Ananthsubramanian, C.P.Vendhan, an efficient algorithm for strapdown acclerometer based motion measurement. International Journal of Ocean engineering Vol.20, No.4, pp.421- 432, 1993
29. Narasimha Rao, S., and Prasad.Y.V.S.N "Experiments studies on foundations of complaint structures-I under static loading", Ocean engineering, J., Pergamon Press, Jan.94, Vol.21, pp 15-27
30. Narasimha Rao, S. and Rajasekharan "Lime injection Technique to improve the Behaviour of self marine clays" ocean engg.J., Pergamon press, Jan.94, Vol.21. pp 29-43
31. Narasimha Rao, S. and Prasad, YVSN "Pull out Behaviour of model pile and helical pile anchors subjected to lateral cyclic loading, "Canadian geotechnical journal, Feb.94, Vol.31.
32. Narasimha Rao, S. "Environmental geotechnology", 13th int confon soil mech & found engg. N'Delhi. Jan.94

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

### 4.13.3 Details of Faculty

Name and Qualification	Major area of Specialisation
<b>Professors</b>	
V.Balakrishnan, Ph.D.(Brandeis)	Theoretical and Statistical Physics
V.Damodara Das, Ph.D.(SPU, Vidyanagar)	Thin Film Science and Technology
M.P.Kothiyal, Ph.D.(IIT Madras)	Optical Instrumentation in Holography and Speckle Phenomenon
(Mrs) Maha Seshasayee, Ph.D.(RPI, NY)	X-ray Crystallography
Y.V.G.S.Murti, Ph.D.(IIT Madras)	Solid State Physics, Photonics
V.R.K.Murthy, Ph.D.(IIT Madras)	Microwave Physics, Dielectrics
C.K.Narayanaswamy, Ph.D.(Madras)	Spectroscopy and Optics
K.V.S.Rama Rao, Ph.D.(Andhra Univ.) <b>[Head]</b>	Magnetism and Magnetic Materials
G.Rangarajan, Ph.D.(IISc)	Low Temperature Physics, Solid State Physics
S.B.S.Sastry, Ph.D.(IIT Madras)	Solid State Physics and Devices
R.S.Sirohi, Ph.D.(IIT Delhi)	Modern Optics, Optical Instrumentation, Holography and Speckle Phenomenon
B.M.Sivaram, D.Phil.(Sussex)	Laser Physics, Quantum Electronics
J.Sobhanadri, D.Sc.(Andhra Univ.)	Microwave Techniques, Dielectric and Magnetic Materials
K.Viswanatha Reddy, Ph.D.(IIT Madras)	Diffusion, Electromigration and Magnetism
<b>Associate Professors</b>	
B.S.V.Gopalam, Ph.D.(IIT Madras)	Physics of Semiconductor Devices

**Name and Qualification**

J.Majhi, Ph.D.(IIT Madras)

V.Ramachandran, Ph.D.(IIT Madras)

B.Subrahmanyam, Ph.D.(Andhra Univ.)

A.V.Narasimham, Ph.D.(IIT Madras)

Pranawa C.Deshmukh, Ph.D.(Nagpur)

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

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

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

**Assistant Professors**

B.S.V.S.R.Acharyulu, Ph.D.(IIT Madras)

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

(Mrs) S.Lakshmi Bala, Ph.D(Madras Univ.)

G.Markandeyulu, 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 Univ.)

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

G.Sreenivasa Murthy, Ph.D.(IIT Madras)

A.Subrahmanyam, Ph.D.(IIT Kharagpur)

V.Sankaranarayanan, Ph.D.(IIT Madras)

V.Venkateswara Rao, Ph.D.(IIT Madras)

C.Vijayan, Ph.D.(IIT Madras)

(Ms.)T.M.Vimala, Ph.D.(IIT Madras)

**Chief Design Engineer**

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

**Senior Scientific Officer Gr.II**

K.Sarangapani, M.Sc.(Madras Univ.)

**Major area of Specialisation**

Semiconductor Physics

Solid State Physics, Lattice Dynamics

Condensed Matter Physics

Theoretical Physics, Ultrasonics

Atomic and Molecular Physics

X-ray Crystallography, Educational Technology

Electro Optics, Dielectrics

Dielectrics, Instrumentation

Electronics, Solid State Physics

Solid State Ionics

Field Theory and High Energy Physics

Magnetism and Magnetic Materials

Magnetic Resonance

Electronics and Instrumentation, Dielectrics

Lasers and Spectroscopy

Magnetic Resonance, Hydrogen in Metals

X-ray Crystallography

Semiconductor Devices

Low Temperature Physics

Optical Instrumentation, Holography, Image Processing

Photonics

X-ray Crystallography

Optical Instrumentation, Lens Design

Electronics and Instrumentation

**4.13.3 Students on Roll**

Programme	I Year		II Year		III Year		IV Year		V Year and above		Total		Total
	M	W	M	W	M	W	M	W	M	W	M	W	
Ph.D	7	2	10	1	8	2	6	1	15	6	46	12	58
M.Tech	13	-	5	1	-	-	-	-	-	-	18	1	19
M.Sc.	13	8	24	10	-	-	-	-	-	-	37	18	55
<b>Total</b>	<b>33</b>	<b>10</b>	<b>39</b>	<b>12</b>	<b>8</b>	<b>2</b>	<b>6</b>	<b>1</b>	<b>15</b>	<b>6</b>	<b>101</b>	<b>31</b>	<b>132</b>

#### 4.13.4 Number of Scholarship/Fellowship holders

Programme	Institute	Others	Total
Ph.D	28	12	40
M.Tech	11	-	11
M.Sc	13	-	13
<b>Total</b>	<b>52</b>	<b>12</b>	<b>64</b>

#### 4.13.5 No. of Degrees Awarded

Programme	Number
Ph.D	13
M.Sc.	23
M.Tech	5
<b>Total</b>	<b>41</b>

#### 4.13.6 Instruments/Equipments Designed and New Methods Developed

1. Flash evaporation assembly
2. Polarization vs Electric field unit
3. New Microwave techniques for high Q measurement
4. Helium liquid level detector
5. Helium gas purity monitor
6. Confocal scanning optical microscope
7. Photoconductivity Data Acquisition System
8. Photoacoustic sample holder assembly was designed and fabricated for the study of solids and liquids

#### 4.13.7 New Facilities added and Major Equipment Procured

1. Multi-electron gun vacuum deposition unit
2. He<sup>3</sup> evaporation cryostat for low temperature experiments down to 400 mK.
3. Zygo interferometer
4. 30 mW He-Ne laser
5. Excimer Laser (QUESTEK) 308 nm
6. Low temperature facilities for the existing vibrating sample magnetometer
7. PC AT 386 computer system for interfacing box-car averager in photonics lab
8. Closed cycle Helium Refrigerator attachment for the existing Mossbauer Spectrometer.

#### 4.13.8 Short-term Courses/Workshops/Seminars/Symposia Conferences organised

Sl.No.	Title of Course / Workshop / Seminars / Symposia/Conf.	Duration	Co-ordinator(s)
1.	Short term training course in helium liquafier operation for BHEL staf	3 weeks	G.Rangarajan V.Sankaranarayanan
2.	Seminar on Holography and Fiber Optics	11-12 Jan. 1993	R.S.Sirohi
3.	XXI National Symposium on Optics	10-12 Feb.1994	R.S.Sirohi



**4.13.9 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.Damodara Das	7th International Workshop on Physics of Semiconductor Devices	14-18 Dec. 1993, New Delhi
2.	Dr.R.S.Sirohi	Fringe '93	19-21 Oct. 1993, Bremen, Germany, Oct.20, 1993 - Chairman
	Dr.R.S.Sirohi	Workshop on Optical Instrumentation	13 Feb. 1993 New Delhi
3.	Dr.B.Subramanyam	3rd National Conference on Phonon Physics 1993 held at Cochin University	20-23 Jan.1993 Cochin
4.	Dr.S.Srinivasan	Discussion meeting on Bromolevels	9-12 Sept. 1993 IISc. Bangalore
5.	Dr.G.Markandeyulu	Solid State Physics Symposium	27-31 Dec.1993
6.	Dr.K.V.S.Rama Rao	Solid State Physics Symposium	27-31 Dec.1993
7.	Dr.K.V.Reddy	First National Conference on Solid State Ionics	14-16 Feb. 1994 Amritsar

**4.13.10 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.V.Balakrishnan	Hamiltonian Dynamics Ergodicity, Mixing & chaos (3 lectures)	SERC School on Statistical Physics, Puri, Orissa	Jan.27-Feb.1 1994
2.	Dr.V.R.K.Murthy	Microwave studies on High Tc Superconductors	Physics Dept. IISc. Bangalore	4 Feb. 1994
3.	Dr.V.R.K.Murthy	Microwave studies on magnetic materials	NCML Bombay	1 Sept. 1993
4.	Dr.V.R.K.Murthy	Microwave dielectrics	Vintek RF Bangalore	5 Oct.1993
5.	Dr.G.Rangarajan	Physics at Low Temperature	AC College Madras Univ.	Feb.'94
6.	Dr.V.Damodara Das	Thin Films	Refresher course in Nuclear Physics Dept.Madras Univ.	3 Mar.1994
7.	Dr.R.S.Sirohi	Theory and Applications of ESPI	Mech. Engg. Tsukubacity Japan	23 Jun. 1993
8.	Dr.R.S.Sirohi	Multiple beam shear interferometry for Optical Testing	The Inst. of Physical of Chemical Research Wako, Japan	24 June 1993
9.	Dr.R.S.Sirohi	Some Applications of Electronic Speckle	Dept.of Mech. & Production Engg. National University Singapore	30 June 1993
10.	Dr.K.V.Reddy	Tracer Diffusion Studies in Super Ionic Conductors	First National conf. on Solid State Ionics at Amritsar	14 Feb.1994
11.	Dr.A.V.Narasimham	Some aspects ultrasonic wave propagation in Liquids	Napur Unvi. Nagpur	12 Mar. 1994
12.	Dr.A.V.Narasimham	Dilatational viscosity	Mathematics Dept. IIT Madras	24 Feb. 1994

Sl.No.	Name of the Faculty	Topic of the Lecture	Delivered at	Date
13.	Dr.B.S.V.Gopalam	Semiconductor Materials Characterisation of Amorphous Semiconductors Fabrication and Characterisation of Schottky barrier Solar Cells	S.V. Univ. Tirupati	5-6 Aug.1993
14.	Dr.B.S.V.Gopalam	Semiconductor Materials Prediction Semiconductor Materials Enumeration, Hall Effect p-n junction Lasers Quantum Well Lasers Quantum Hall Effect	Mysore Univ. Mysore	4-6 Nov. 1993
15.	Dr.B.S.V.Gopalam	Calculation of Electronic partition functions of artificially layered structures	Punjab Univ. Chandigarh	1 Feb.1994
16.	Dr.B.S.V.Gopalam	Stark Effect in Quantum Well Lasers	Maharshi Dayanand Univ. Rhotak	2 Feb.1994
17.	Dr.B.S.V.Gopalam	Physics and Technology of Semiconductor Micro Structures	Dept. of Physics IIT Madras	2 Mar. 1994
18.	Dr.B.S.V.Gopalam	Basics of Semiconductor Physics of 3D and 2D Physics of 1D and OD Semiconductors	SV Univ. Tirupati	7-8 Mar. 1994
19.	Dr.B.S.V.Gopalam	Preparation and Characterisation of semiconductor materials Hetero junction Superlattice Physics of 1D and OD Semiconductors	Samrat Ashok Tech. Inst. Vidasha	21-23 Mar. 1994
20.	Dr.S.Lakshmi Bala	Chaos in gauge field theories	Physics Dept. Central Univ. Hyderabad	Dec. 1993
21.	Dr.S.Lakshmi Bala	Dynamical chaos in Chern- Simons-Higgs theories	Physics Dept. IIT Kanpur	Mar.1994
22.	Dr.S.Lakshmi Bala	Dynamical chaos in Chern- Simons-Higgs theories	Inst. of Physics Bhubaneshwar	Mar.1994
23.	Dr.A.Subrahmanyam	Si-Ge alloys	IGCAR Kalpakkam	Sept.1993
24.	Dr.G.Markandeyulu	Magnetic Materials for transducers in SONAR applications	NPOL Cochin	2 Dec.1993
25.	Dr.C.Vijayan	Advances in Photonics	Refresher Course for College teachers	Cochin Univ. 11-12 Nov.1993
26.	Dr.YVGS.Murti Dr.C.Vijayan	Color centers for photonics	10 National Symposium on Radiation Physics Kalpakkam	17-20 Aug.1993
27.	Dr.K.V.S.Rama Rao	Magnetism, hydrogen storage and kinetics in ternary alloys	Dept. of Physics State Univ. of New York, USA	12 Nov. 1993
28.	Dr.K.V.S.Rama Rao	Magnetic properties, hydrogen storage and kinetics in ternary alloys	Michigan State Univ. USA	15 Nov. 93
29.	Dr.K.V.S.Rama Rao	Solubility and kinetics of hydrogen absorption in $Zr_{1-x}Ho_xCo_2(O_2)$ System	Penn.State Univ. USA	29 Nov. 1993

Sl.No.	Name of the Faculty	Topic of the Lecture	Delivered at	Date
30.	Dr.K.V.S.Rama Rao	Studies of magnetic and electrical properties on magnetostrictive alloys		30 Nov. 1993
31.	Dr.K.V.S.Rama Rao	Solubility and kinetic of hydrogen absorption in $Zr_{1-x}Ho_xCo_2(O)$ systems	Univ. of Brighton UK	3 Dec. 1993
32.	Dr.K.V.S.Rama Rao		Univ. of Birmingham UK	8 Dec. 1993

#### 4.13.11 Visits abroad

Sl.No.	Name of Faculty	Country visited	Date	Purpose of visit
1.	Dr.R.S.Sirohi	Japan	1.6.93-29.6.93	Professional visit under JITA Fellowship
2.	Dr.R.S.Sirohi	Singapore	30.6.93	Visit to Mech. & Prod.Engg.Dept. Singapore University
3.	Dr.R.S.Sirohi	Germany	13.9.93-11.11.93	Under BMFT-HRD project
4.	Dr.G.Rangarajan	U.K.	May '93	Training in the operation of $He^3$ cryostat
5.	Dr.G.Rangarajan	Germany	Nov-Dec. 93	Indo German project
6.	Dr.J.Sobhanadri	USA	21.8.93-15.9.93	Indo-US Project
7.	Dr.K.V.S.Rama Rao	USA, UK, Germany	Oct-Dec. 1993	Visited various laboratories/Universities in USA, UK and Germany.

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

Sl.No.	Name of the Visitor and Occupation	Date of visit	Purpose of Visit (Lecture/Discussion)
1.	Prof.F.P.Flandrio CNRS France	Dec. 1993	Discussions
2.	Prof.A.Marchand Univ.Paris, France	Oct. 1993	Discussions
3.	Prof.V. Venkatesan Univ.of Maryland	Jan 1994	Lectures and Discussions

#### 4.13.13 Sponsored Projects

S.No.	Title	Period	Funding Agency	Amount (in Lakhs)	Co-ordinator(s)
1.	Physico-chemical studies of graphite intercalation compounds	92-95	CSIR	2.00	Dr.B.Viswanathan Dr.V.R.K.Murthy
2.	Development of Dielectric material for microwave chip design	92-94	DRDO	6.00	Dr.B.Viswanathan Dr.V.R.K.Murthy
3.	Microwave studies on liquids	92-95	INDO-US DST	17.00	Dr.J.Sobhanadri

S.No.	Title	Period	Funding Agency	Amount (in Lakhs)	Co-ordinator(s)
4.	Development of confocal....	3 years	CSIR	77.315	Dr.M.P.Kothiyal
5.	Study of Optical...	3 years	ISRO-IITM	9.80	Dr.M.P.Kothiyal Dr.V.V.Rao Dr.D.K.Sharma
6.	Investigations on holograph	3 years	ARDB	13.00	Dr.M.P.Kothiyal Dr.V.V.Rao Dr.D.K.Sharma Dr.R.S.Sirohi
7.	Optical Instrumentation	5 years	DAE	50.00	Dr.M.P.Kothiyal Dr.V.V.Rao Dr.D.K.Sharma Dr.R.S.Sirohi
8.	ESPI/Shearography	3 years	HRD-BMFT	-	-
9.	Production of Newsletter on Superconductivity	1 year	DST	1.89	Dr.G.Rangarajan
10.	Molecular Dynamics in liquid crystal	3 years	DST	1.65	Dr.J.Sobhanadri Dr.V.R.K.Murthy
11.	Fabrication of a photoacoustic Spectrometer	Aug92-Aug95	DST	8.90	Dr.C.Vijayn Dr.J.Subramanian Pondicherry Univ.

#### 4.13.14 Major Consultancy Assignments

Sl.No.	Title	Organisation	Amount (Rs.In Lakhs)	Co-ordinator(s)
1.	Dielectric resonation	Vintek RP Products Ltd.	3.00	Dr.V.R.K.Murthy
2.	Microwave characterization	NCML, Bombay	0.82	Dr.V.R.K.Murthy Dr.B.Viswanathan
3.	Magnetic measurements on permanent magnets	OEN, India Ltd	0.14	Dr.K.V.S.Rama Rao
4.	-do-	T.I. Cycles	0.075	Dr.Y.Syamasundara Rao

#### 4.13.15 Honours and Award

Sl.No.	Name of the Faculty/Students	Honours/Awards
1.	Dr.V.Damodara Das (Award given in Dec.93)	Awarded Hari Om Ashram H.C.State Research Evaloment prize for best research in Solid State Physics during the Five year period 1987-1991
2.	Dr.K.V.S.Rama Rao	Chairman of the Subject group for magnetic materials of MRSI
3.	Dr.R.S.Sirohi	President, Optical Society of India
4.	Dr.R.S.Sirohi	Fellow SPIE-The International Society for Optical Engineering
5.	Dr.S.Ramaprabhu	Elected as an International committee member of Nuclear Quadrapole Resonance Spectroscopy for 1993 - 1997

#### 4.13.16 Research Publications

1. S.Revathi & V.Balakrishnan, J.Phys. A 26,, 5661-5673 (1993).
2. S.Revathi & V.Balakrishnan, J. Phys. Rev. A 26, 467-475 (1993).
3. V.Balakrishnan, Pramana 40, 259-265 (1993).
4. Size Dependence of Electrical Resistivity and Thermoelectric Power in  $Pb_{0.2}Sn_{0.8}Te$  Thin films, V.Damodara Das and C.Bahuleyan Physics of Semiconductor Devices, p. 489-491, (1993), (Ed.KrishanLal, (Narosa Publishing House)
5. Electrical Resistance Variation and Optical absorption in 2% Indium doped  $CdSe_{0.5}Te_{0.5}$  Thin Films, V.Damodara Das, K.Rajesh Nayak and Laxmikant Damodare Physics of Semiconductor Devices, p, 496-498, (1993), (Ed).Krishan Lal, (Narosa Publishing House)
6. Electrical Resistance Variation with Temperature and Thickness and Seebeck Coefficient in Vacuum - deposited Thin Films of 1% Pb doped  $PbSe_{0.2}Te_{0.8}$  Alloy, V.Damodara Das, B.Sivagnanam and P.Gopal Ganesan, Physics of Semiconductor Devices, p.486-488, (1993) (Ed.Krishan Lal, (Narosa Publishing House)
7. Electron Optical Studies on Thin Films of the Semiconducting Alloy  $GasSe_{20}Te_{75}$ , V.Damodara Das, K.S.Raju and A.Bhaskaran, Physics of Semiconductor Devices, p.483-485, (1993), (Ed.Krishan Lal, (Narosa Publishing House)
8. K.C.James Raju, V.Sivasubramanuam, R.Pragasam, V.R.K.Murthy and B.Viswanthan, J.Appl.Phys. 74(3), 1966 (1993).
9. R.Pragasam, C.Srinivasan, V.R.K.Murthy and B.Viswanathan, Super cond. Science and Technology 402, 6 (1993).
10. K.V.Sriram, M.P.Kothiyal and R.S.Sirohi, Opt. Engg. 32, 94-100 (1993).
11. P.Sreedhar and R.S.Sirohi, Opt.Commun, 97, 83-87 (1993).
12. K.V.Sriram, P.Senthilkumaran, M.P.Kothiyal and R.S.Sirohi, Appl. Opt., 32, 4199-4203 (1993).
13. K.V.Sriram, M.P.Kothial and R.S.Sirohi, J.Opt. (India) 22, 61-66 (1993)
14. R.S.Sirohi and N.K.Mohan, Appl.Opt.,32, 6387-90 (1993)
15. P.J.Masalkar, V.V.Rao and R.S.Sirohi, Int.J.Optoelectronics 8, 333-340 (1993)
16. P.R.Sreedhar, K.V.Sriram, P.Senthilkumaran, M.P.Kothiyal and R.S.Sirohi, J.Opt.(India) 22, 136-141 (1993)
17. R.Ranganathan, L.S.Vaidhyathan, A.Chakravarti and G.Rangarajan, Recutrant magnetic behavi-our in  $(NiFe)_{25}Au_{75}$  alloy, Solid State.Comm., 85, 911-915, (1993).
18. S.Uma, T.Sankar, M.Seshasayee, G.Rangarajan, C.Venkateswara Rao and C.Subramanian, Structural and crystal field studies in a single crystal of  $DrBa_2Cu_3O_6$ , Solid State Commn. 87, 289-293, (1993).
19. Anasuya Raghunathan, T.S.Natarajan, G.Rangarajan, S.K.Dhawa and C.Trivedi, Charge Transport, optical and magnetic proposals of polyariline synthesized using organic acids, Phys. Rev.B47 13189 - 13196, (1993).
20. Francois Beniere, Rene Chaplain, Marcel Gauneau, Viswantha Reddy and Andre Regreny, Delta-doping in diffusion studies, J.Phys. III France 3 2165-2171 (1993).
21. M.Senthil Kumar, K.V.Reddy and K.V.S.Rama Rao, Magnetic and Electrical Studies on  $H_{0.85}Tb_{0.15}Fe_{2-x}Ni_x$  system, J.Appl.Phys. 74 5112-5116 (1993) .
22. Anjali Rastogi and K.V.Reddy, Mechanism of Self Diffusion in Insb Single Crystals Proc.International Conference on Physics of Semiconductor Devices, New Delhi, Dec. 1993 pp 453-455.
23. A.V.Narasimham, Viscoelastic Relaxation in Liquids, ACUSTICA,79 277-286, (1993).
24. A.V.Narasimham, Ultrasonic Dispersion and Relaxation - and the Buck Viscosity coefficient of a Liquid- ACUSTICA, 79, 72-82 (1993).
25. A.V.Narasimham, Compressional Relaxation in Liquids and Molecular parameters, ACUSTICA, 80, 72-81(1993).
26. A.V.Narasimham and B.Manikiam, Comprasional wave propagations in some ionic solutions, Journal of pure and Applied Ultrasonics, NPL, New Delhi, 15, (1993).

27. A.V.Narasimham and B.Manikiam, Journal of Pure & Applied Ultrasonics, NPL, New Delhi, 15, (1993).
28. A.V.Narasimham and A.T.Seshadri, Dependence of Ultrasonic Relaxation on its Distribution, Ind. J.Physics Calcutta, 67, 348- 352 (1993).
29. A.V.Narasimham, The Bulk viscosity coefficient of a Liquid and its Relation to Absorption and Dispersion of Ultrasonic waves Ind.J. of Pure & Appl. Physics CSIR, New Delhi - 31, 280-292 (1993).
30. K.Rangaswamy, A.V.Narasimham and J.Sobhanadri, Dielectric Studies of some Aromatic Polyamides, Ind.J.Pure and Appl. Physics, 31, 165-173 (1993).
31. K.Rangaswamy, A.V.Narasimham and J.Sobhanadri, Dielectric Relaxation in some Aromatic Polyamides and surface polarisability plots, Ind J. of Pure and Appl. Phys. 32 111-117 (1994).
32. S.Srinivasan, Structure of a Thiazine derivature, Acta Crystallographica C50 1-4 (1994).
33. S.Srinivasan, Structure of a chalcone, Acta Crystallographica C49, 303-307 (1993).
34. S.Srinivasan, Structure of derivations of Diels Older adduct, Acta Crystallographica C49, 303-307 (1993).
35. S.Srinivasan, Crystal structure of an indot 1-me, Zeitschrift für Kristallographie 39 (1993).
36. S.Srinivasan, Crystal structure and conformation of depeptides with polar side chains, Int. J.Peptide and Protein Research 42, 292-299 (1993)
37. B.Subramanyam, Elastic anomalies of BaTiO<sub>3</sub>, J.Appl. Phy.74 945, (1993).
38. B.Subramanyam, SOE anomalies in BaTiO<sub>3</sub> from cubic to tetragonal phase transition, Pramana 41, 31-39, (1993).
39. B.Subramanyam, Anomalies in SOE constants and gyrotropic constants of triglycone sulphate near phase transition, Pramana 41, 203, (1993).
40. B.Subramanyam, Elastic anomalies in SrTiO<sub>3</sub>, Pramana 42, 1 (1994).
41. R.Amrutha and Y.Syamasundara Rao, Frequency dependent relative permittivity of silicon, Proceedings of the DAE Solid State Physics symposium BARC, Bombay 36c (1993).
42. B.A.Bambah, S.Lakshmi Bala, C.Mukku and M.S.Sriram, Chaotic behavior in chem-simons. Higgs systems. Phys. Rev.D47, 4677, (1993).
43. A.Subrahmanyam and P.Manivannan, J.Phy.D. Appl. Phys. 26, 1510- 1514 (1993).
44. C.Vijayan and M.Ravikumar, Fractal dimensionality of polymer conformations, JI. Chem. EDU (USA) 70, 27, (1993).
45. C.Vijayan, Computer simulation of chemical reactions, J.Chem. Educ. (India) 9, 27, (1993).
46. S.Ramaprabhu, N.Amstutz, F.A.C. Lucken and G.Bernardinelli, Copper 63,65 NQR of complexes of Cu(1) halides with phosphorous containing liquids, J.Chem Soc. Dalton trans., 871 (1993).
47. S.Ramaprabhu, E.A.C.Luken and G.Bernardinelli, <sup>63,65</sup>Cu NQR of complexes of Cu(1) halides with sulphur containing ligands, Part II, J.Chem Soc. Dalton Trans, 1185 (1993).
48. F.El.Snabary, S.Ramaprabhu, Al. Weiss and Ber. Bunsenges, Thermodynamics of hydrogen dissolved in pd-nih pd-Er-Agl Au, lu) ternary Solid Solution alloys, Ber. Burgenges. Phys. Chem., 97, 607 (1993).
49. M.Senthil Kumar, K.V.Reddy and K.V.S.Rama Rao, Magnetic and electrical studies on HO<sub>0.85</sub>Tb<sub>0.15</sub>Fe<sub>2-x</sub>Ni<sub>x</sub> system, J.Appl. Phys.74 5112-5116 (1993).
50. K.Elankumaran and K.V.S.Rama Rao, Temperature variation of magnetization and electrical resistivity in MnCO<sub>x</sub>Sb[0.1], J.Phys. Soc.Japan 62, 2832-2836 (1993).
51. K.Elankumaran and K.V.S.Rama Rao, Ferromagnetic resonance studies on MnCO<sub>x</sub>Sb [0 x 0.25], J.Phys.Soc. Japan 62 1354-1359 (1993).
52. B.Anusuya, V.S.Murty and K.V.S.Rama Rao, Electron spin resonance study on single crystals of ortho-periodic acid gama-irradiated at RT, J.Phys. Condensed Matter 5, 3681-3688 (1993).
53. K.R.Dhilsha and K.V.S.Rama Rao, Investigation of magnetic, magnetomechanical and electrical properties of Tb<sub>0.27</sub>Dy<sub>0.73</sub>Fe<sub>2-x</sub>CO<sub>x</sub> system, J.Appl.Phys.73, 1380-1385 (1993).
54. R.Ramesh and K.V.S.Rama Rao, Hydrogen absorption characteristics of Zr<sub>1-x</sub>HO<sub>x</sub>CO<sub>2</sub> system in the pressure range 0 - 40 bar, J.Alloys and Compounds 191, 101-105 (1993).

55. R.Ramesh, Y.V.G.S.Murti, K.V.Reddy and K.V.S.Rama Rao, The kinetics of hydrogen absorption in  $Zr_{1-x}HO_xCO_2$  ( $x = 0.4, 0.6$  and  $0.8$ ) alloys, *J.Alloys and Compounds*, 205 211-214 (1994).
56. K.V.S.Rama Rao, Recent investigations in some cubic Laves phase compounds of rare earth and transition metals, *Bull.Mater.Sci.* 16, 491-499 (1994).

#### 4.13.16 (b) Conference Presentations

1. V.Damodara Das, K.Rajesh Nayak and Gopal Ganesan, Optical Bandgap of Thin Films of Photo-voltaic Material 2% Indium doped  $CdSe(0.5)Te(0.5)$  Solid State Physics Symposium, December 27-31, 1993, Bhabha Atomic Research Centre, Bombay, India, 36C, p.225, (1993)
2. R.S.Sirohi, Invited talk: Holography in Fiber Optics. International Workshop on Fiber Optic Sensors, March 25-27, 1993 at Anna University, Madras
3. A.M. Niraimathi, G.Rangarajan and E.Guelin, Crystal field effects in  $NdBa_2Cu_{3-x}Ga_xO_{7-y}$ , Proc. of 13th General Conf. of European Phys. Soc. and Deutsche Physikalezche Gesellschaft, Referhnerns, Germany, March '93.
4. S.Uma, T.Sekar and G.Rangarajan, Paramagnetic Anisotropy of a single crystal of  $PrBa_2Cu_3O_6$ , Proc. DAE Solid State Phys, Symp. Bombay, vol. 3.6c. p.375, Dec. '93.
5. K.Sethupathi, S. Kasiviswanathan and G.Rangarajan, Single particle tunneling in HTSC break junction, *ibid* p.376.
6. V.Ganesan, P.R. Vasudeva Rao, C.K.Mathews, Narayani Senthil Kumaran and G.Rangarajan, Enhancement of superconductivity in  $Rb-C_{60}$  System by co-doping with indium, *ibid*. p.387.
7. Narayani Senthil Kumaran and G.Rangarajan, Thermoelectric power (TEP) of quenched melt grown YBCO - *ibid* p.389.
8. S.Srinivasan, Structure of a biomolecule, XVI National Seminar on Crystallography March, 15-17, 1993
9. C.V. Ramasastry and B.S.V.Gopalam, Electromodulation of single quantum well laser beams XXI National Symposium on Optics, IIT Madras 1994
10. B.S.V.Gopalam, Modulation characteristic of a single mode p-n junction laser beams National Symposium on trends in instrumentation, 4th Nov. '93, Andhra University.
11. GNR Sanjay Kumar and B.S.V.Gopalam, Mosfet: Triangular quantum well structure, IAPT Annual Convention, Vijayawada 10th Dec. 1993.
12. B.S.V.Gopalam, Line width of quantum well laser beams National laser symposium C.A.T. Indore Jan. 29th, 1994
13. B.Subramanyam, SOE anomalies in  $BaTiO_3$  at Cubic to tetragonal phase transition, 3rd National Conference on Phonon Physics. Jan. 20-23, 1993 held at Cochin University, Cochin.
14. A.Subrahmanyam and P.Manivannan, 7th International Conference on Physics of Semiconductor Devices, New Delhi, Dec. '93
15. S.Kishore, K.R.Dhilsha, G.Markandeyulu and K.V.S.Rama Rao, Structural and Magnetic properties of  $Ho_{0.85}Tb_{0.15}Fe_{1.5}Co_{0.5}Hy$  Solid State Physics Symposium held at BARC during Dec. 27-31, 1993.
16. M.Senthil Kumar, K.V.Reddy and K.V.S.Rama Rao, Mossbauer study of some cubic Laves phase compounds *ibid* p.187.
17. K.G.Suresh and K.V.S.Rama Rao, Magnetic properties of  $[Pr_xEr_{(1-x)}Fe]_{17}$  *ibid* p.173.
18. R.Ramesh and K.V.S.Rama Rao, Electrical Resistivity studies of  $Zr_{1-x}HO_xCO_2Hy$  System, *ibid* p.330.

19. T.R.Kesavan, R.Ramesh and K.V.S.Rama Rao, Hydrogen absorption studies on the  $Zr_{0.4}HO_{0.6}Fe_2$  system in the pressure range 0-1 bar ibid p.437.
20. S.Ramaprabhu, N.Amstoz and E.A.C. Lucken,  $^{63,65}Cu$  and  $^{79,81}Br$  NQR studies of halogenocuprate complexes of pph3: Presented at XII International NQR symposium, Zurich, Switzerland (1993).
21. S.Ramaprabhu, E.A.C. Lucken and G.Beruardinelli, Crystal structure and NQR of Cu(1) complexes of 4,6 methylpyrimidium p.2 thione, XII NQR Symposium, Zurich, Switzerland (1993).

#### 4.13.17 Any other Relevant Details

1. V.R.K.Murthy, One monograph on 'Microwave Materials' as published by M/s.Narosa publishing House, New Delhi.
2. R.S.Sirohi, Speckle Metrology ed. R.S.Sirohi, Marcel Dekker, Inc. USA(1993)
3. R.S.Sirohi, Wave Optics & Application Orient Longman (1993)
4. A.V.Narasimham, 3 more papers are under communication. 5 more papers are under preparation.
5. B.S.V.Goapalm, Initiated Research in Semiconductors at Vidisha
6. S.Lakshmi Bala, Selected as a Theoretical Physics Seminar circuit speaker for the year April '93 - March '94.



## 4.14 Centre for Bio-Sciences and Bio-Technology

### 4.14.1 Introduction

The Biosciences and Biotechnology was established in 1982. The centre offers Ph.D programme.

### 4.14.2 Details Faculty

#### Name of Faculty

#### Area of Specialisation

#### Professors

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

Immobilized enzymes/cell, Bioreactors, Modelling and Kinetics of biosystems

Megha Singh, Ph.D.(Carolina USA)

Biomedical engineering, Biorheology pulsating flow in blood vessels

#### Assistant Professors

T.Panda, Ph.D. (IIT Delhi)

Process development for industrial enzymes, Protoplast fusion technology and bioenergy

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

Basic and applied aspects of microbiology, Biotransformation, Fermentation of agroresidues for production of useful compounds

(Mrs.)K.Lalitha, Ph.D (Mysore)

Applied microbiology, Bio-chemistry, Enzymology, Biomethanation and waste treatment

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

Optimization and control of bioreactors, Downstream processing including membrane applications and aqueous two phase systems

T.Swaminathan, Ph.D (IIT Kanpur)

Environmental Bio-technology, bio reactors for waste treatment, biodegradation of toxic elements and compounds

### 4.14.3 Visit of Faculty Members to other Institutions

S.No.	Name of Faculty	Place visited	Purpose	Date
1.	Prof. Mega Singh	IIT, Bombay	Visiting faculty	-
2.	Dr.S.K. Rakshit	AIT, Bangkok	-do-	17 Sept.-20 Dec. 93
		Agency of IST Tsukuba, Japan	Invited lecture & Discussion about collaborative research	13-20 Mar. 1994
3.	Dr.T. Panda	IOWA Univ. of Sci.Tech. Ames, USA	Visiting Scientist INDO-US Fellowship	31 Jan.-31 Dec.94

#### 4.14.4 Particulars of participation in Seminars/Symposia/ Short-term courses

S.No.	Name of Faculty	Particulars of participation	Date
1.	Prof.A.Baradarajan	Gave a lecture on Bioreactors in the meeting connection with Royal Soc. of Chemistry section in Loyola College Madras	Jan. 1994
2.	Prof. Mega Singh	XXI National Symposium on Optics IIT Madras	10-12 Feb 94
3.	Dr.S.K. Rakshit	International Symposia on The Engineering Properties of Foods, AIT Bangkok, Thailand	21-23 Sept. 93
4.	Dr.T.Swaminathan	Presented 2 papers in 2nd IDA and WRPL World Conf. on Desalination and Water Treatment, Yokohama, Japan	Nov. 93
		Gave a lecture for the Educational Programme on Pollution control for leather Tanning organized by SISI, Madras	Jan. 94

#### 4.14.5 Research Publications

##### International and National Journals

1. P.Padmini, S.K. Rakshit and A.Baradarajan, Lipase catalysed hydrolysis of rice bran oil by free and immobilized system in Batch stirred reactor, *Bioprocess Engg.*, Vol.9, 2-3, p.103-106, 1993.
2. P.Padmini, S.K. Rakshit and A.Baradarajan, Studies on immobilization of Lipase enzyme on alumina beads for hydrolysis of rice bran oil, *Bioprocess Engg.*, Vol.9, No.1, p.43, 1993.
3. P.Padmini, S.K. Rakshit, K.Krishnaiah and A.Baradarajan, Studies on lipase kinetics using immobilized recycle reaction, *Bioprocess Engg.* July 1993.
4. S.K. Rakshit, P.Ghosh and V.S. Bisaria, Ethanol separation by selective absorption of water, *Bioprocess Engg.*, Vol.18, p.279- 282, 1993.
5. M.Singh, J.Middleberg, G.Ramachandran and H.J. Rath, Alteration in structure and mobility of erythrocyte aggregates under normal to - microgravity conditiona, *Microgravity Sci. Technol*, 6, 39-42, 1993.
6. M.Singh and P.Kanakaraj, Influence of hyper-chloesterolemia on structure and functioning of erythrocytes, *Biomedicine*, 13, 21-30, 1993.
7. K.Lalitha, C.M.Vargheese & N.Balasubramanian, Spectrophotometric determination of mimosine and 3-hydroxy-4(1H)- pyridone the toxic principles of leucaena leucocephala, *Anal. Biochem.*, 213, 21-30, 1993.
8. R.Gopalan, T.Swaminathan, N.S.Punekar and H.Veeramani, Study of iron removal from ferric citrate medium by pure and mixed cultures of iron resistant microbes, *Biotechnology letters*, 15(4), 433-438, 1993.
9. P.Padmini, S.K. Rakshit, K.Krishnaiah and A.Baradarajan, Studies on a continuous recycle reactor for lipase catalysed processing of rice bran oil, *Bioprocess Engg.*, JULY 1993.
10. S. Sivakesava, S.K. Rakshit and T.Panda, Improved process for ethanol production using *Zymomonas mobilis* effect of step feeding of glucose and relevant growth factors, *Process Biochemistry*, Jan. 1994.
11. P.Padmini, S.K. Rakshit and A.Baradarajan, Kinetics of lipase enzyme production in organic media, Nov. 1993.
12. S.K. Rakshit, N.H.Khan and K.V. Lakshmi, A fed batch surface culture process for the production of citric acid with reuse of *Aspergillus niger* mycelia, *Bioprocess Engg.* Oct. 1993.
13. S.Kar. T.Swaminathan and A.Baradarajan, Modified substrate inhibition for biodegradation of phenol of *Arthrobacter* sp., *Bioprocess Engg.*, 1993.
14. M.Singh and K.S. Kumar, Online characterization of biological tissues with a He-Ne laser light, *Optimization Engg.* 1994.
15. S.Karr, M.R. Subramaniam, Srinivasamurthy, T.Swaminathan and A.Baradarajan, Biodegradation of phenol by *Arthrobacter* and modelling of the kinetics, *Bioprocess Engg.* 1994.

### **International and National Conferences**

1. C.N.Raghupathi and T.Swaminathan, use of reverse osmosis in chlor alkali industry, Proc. IDA and WRPL World Conference on Desalination and Water Treatment, Vol.II, 513-517, 1993.
2. C.N.Raghupathi and T.Swaminathan, Use of reverse osmosis in chlor alkali industry, Proc. IDA and WRPL World Conference on Desalination and Water Treatment, Vol.II, 513-517, 1993.
3. A.Namasivayam, B.Prakash and M.Singh, Erythocyte and velocity distributions in invivo microvessels and glass capillaries, Proc. First Asian Congress for Microcirculation, Japan, p.40, 1993.
4. S.Kar, T.Swaminathan and A.Baradarajan, Biodegradation of phenol by Arthrobacter species study of growth kinetics and effect of toxic compound on growth rate on Environmental Pollution and its control, Sarang, Talcher, Orissa, Dec. 1993.
5. S.Kar, T.Swaminathan and A.Baradarajan, Substrate inhibition kinetic model for phenol biogradation by Arthrobacter species, Indian Chemical Engg. Congress 1993, Bomaby DEc.15-18, 1993.
6. A.Sivakumar, T.Srinivasaraghavan, T.Swaminatha and A. Baradarajan, Extended Monod kinetics for substrate inhibited systems, Chemcon 93, IICChE., Bomaby, DEc. 1993.
7. M.Kumaravel and M.Singh, Sequential analysis of aggregation mechanism of erythrocytesby He-Ne laser light scattering, Proc. XXI National Symposium on Optics, p.110, March, Feb. 1994.
8. B.Prakash and M.Singh, Tomographic analysis of blood flow pattern in microvessels, Presented at the Int. conference on Recent Advances in Biomedical Engg. Hyderabad, Jan. 1994
9. R.S.Karthikeyan, S.K. Rakshit and A.Baradarajan, Medium development for dextran production, Annual Session of the Indian Insitute of Chemical Engineers, CHECON 93, Bomaby, Dec. 15-18, 1993.
10. S.Kar, M.R. Subramaniam, Srinivasamurthy, T.Swaminathan and A.Baradararajan, Substrate inhibition kinetic model for phenol biodegradation by Arthrobacter species, Annual meetings of Indian Institute of Chemical Engineers, Bombay, Dec. 1993.

## 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 Departments are:

- Molecular Spectroscopy
- Quantum Chemistry and Instrumentation
- Magnetic Resonance Spectroscopy
- Study of Biomolecules and Clusters in solids/solution

### 4.15.2 Details of Faculty

Name and Qualification	Major area of Specialisation
<b>Professors</b>	
P.T. Manoharan, Ph.D. (Columbia)	Theoretical Chemistry and Magnetic Resonance Spectroscopy
Surjit Singh, Ph.D. (IIT Kanpur)	Molecular Spectroscopy and General Physical Chemistry
S. Subramanian, Ph.D.(Leicester)	Magnetic Spectroscopy and Theoretical Chemistry
T.K.K. Srinivasan, Ph.D.(Banaras)	Molecular Spectroscopy
<b>Visiting Faculty</b>	
Pradeep Thalappil, Ph.D.(IISc.)	Physical Chemistry Molecular Spectroscopy Electron Spectroscopy and Allied Techniques

### 4.15.3 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.	1	-	4	-	3	1	4	1	3	1	15	3	18
	Institute						Projects				CSIR		
Research Associates					1		3				1		

### 4.15.4 Number of Scholarships/Fellowships holders

Programme	Institute	Others	Total
Ph.D.	7	11 (10 CSIR)	18

### 4.15.5 Number of Degrees Awarded

Programme	Number
Ph.D.	1

#### 4.15.6 Instruments/Equipment Designed and Developed

1. Closed cycle cryostat for EPR measurement down to 12K ready for operation.
2. Matrix isolation apparatus.
3. FT EPR under construction.

#### 4.15.7 New Facilities added and Major Equipment procured

1. Bruker IFS 66V FT-IR spectrometer was installed.

#### 4.15.8 Training Abroad

S.No.	Name of Staff Member	Place	Date
1.	Dr.Babu Varghese Scientific Officer Mr.N.Devasahayam Senior Technical Asst.	Operation and maintenance of Enraf Nonius XRD model FRG 590 in their factory at the Delft The Netherlands	26-4-93- 07-5-93
2.	N.Devasahayam Senior Technical Asst.	Programme connected with the pulsed EPR system project at ETH, Zurich, Switzerland	10-5-93- 12-5-93
3.	M.Myrajan Senior Technical Asst. G. Palanisamy Scientific Officer	Operation and Maintenance of Bruker IFS 66V Fourier transformInfrared spectrometer at Bruker Analytische Metstechnik, GmbH, Germany	18.10.93 - 29.10.93
4.	C.J. Gunasekar Technical Assistant R. Rajendran Senior Technical Asst.	Training and maintenance of Z-24 Dilor Laser Raman Spectrometer at DilorLabs. Lille, France	20.10.93 - 29.10.93

#### 4.15.9 Short term course organised

Sl.No.	Title of course	Date
1.	Raman Spectroscopy and its applications	May 5-7 1993
2.	Electron Spectroscopy and Allied Techniques	March 28-31 1993

#### 4.15.10 Invited talks during the Short term course

Sl.No.	Name of the Visitor	Title
1.	Dr.S. Umapathy Department of Chemistry IISc, Bangalore - 560 012	Time Resolved Raman Spectroscopy
2.	Dr.Ashok V. Pimpale Inter University Consortium for UAE, University Campus Khandwa Road, Indore	Synchrotron radiation and Electron Spectroscopy using Indus-1
3.	Dr.Murali Sastry Physical Chemistry Dvn National Chemical Laboratory Poona - 8	Recent Advances in qualitative surface science using electron spectroscopy
4.	Dr.P.K. Ghosh Department of Chemistry IIT, Kanpur	Photodetachment studies of Negative ions in Penning Trap

Sl.No.	Name of the Visitor	Title
5.	Dr.D.D. Sharma Indian Institute of Science Bangalore - 560 012	Theory of photoemission Brumstrahlung Isochromat spectroscopy
6.	Dr.R.V. Subba Rao IGCAR, Kalpakkam	Scanning Auger microprobe

**Organising Committee for the Short term course:**

1.	Prof.P.T. Manoharan	Director
2.	Prof.Surjit Singh	Asso. Director
3.	Prof.S. Subramanian	Asso. Director
4.	Prof.T.K.K. Srinivasan	Asso. Director
5.	Dr.Pradeep Thalappil	Asso. Director

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

Sl.No.	Name of Faculty	Topic of the lecture	Delivered at	Date
1.	Dr.P.T. Manoharan	a. Reconstituted Hemoglobins - "A Spectroscopic View" - Planary speech at the Discussion Meeting	Jawaharlal Nehru Centre, Bangalore	August 1993
		b. Modulation of Heme Environment in Reconstituted Hemoglobin - Talk given to "The Institute of Molecular Spectroscopy"	Katholieke University, Nijmegen, The Netherlands	June 1993
		c. Biradicals - Fast Computer simulation on Effect of Exchange	Talk given at the "National Cancer Research Institute,,NIH, Bethesda"	July 1993
		d. Exchange Interaction by NMR spectroscopy	Talk given at the PAC/DST meeting in Mysore	Janunary 1993.
		e. Spectroscopy and Chemistry	Talk given to the combined Physics and Chemistry departments in Mysore University	October 1993.
		f. Biradicals As applied to Biomolecules	Talk given C N R Rao Symposium	December 1993.
2.	Dr.Surjit Singh	a. Thermodynamics of solvation international seminar:M.O. Calculation Ion solvation	Delhi	January 1993
		Theoretical Chemistry Symposium: Ion Parr Solvation	Calcutta	March 1993
		b. Science Day Symposium: Raman Effect	INSA Madras Chapter	February 1993
		c. Frontiers in Chemistry: Anion solvation	IISc, Bangalore	December 1993

Sl.No.	Name of Faculty	Topic of the lecture	Delivered at	Date
		d. Vibrational Spectroscopy	Bharathidasan University, Trichy	December 1993
3.	Dr.S. Subramanian	a. RF EPR Spectroscopy and Imaging	University of Denver, Colorado, USA	July 23 1993
		b. Low Frequency EPR of biological system	OHIO State University, Columbus, OHIO, USA	February 17 1993
4.	Dr.T.K.K. Srinivasan	a.Raman Spectroscopy and its applications (6 lectures)	Bharathidasan Univ.Trichy	December 1993

#### 4.15.12 Visits abroad

Sl.No.	Name of Faculty	Country Visited	Date	Purpose of visit
1.	Dr.P.T. Manoharan	Netherlands	June 1993	INSA-Dutch Academy Exchange Visitor to the Netherlands (Nijmegen)
		USA	July 1993	Professional visit to NIH/NIA, Baltimore, USA
2.	Dr.Surjit Singh	Germany	May - July 1993	AvH Fellowship - University of Seigen
3.	Dr.S. Subramanian	U.S.A.	31.12.1992 to 31-01-1994	Visiting Professor (sabbatical)

#### 4.15.13 Distinguished visitors to the Department

Sl.No.	Name of the visitor & Occupation	Date of visit	Purpose of visit (Lecture/Discussion)
1.	Derk A Tocher Univ. College of London 20 Gordon St, London WC1H	03.08.1993	From conducting polymers to Agostic bonding
2.	Dr.A. Kasi Viswanath Advanced Microelectronic Centre, CRL, Hitachi, Japan	15.09.1993	Quantum Confinement and Recombination Dynamics in GaAs
3.	Dr.V.J.P. Srivasavoy Institut De Chemie Physique 11 Department De chemie EPFL-ECUBLENS, CH-1015 Lausanne	03.01.1994	Photophysics of Nanocrystalline organic pigments in the solid state
4.	Dr.F.G. Riddell School of Chemistry The Purdie Building The University of St. Andrews FIFE KY16	27-01-94	Using Solid-state NMR to solve problems in aquire Chemistry
5.	Prof.G.F. Kuzynetsov IREE, Moscow	11.02.1994	X-ray Tonographic and diffractometricnon destructive qualitative analysis of multilayer Epitacal system for electric device application

#### 4.15.14 Sponsored Projects

Sl.No.	Title	Period	Funding Agency	Amount(Rs.in Lakhs)	Co-ordinator(s)
1.	Spectroscopic Investigations of inter and intra molecular interactions	1991-1994	DST	18 lakhs	Dr.P.T. Manoharan
2.	Construction of a FT-EPR Spectrometer	1992-1995	DST	84 lakhs	Dr.P.T. Manoharan Dr.S. Subramanian
3.	Matrix ...Copperativity	1989-1992	DST	8.5 lakhs	Dr.Surjit Singh
4.	Theoretical studies on.. reactions	-	DST	6.2 lakhs	Dr.S. Subramanian Dr.V. Ramakrishnan
5.	US-India Rupee project approved	-	US-India Project	20 lakhs	Dr.P.T. Manoharan Dr.S. Subramanian

#### 4.15.14 Major Consultancy Assignments

S.No.	Firm's Name	Amount (Rs.in lakhs)
1.	South India Viscose, Mettupalayam	0.075
2.	Indofil Chemicals. Bombay	0.060
3.	Indian Additives Co Ltd, Madras	0.900

#### 4.15.15 Research Publications

1. S. Sankarapandi, C. Daul, G.V.R. Chandramouli and P.T. Manoharan, J.Mag.Reson. (1993) Series, A103, 163-170.
2. P.K. Mandal and P.T. Manoharan (1993), Chem.Phys.Letters 210 463- 478.
3. K.M. Ananth and P.T. Manoharan (1993), J.Phys.Chem.Solids. 54, 835-843.
4. R. Jayakumar, A.B. Mandal and P.T. Manoharan, J.Chem.Soc. Faraday, Trans. (Accepted).
5. S. Sankarapandi, J. Rifkind and P.T. Manoharan, Proc.Ind.Acad.Sc. (Chem.Sci.), (Accepted).
6. M.C. Shivaglal, P.Mohandas and Surjit Singh, Effect of HB...Ammonia, I.J. Phys, 67B, 23(1993).
7. M.I.S. Sastry and Surjit Singh, Vibrational relax...Sulfoxide, I.J. Chem., 32A, 662(1993).
8. A.F. Jeyaraj and Surjit Singh, NIR spectral...ions, Proc.Ind.Acad. Sc. 105, 71(1993).
9. E. Knozinger, K.H. Jacob, S. Singh and P. Hoffman, Hydroxyl group...Crystallites, Surface Sc., 290, 388(1993).
10. P. Mohandas, M.C. Shivaglal, Surjit Singh and J. Chandrasekhar, abinitio M.O...Cyanide systems, J. Mol.Struct.284, 147(1993).
11. U. Pschn, H. Korperich, L. Heymans, S. Subramanian and W. Kuhn, M.R.I. and M.R.S. studies on the time course of rat brain lesions: Volume Quantification and the characterization of tissue heterogeneity by parameter subation, Magnetic Resonance in Medicine 30, 174, 1993.
12. J. Bourg, Murali C. Krishna, James Mitchell, R. Tschudin, T. Pohido, W. Friauf, P. Smith, F. Harrington and S. Subramanian, Radiofrequency FT-EPR spectroscopy and Imagine, J.Magn. Reson.B, 102, 1993.
13. C.S. Gopinath, S. Subramanian, M. Paranthaman and A.M. Hermann, Valence band electronic structure of the  $Tl_{2-x-z}Ba_2Ca_{2+x}Cu_3O_{10-y}$  system Physica C. 214, 153, 1993.
14. C.S. Gopinath, S. Subramanian, P. Sumara Prabhu, M.S. Ramachandran Rao and G.V. Subbarao, Structure, Superconductivity and XPS on  $Bi_{2.1}Sr_2Ca_{0.97-x}Y_xCu_2O_8$  system Physica C, 218, 315 (1993).
15. C.S. Gopinath, S. Subramanian, M. Paranthaman and A.M. Hermann, Comparative photoemission studies of  $Tl_2Ba_2Ca_{n-1}Cu_nO_{2n+2}$  (n = 1, 2 and 3), Phys.Rev.B, 48, 15999 (1993).



16. C.S. Gopinath, S. Subramanian, A. Paranthaman and A.M. Hermann, Valence fluctuations in  $Tl_{2-x-z}Ba_2Ca_{2+x}Cu_3O_{10-y}$  system, C.S. J. Solid State Chemistry 109, 211 (1994).

#### 4.15.16 Any other Relevant Details

A total of Rs.105 lakhs has been received for 1993-94 - the largest for the RSIC/IIT Madras from the DST.

The Department/Centre has 3 Scientific Officers 15 non-teaching technical and 6 non-teaching non-technical staff, 3 more Scientific Officers are expected to be appointed, as the interview formalities are already completed.

## 4.16 Computer Centre

### 4.16.1. Introduction

The Computer Centre was established in 1973 and provides Central Computing resources - facility and support. The Centre started with IBM 370 and changed over to SIEMENS 7580-E in 1987. The mainframe is complemented with MX500 running Unix and several micro computers and PCs to support research and development in various areas. Applications for the institute are also supported.

Phased replacement of the SIEMENS 7580-E which is now seven years old is under processing. The proposed systems will be on the client/server architecture with High-end servers having bulk disk-storage, multiple midrange compute servers and about forty user seats comprising workstations and PCs connected on a high speed network. The committee constituted by the Senate has presented its recommendations which are approved by the Senate. The Board of Governors, IIT Madras has also approved the Senate recommendations sanctioning in principle Rs 120 lakhs for the purpose.

Technical specifications have been drawn up to choose the machines and proposals have been received which are being examined.

It is planned to use existing terminal/telephone cables to various departments for institute-wide extended ethernet network to start with.

### 4.16.2. Details of Staff

<b>Name and Qualification</b>	<b>Major Area of Specialisation</b>
<b>Professor</b> Muthukrishnan, C.R. (Ph.D.)[Head]	Software Engg, Distributed and Parallel Systems, Object Oriented Systems
<b>Manager</b> Seshasayi, P. (M.S.) (on leave)	Semantics, Computer Systems Natural Language Processing
<b>Senior Systems Engineer</b> Dheenadayalu, R. (M.Sc.Engg)	Data Centre Operations, System Administration
<b>Senior Systems Programmer (SG)</b> Ramanujam, M.K. (Ph.D)	Systems Programming, Operating Systems, Computer Networks
<b>System Engineers</b> Jayaprakash, S. (M.S)	Programming Methodology, Software Metrics, Systems Programming, Fault tolerant Distributed Systems
Ramesh, S.K.(M.S)	MIS, Data Management, Data Processing, Systems Programming
<b>Assistant System Engineers</b> Ms. Vatsala (M.S)	System Analysis & Design, Application Software Development, Systems Programming, Data Base Management

**Name and Qualification****Major Area of Specialisation****Assistant System Officers**

Sourirajan, C.S.(M.Sc.)

System Administration, Programming Languages, Small Computers, Application Software Development

(Mrs) Vijayalakshmi Sirohi, (Ph.D.)

Software Engineering, Database Management Systems, Numerical Computing, Application Software, Parallel Computing, System Analysis &amp; Design

**Junior Systems Officers**

Ravichandran, V. (M.Sc.)

Application Programming, System Operations, Networking, Systems Programming

Vijayaraghavan, C.N. (M.Sc. &amp; P.G in Ind. Maths)

Computer Applications in Industry, Operating Systems, Systems Operation/Administration, Networking

**4.16.3. System Trainees on Rool**

1991-93	1993-95
12	12

**4.16.4. New Facilities/Equipment Added**

The PC Maintenance Cell which was functioning under Electrical Engineering Department has been taken over by Computer Centre from September 1993. This Cell has taken over the maintenance of PCs, PC-XTs and PC-ATs in the Institute. The system audit and inspection of all PCs was completed during October 1993. The Cell is at present maintaining the machines under its purview.

The Cell has also upgraded a Wipro PC-XT to PC-AT 386 on experimental basis.

An Application Development Laboratory has been setup in December 1993 with the following resources:

**Hardware**

- 1 No ACER FRAME 486 EISA DX2 66 MHZ system with 16MB RAM and 300 MB HDD.
- 6 Nos Diskless 286 systems with 1MB RAM over thin ethernet
- 1 No 132 col 300 cps EX 1000 Printer

**Software**

1. SCO UNIX V 4.0
2. MS DOS V 6.0
3. WINDOWS
4. 'C'

The laboratory is used as support for the professional work in Computer Centre and as platform for development and transfer for Institute and other applications.

Binary Editor has been developed and implemented in MX500 SINIX System.

**4.16.5. Short Term Course/Workshop Attended by the Staff**

S.No.	Name of staff	Course/Workshop attended	Date
1.	Mr S Jayaprakash Ms.Vatsala Mr.C.N.Vijayaraghavan	Open System Open House Digital - OSF1/ALPHA AXP	7th April 1993.

2.	Mr S K Ramesh	Workshop on Graphic information System for Natural Resources Management at IIT Bombay	Oct 18 to Nov 12
3.	Mr S K Ramesh	Workshop on SCO UNIX at Software Mart India Ltd, Madras	December 1993.
4.	Mr S K Ramesh Mr S Jayaprakash	Seminar on High Performance Computing at Digital Equipment (I) Ltd.	14th December 93.
5.	Mr V Balasubramaniam Mr G Mani Mrs Kiruba Rajagopalan	Word-Processing Course at IIT Madras Campus Educational Society.	-

#### 4.16.6. Staff Served in Committees

Committee on Modernisation of Central Computing Facilities

Prof. C R Muthukrishnan, Chairman

Mr R Dheenadayalu, Member

Dr M K Ramanujam, Member

#### 4.16.7. Visitors/Invited Talks

S.No.	Name & Occupation	Lecture/Discussion	Date
1.	Prof. E.D.Deaton State University of California USA	Object Oriented Database Systems	17-3-94
2.	Prof. V.Rajaraman Supercomputer Education & Research Centre IISc. Bangalore	Developments in Computer & Communication Technologies Experience in setting up a Computing a large Computing Facility	2-12-93
3.	Uma Mahadevan Computer Language Laboratory HP, California	Compiler Optimisation Technology	3-12-93

#### 4.16.8. Technical Presentations

Sl.No	Date	Company	Products
1.	20.04.93	ZENITH	ACER PAC & Note-Book Computers Madras.
2.	02.08.93	CDAC	Parallel PARAM Computing Systems.
3.	10.08.93	ECIL	ANUPAM Parallel Processing Computer Systems.
4.	08.11.93	TATA-IBM	RS 6000 Systems.
5.	09.11.93	DIGITAL	Alpha Systems.
6.	15.11.93	HCL-HP	HP 9000 series Systems.
7.	08.12.93	WIPRO	SPARC Systems.
8.	14.12.93	S R	Document Mgmt System Associates - ODYSSEY

#### 4.16.9. Institute Projects

S.No.	Title	Coordinator
1.	Hospital Information System	Mr.Dheenadayalu R.
2.	JEE Data Processing	Mr Sourirajan C.S. Mr.Vijayaraghavan C.N

S.No.	Title	Coordinator
3.	GATE Data Processing & CLAM Management	Mr. Jayaprakash S,
4.	M.Tech Admission & CARS System Management	Mr. Ramesh S.K.
5.	Stores & Purchase Management	Dr. (Mrs) Sirohi
6.	Board/Senate Proceedings Retrieval System	Ms. Vatsala Dr. M.K.Ramanujam.

#### 4.16.10 Consultancy Projects

S.No.	Name of Staff	Funding Agency
1.	Mr. S.K.Ramesh	Technical Consultancy to Ms CRIIL Nandanam, Madras

#### 4.16.11 Lectures Delivered

S.No.	Staff Name	Title
1.	R.Dheenadayalu	Delivered lectures for the course on "Computers in Civil Engineering" in the Hydraulics Laboratory, IIT, Madras
2.	R.Dheenadayalu	Delivered lectures for National Institute of Port Management in the course titled "Personal Computers in Ports"

#### 4.16.12 Major Consultancy

S.No.	Organisation	Dept of IIT Madras	Project
		Providing Consultancy	
1.	Integral Coach Factory, Madras	Applied Mechanics	Design of Metre Gauge coaches.
2.	Vikram Sarabhai Space Centre, Trivandrum	Aerospace Engg.	Development of Computer programs for rocket motor propellant design.
3.	Bharat Heavy Electricals Ltd.	Mechanical Engg.	Analysis of Transients in steam deaerator.
4.	Andaman-Lakshadweep Harbour works	Ocean Engg.	Harbour Foundation Design
5.	University of Madras	Direct	Labour Market Analysis Analysis.
6.	Public Works Department	Direct	Water Studies
7.	Dept of Home Sc. S.V. University	Direct	School of Environment Studies
8.	Centre for Water Resources Development	Direct	Modelling saline water intrusion.
9.	Nuclear Power Corporation	Civil Engg.	FE analysis of raft foundation in Nuclear plant
10.	Dept of Non-Conventional energy sources	Applied Mech.	Generation of aero dynamic data for blade sections of wind energy systems

#### 4.16.13. Projects by System Trainees

S.No.	Title	Name
1.	Hospital Information Management System	G. Raja

S.No.	Title	Name
2.	Monthly Items Shortage Forecasting for Automobile Industry	P.Muthuraman S.M.A.Khader
3.	Family Card Information System	Jayashankar Ramesh Balaji
5.	Proto Type of Personnel Information System for IIT	S.Muruganandam
6.	Siemens Library Information Processing System	D.Sudhakar A.Ashok Kumar
7.	Personnel Information System of Students in ORACLE	George Thomas
8.	Financial Accounting and Reporting System	S.Padma

#### 4.16.14. Books

S.No.	Name of Staff	Title	Publisher
1.	R.Dheenadayalu	Computer Science for Class XI CBSE	Tata Mc Graw-Hill Publishing Co.
2.	R.Dheenadayalu	Computer Science for ICSE Examination Class IX	Tata Mc Graw-Hill Publishing Co.
3.	R.Dheenadayalu	Computer Science for ICSE Examination Class X	Tata Mc-Graw Hill Publishing Co.

#### 4.16.15 Research Publications

1. K.Srinivas and C.R. Muthukrishnan, 'Concurrent Computing on a Hypercube Simulated Over a Network of Workstations' - Computer Science and Informatics Journal Computer Society of India - Vol.20.No.1 July 1990, pp:10-20.
2. R. Satyanarayanan and C.R. Muthukrishnan, 'Static allocation of communicating process for distributed computing systems with resources heterogeneity' - J Indian Inst. Sci., July-Aug. 1990, 70, 305-315.
3. C. R. Muthukrishnan, 'A Diffusive Decentralized Method for Dynamic Load Balancing in Distributed Computing Systems' - Proceedings of the ISMM International Conference, Parallel and Distributed Computing and Systems, New York, October 10-12, 1990, pp:344-348.
4. S. Jayaprakash and C.R. Muthukrishnan, 'Fault tolerance in Maekawa's distributed mutual exclusion algorithm', ICCS'90, Singapore, Nov.1990.
5. T. V. Gopal, C.R.Muthukrishnan and R.K. Subramanian, 'Data Abstraction and Concurrency in Ada' Journal of Information Science and Technology, Vol.1, No.2, Jan 92.
6. S. Jayaprakash and C.R.Muthukrishnan, 'An improved Reliable Distributed Mutual Exclusion Algorithm', Singapore ICCS/ ISITA '92, pp 209-213.
7. R. Satyanarayanan and C.R.Muthukrishnan, 'A note on Raymond's tree based algorithm for distributed mutual exclusion - Information Processing Letters, 43(1992)249-255, North-Holland, 5th October 1992.
8. R. Satyanarayanan and C.R.Muthukrishnan, 'Message-efficient distributed mutual exclusion incorporating the 'least recently used' fairness criterion - IEE Proceedings-E, Vol.139, No.6, November 1992.
9. T. V.Gopal and C.R. Muthukrishnan, Concurrent Programming in Encyclopedia of Computer Science and Technology, Vol. 26, Supplement 11, Allen Kent and James G Williams, Marcel Dekker Inc. 1992.
10. Afsal C. Majeed and C.R. Muthukrishnan, 'Usage analysis: a compile-time analysis to improve reference counting', Journal of Programming Languages 1 (1993)93-102.
11. S. Radha and C.R. Muthukrishnan, 'A Portable Implementation of Unity on Von Neumann Machines' - Computer Lang. Vol.18,No.1, pp.17-90, 1993.
12. R.Satyanarayanan and C.R. Muthukrishnan, 'A Dynamic-tree Based Distributed Mutual Exclusion Algorithm Incorporating the 'Least Recently Used' Fairness Criterion' - Sixth International Conference on Parallel and Distributed Computing and Systems (PDCS-93), October 14 - 16, 1993 Sponsored by The International Society for Computers and Their Applications - ISCA in co- operation with the IEEE Computer Society.

## 4.17 Materials Science Research Centre

### 4.17.1. Introduction

The Materials Science Research Centre established in 1975. The major areas of teaching and research of the Centre 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 Interca- lation 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 semi-conductor-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 proper-ties 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

#### Professors

K.V.S. Rama Rao, Ph.D.(Andhra)[Head]

Magnetism and Magnetic Materials

G.V.Subba Rao, Ph.D.(IIT Kanpur)

Materials Science and Solid State Chemistry .. High

FRSC (Lond).C.Chem.

FAIC (USA), F.I.A.Sc.(Ind.)

FNA (Ind.)

- Director CECRI

Karaikudi (on lien)

$T_c$  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		Total
	M	W	M	W	M	W	M	W	M	W	M	W	
Ph.D.	-	-	-	1	-	-	1	2	2	-	3	3	6

#### 4.17.4. Number of Scholarships/Fellowships holders

Programme	Institute	CSIR	Others	Total
Ph.D.	5	--	1	6

#### 4.17.5. Number of Degrees Awarded

Programme	Number
Ph.D	1

#### 4.17.6. New Facilities added and major equipment procured

1. Keithley's Scanner Model 705 with Vander-Pauw switching card.
2. TVS 24 pin dotmatrix printer
3. Installation of Major equipments such as X-ray diffractometer, Faraday Balance, Infrared Spectrometer, Thermal Analyser, Tri-Arc Furnace etc., carried out in the New MSRC building.

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

Number of Lectures delivered : 5

#### 4.17.8 Distinguished visitors to the Department

Sl. No.	Visitor's Name & address	Date	Purpose
1.	Prof.F.J.Berry Dr.L.E. Smart The Open Univ. UK	01 Apr 1993	To deliver talk
2.	Prof. L.C. Gupta Head - SSP Group TIFR Bombay and Prof. G.V. Subba Rao Director CECRI, Karaikudi	22 June 1993	-do-
3.	Sri RBSYS Rawat Lecturer HNB Garhwal Univ. Uttar Pradesh	23 June 1993	-do-
4.	Prof. L.C.Gupta Head - SSP Group TIFR Bombay and Prof. G.V. Subba Rao Director CECRI, Karaikudi	10 Aug. 1993	-do-
5.	Dr. S.S. Krupanidhi Materials Research Lab. Pennsylvania State Univ. USA	19 Aug. 1993	-do-



Sl. No.	Visitor's Name & address	Date	Purpose
6.	Dr. M.A. Subramanian Central Res. & Dev. Dept. E.I. Du Pont de Nemours & Co. USA	27 Sept. 1993	To Deliver talk
7.	Dr.G.P. Agarwal Dr.Manfred Baien Technical Univ. Munschem	14 Oct. 1993	-do-
8.	Prof.G.V. Subba Rao Director CECRI Karaikudi	08 Nov. 1993	-do-
9.	Dr.B.R. Sekhar Dept. of Physics Univ. of Rajasthan	08 Nov. 1993	-do-
10.	Dr.Ram Pratap Dept. of Physics Univ. of Bombay, Bombay	17 Nov. 1993	-do-
11.	Dr.S.Natarajan Dave-Faraday Research Lab. The Royal Institution of Great Britain, UK	10 Dec. 1993	-do-
12.	Prof. L.C. Gupta Head SSP Group TIFR, Bombay	24 Nov 1993	-do-
13.	Prof.Anthony K.Cheetham Director Material Research Lab. University of California Santa Barbara, USA	13 Dec. 1993	-do-
14.	Prof. Antony R.West Department of Chemistry Univ. of Aberdun United Kingdom	18 Dec. 1993	-do-
15.	Prof.Mihir Chaudhary IACS, Calcutta	20 Dec. 1993	-do-
16.	Prof. D.J. Buttrey Dept. of Chem. Engg. Univ. of Delaware Newark, USA 21 Dec. 1993	-do-	
17.	Prof.V.Venkatesan Department of Maryland USA	03 Jan. 1994	-do-
18.	Prof.F.J.Berry Dept. of Chemistry The Open University Milton Keynes, England	27 Jan. 1994	-do-
19.	Dr.R.Suryanarayanan Laboratoire de Physique des Solides de Bellevue CNRS, Meudon, France	29 Jan. 1994	-do-

Sl. No.	Visitor's Name & address	Date	Purpose
20.	Dr. Herbert Pausch Universitat Kiel Institut fur Anorganische Chemie Otto-Hahn-Platz, Germany	03 Feb. 1994	To Deliver talk
21.	Dr. R. Suryanarayanan Laboratoire de Physique des Solides de Bellevue CNRS, Meudon, France	08 Feb. 1994	-do-
22.	Prof. H. Schimid Laboratoire de Physique des Solides de Bellevue CNRS, Meudon, France Department of Chime Minerale Analytique et Applique Univ. of Geneva, Geneva	10 Feb. 1994	-do-
23.	Dr. J. Sievert Physikalisch - Technische Bundesan - Stalt Magnetic Measurments Lab. Braunschweig, Germany	10 Feb. 1994	-do-
24.	Dr. Shyam Bhoga Nagpur Univ.	16 Feb. 1994	-do-

#### 4.17.9. Sponsored Projects

S.No.	Title	Funding Agency
1.	"Redox Mechanisms in High $T_c$ Superconductors and search for new Copper and Non-Copper based Superconductors"	Indo-French Project

#### 4.17.10 Research Publications

1. P.A. Ramakrishnan, S. Sampath and G.V. Subba Rao, Photoelectrochemical studies on the mixed oxide bronze,  $Ba_3Nb_4Ti_4O_{21}$ , Mater. Chem. Phys. 34, 1993, 295-299
2. T.A. Mary, N.R.S. Kumar and U.V. Varadaraju, Structure and Physical Properties of the  $LnBa_2Cu_2MO_7$ - System ( $Ln$ =Rare Earth and  $Y$ ;  $M$ =Ga, Co) J. Solid State Chem. 107, 243, 1993.
3. T.A. Mary and U.V. Varadaraju, Phase Formation and Superconductivity on the  $LnBa_2Cu_{3-x}Ti_xO_7$ - System ( $Ln$ =Nd, Sm; O), Physica C. 215, 1993, 269-278.
4. T.A. Mary, N.R.S. Kumar and U.V. Varadaraju, Influence of Cu-site substitution of the structure and superconducting properties of  $NdBa_2Cu_{3-x}M_xO_7$ - ( $M$ =Fe, Co, Ni, Zn) system, Phys. Rev. B. 48, 1993, 22.
5. C.S. Gopinath, S. Subramaniam, P. Sumana Prabhu, M.S. Ramachandra Rao and G.V. Subba Rao, Structure super-conductivity and XPS studies on  $Bi_{2.1}Sr_{1.03}Ca_{0.07}Y_xCu_2O_{8+y}$  system, Physica C 218 (1993) 117
6. P. Sumana Prabhu, M.S. Ramachandra Rao and G.V. Subba Rao, Structure and superconductivity studies on Fe and Co doped Bi- 2212, Physica C 211 (1993) 279
7. G.V. Rama Rao, P.V. Sivaprasad, R.K. Singh Raman, S. Venkadesan, S.L. Mannan and U.V. Varadaraju, Thermoanalytical Investigation of the formation of  $YBa_2Cu_3O_{6.5}$ , Thermochemica Acta, 230, 1993, 207-223.

## 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 programme for students registered through various departments. The major areas of teaching and research of the Centre are:

- \* Development of Composite Materials
- \* Manufacturing technology of polymers, metal and ceramic matrix composites
- \* Theory of composite materials
- \* Analysis of composite structures
- \* Composites product design
- \* Testing and quality control

### 4.18.2. Details of Faculty

#### Name and Qualification

Chief Design Engineer

N G Nair, Ph.D.(IIT Kanpur)

#### Major area of specialisation

Composites Technology, including materials and process development, analysis & design of composite products Quality assurance of composites structural engineering.

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

Design and development of composite products processing and testing of composite materials and products.

### 4.18.3. 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	-	3	-	1	-	2	1	8	1	9
M.S.	-	-	1	-	1	-	-	-	1	-	3	-	3
<b>Total</b>	-	-	3	-	4	-	1	-	3	-	11	1	12

(All registered through departments)

### 4.18.4 Number of Scholarship/Fellowship Holders

Programme	Institute	Others	Total
Ph.D.	6	3	9
M.S.	1	2	3
<b>Total</b>	7	5	12

#### 4.18.5. Number of Degrees Awarded

Programme	Number
Ph.D	2

#### 4.18.6. Short term course/Workshop/Seminar/Symposia/Conference organised

S No.	Coordinator(s)	Title of course	Period
1.	Dr N G Nair	Design & Manufacture of FRP Chemical Plant Structures	29.11.93 to 04.12.93
2.	Dr S K Malhotra	Composites Technology (ISRO IITM Cell)	06.12.93 to 10.12.93
3.	Dr N G Nair	Workshop on FRP Technology	14.03.94 to 26.03.94

#### 4.18.7. Visits Abroad

Sl.No.	Name of faculty	Country Visited	Date	Purpose of Visit
1	Dr.S K Malhotra	Spain	11-17 July 1993	Presented paper & attended ICCM-9 Conference
2	Dr.G Santhanakrishnan	USA & France	15.10.93-13.11.93	Conference and visit to Institutes

#### 4.18.8. Sponsored Projects

The following projects sanctioned in earlier years and were continued during the year

Sl.No.	Title	Period	Funding Agency	Amount (in Lakhs)	Coordinator
1.	Development of Rehab.aids in Composites for paraplegics	4 Years	DST	1.43	Dr.N.G Nair
2.	Dev. & Evaluation of FRP splints for cerebral palsy	3 years	DST	1.81	Dr NG Nair

#### 4.18.9 Major Consultancy Assignments

S.No.	Title	Amount (Rs. in lakhs)
1.	Design and Development of FRP Spolers for Cars	0.25
2.	Design consultancy and test consultancy under Composite Test Facility	1.50

#### 4.18.10 Research Publications

1. S.K. Malhotra, Some studies on end connection of Composite sandwich panels, Presented at 9th Intl. Conf. on Composite Materials (ICCM-9), July 12-16, 1993, Madrid, Spain, pp.384-391.
2. G.Santhanakrishnan, R.Krishnamurthy and S.K. Malhotra, Investigations on the dynamics of machining of composites, presented at 9th Intl. Conf. on Composite Materials (ICCM-9), July 12-16, 1993, Madrid, Spain, pp.608-615.
3. G.Santhanakrishnan, R. Krishnamurthy and S.K. Malhotra, Mechanics of tool wear during machining of advanced fibrous composites, Proc. of Intl. Conf. of Machining of Advaned Materials, July 20- 22, 1993, Gaithersberg, Maryland, pp.489-500.

4. G. Santhanakrishnan, R.Krishnamurrthy and S.K. Malhotra, Preliminary investigations on machining of advanced fibrous composites, Proc. of 38th Intl. SAMPE Symposium, May 10-13, 1993, Anaheim California, pp.1700-1709.
5. S.K. Malhotrrra, Repair of composite panels, presented at Composite 94, Conf., Feb.17-18, 1994, VSSC, Trivandrum.
6. G.Santhanakrishnan, R.Krishnamurthy and S.K. Malhotra, Studies on cutting forces during machining of composites, presented at Composites 94, Conf., Feb. 17-18, VSSC, Trivandrum.

## 4.19 Industrial Consultancy & Sponsored Research Centre

### 4.19.1 Introduction

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

- Sponsored Research programmes
- Plan schemes
- Consultancy programmes
- Collaborative research with foreign companies
- Industrial associateship scheme
- ISRO-IITM cell joint projects sponsored by ISRO
- CODAPS Cell joint projects sponsored by Dept. of Ocean Development, Govt. of India
- Entrepreneurship Development Programmes
- Technology transfers
- Patents, etc.

### 4.19.2 Sponsored Research

More than 150 projects with a total sanction of about Rs 10 crores for a 3-year period are handled by the Centre. Out of this, 52 projects of value totalling to Rs 5.02 crores were received during 1993-94 alone.

### 4.19.3 Plan Schemes

The Centre provides administrative support for plan schemes of Ministry of Human Resources Development sanctioned to the Institute in the emerging areas and processing of technology such as CAD-CAM, VLSI, Telematics, Fibre Optic communication, Environmental engg. etc. The following schemes were sanctioned during the year:

1. Development of a Decision Support System for aggregate Planning and Scheduling.
2. Software Technology - New Approaches and Innovative Methods.

### 4.19.4 Consultancy Programmes

The consultancy programmes showed a substantial growth during this year also. The total value of the approved assignments increased to Rs 373.08 lakhs in 1993-94 from Rs 221.58 lakhs in 1992-93. Research Based Industrial Consultancy activity contributing nearly 50% of the total value of the assignments. Also 26 faculty were retained as consultants by various industries. Another important activity is, taking up interdisciplinary programmes for providing consultancy to Tamil Nadu Pollution Control Board, Tamilnadu Leather Development Corporation and Tamilnadu Minerals Limited.

### 4.19.5 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 continued. Also projects under Indo-Russia and Indo-EEC Indo- French and National Science Foundation of USA were continued.

#### **4.19.6 Industrial Associateship scheme**

The response from the industry towards this scheme has been highly encouraging with the membership increasing from 309 in the previous year to 343 during 1993. Four Technology Appreciation Programmes and two Technology Absorption & Adaptation Programmes were held.

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

#### **4.19.7 ISRO-IITM Cell Joint Projects**

This is a joint research activity sponsored by the Indian Space Research Organisation where research projects of interest to ISRO are being taken. Four new projects were taken during the year and also short-term courses were conducted in the areas of interest to ISRO.

#### **4.19.8 Technology Development Missions**

Three Mission projects in the areas of New Materials, Energy Efficient Technologies and Natural Hazards Mitigation, with financial support from the Ministry of Human Resource Development were taken up during this year. These projects were connected during the current year, with financial support from the Planning Commission. A few industries have already agreed and extended the financial support for some of these projects.

## 4.20 Central Electronics Centre

### 4.20.1 New Courses Introduced

Tenth training programme of one year duration was started on 3- 01-94. Fifteen candidates are selected.

### 4.20.2 New Facilities added and major equipment procured

- |    |                                   |           |
|----|-----------------------------------|-----------|
| 1. | Small Format Digitiser            | Rs.21,000 |
| 2. | Flat Bed Plotter with Accessories | Rs.40,000 |

### 4.20.3 Major Consultancy Assignments

S.No.	Title of Assignment	Organisation	Amount	Co-ordinator(s)
1.	Moisture Measuring Instrument	Cutoff Abrasive	0.25	M.Kumaravel
2.	Fabrication of Evading Target	State Police	0.70	M.Kumaravel
3.	Tape Recorder (B & K)	Ashok Leyland	0.075	V.K.Ranganathan
4.	Microline Dot Matrix Printer	Ashok Leyland	0.095	M.Kumaravel
5.	Development of Frequency Voltage Converter	Ashok Leyland	0.075	M.V.Srinivasan

### 4.20.4 Any other relevant details

The Centre has 12 Technicians, 3 Administrative and One Project Staff.



## 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, manufacture 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 May-June 1993 to the B.Tech. students. The following are the details of the work undertaken during the period under report:

No. of Work Orders completed : 677

No. of students trained in the Advanced  
Workshop Training during Summer Term Course : 25

During the above period several work of industrial consultancy and Sponsored Research works were undertaken and completed. In addition to the above Institute buses and vehicles were maintained.

### 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 undertakes 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 consultancy programme.

This section has a range of modern glass working equipment 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 quite significant in recent years. The section has adequate facilities for Quartz Working and has developed high level of expertise in this area.

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

Cryostat, Spherical, Cylindrical and Dewars (Window silvering), Luggin probe, Adibetic 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.)

This centre also procures new tools to help in fabrication of most sophisticated glass systems such as hydrogen absorption facilities working on volumetric and pressure reduction methods, to study the hydrogen absorption properties of metals and alloys, and bubble pump evaluation test-rig to study the volume flow rate of refrigerant and strong solution various glass diameters for R and D of the various departments of this Institute.

### **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, Phototaking 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:** Oxygen, Nitrogen, Dissolved Acetylene, Argon and Hydrogen.

**Special gases:** High Pure Argon, High Pure Oxygen, High Pure Nitrogen and Zero Air

### **5.5 Centre for Continuing Education:**

The Centre for Continuing Education was established in June 1986, by merging different units connected with continuing Education activities, Quality Improvement Programme and Curriculum Development work at the Institute.

#### **Quality Improvement Programme:**

Since inception 221 faculty members have obtained Ph.D degrees and 300 faculty members have obtained M Tech degrees under this Programme.

During 1993-94, 17 Ph.D scholars and 19 M.Tech. scholars were admitted to the above programme; 45 Ph.D scholars and 15 M.Tech. scholars were on rolls during 1993-94.

Under QIP, Summer/Winter Schools were conducted during 1993-94 mainly for teachers of Engineering Institutions, but also involving a few participants from industry.

A more comprehensive overall Curriculum Development Cell has now been established in order to cater to the needs of all departments.

During 1993-94, 5 proposals from faculty members for preparation of resource materials have been approved under CD Cell Activity. Two workshops have been conducted under this Cell.

#### **Continuing Education Programmes:**

A total of 13 Continuing Education Programmes were conducted and about 350 participants attended these programmes, during 1993-94. Many industries are coming forward to make use of the expertise of the IIT Madras faculty through these programmes.

#### **Continuing Education Project:**

During 1993-94, 4 modules were completed; 61 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.

### **5.6 Educational Technology Cell:**

Educational Technology is a project funded by the Ministry of Human Resource Development with a

goal to develop and disseminate very high quality audio-visual instructional material in Science and Technology. One of the objectives of the sponsors is to make available the high quality expertise of the faculty and the excellent resources of IITs to a wider national and international audience through the medium of television.

Teaching aids vary widely from the more basic blackboard, chalk and chart to somewhat more modern aids such as transparencies, slides, films etc. In addition, there are instances when a laboratory experiment, a plant or a field situation is required to be introduced to emphasize the concepts being taught. All of these can be integrated and transferred to video tape and along with audio, can be presented as a video film to maximise the impact of the learner.

The Educational Technology Cell at IIT, Madras has been developed with this in mind. It has an excellent state of art T V Studio. We have produced more than a dozen high quality video instructional packages in a variety of specialised science and engineering topics with the help of faculty members from several departments.

### **Facilities**

The entire studio is equipped with professional broadcast quality equipment.

#### **Studio set-up**

A full-fledged sound proof three camera based television studio with a shooting area of 240 sq.ft. which can be used for live recording of lectures, discussions, etc.

#### **Audio recording & dubbing facility:**

An audio mixer provides mixing of upto 8 channels of audio simultaneously. A digital reverberator provides a wide range of audio special effects.

#### **Post production A/B roll editing facility on 3/4" U Matic SP High band Video:**

The editing unit consists of a fully computerised A/B roll edit controller and an interphased 8 input special effects generator with dissolves and over 200 wipe patterns. It is possible to convert practically any audio-visual material to video.

A telop camera captures images from OHP slides or from xeroxed paper, and overlays on to the live video.

A multiplexer chain/telecine adaptor uses two 35 mm carousel projector and a 16mm movie projector to convert 35 mm and 16 mm film to video.

A chromakeyer attached to the system allows creation of visual special effects.

A microcomputer is used for title generation and for simple 2-D graphics.

#### **E N G Video set up (for outdoor shooting)**

An E.N.G. outdoor unit complete with professional quality portable camera, recorders, and lighting equipment is available to shoot outside our studio such as in laboratories, industries, constructional sites, etc.

#### **3 Animation Computer**

An animation computer which is capable of producing 3-D graphics and animation is being acquired currently. 3-D graphics produced elsewhere can also be imported through our system.

#### **The Staff**

Our production team consists of Producer, Cameraman, Editor, Camera Assistant and Computer Operator.

## **ETV Programmes Produced**

The ETC has produced the following ETC Programmes so far.

### **Producer Oriented Televised Educational Films**

1. "What is man" - Behavioral Psychology
2. "Bukling of thin walled open sections" - Aeronautical Engg.
3. "Potential Energy Surfaces" - Chemistry
4. "Computer Integrated Manufacturing" - Manufacturing Engg.
5. "Phenomenon of Vortex Shedding" - Fluid Mechanics
6. "Process Control" - Chemical Engineering
7. "Fast Reactions" - Chemistry
8. "Chemical Equilibrium" - Chemistry
9. "From Hardware to Firmware" - Electrical Engineering

### **Teacher Oriented Televised Educational Films**

1. Artificial Intelligence & Scheduling - Artificial Intelligence
2. Approaches to Factory Scheduling - Artificial Intelligence
3. Factory Scheduling - Case Studies - Artificial Intelligence

## **5.8 Central Library**

The Central Library has added a number of new facilities and information services during the reporting period 1993-94. 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 just completed and will be implemented during 1994-95.

*Serials control:* Serials control system is running under DOS and would be changed to UNIX environment during 1994- 95.

*Open Public Access Catalogue (OPAC):* A data base of periodicals holdings of Central Library is being created (75,000) besides updating of records for books.

### **2. INFOLINE: On-line Information Retrieval Service:**

A new on-line information access and retrieval service has a high speed telecommunication link to access more than 500 databases through DIALOG Information Service in USA. The service has been used by Industrial Associates of IIT besides IIT faculty, students and staff of the Institute.

### **3. CD-ROM Information Retrieval Service:**

In addition to the already acquired CD-ROM database of OCLC, INSPEC, an Engineering Index database is being subscribed for the year 1994. These CD-ROMs covers Physics, Electronics, Electircals, Computers and Engineering technologies. This service is open to all authorised users. Literature search can be done interactively.

#### **4. INFODESK:**

It is a reference and reader-assistance service and serve as a main focal point of contact for the library users.

#### **5. 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.

#### **6. Media Resource Centre:**

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.

#### **7. Book Bank:**

The Book Bank of the Central Library since its inception, 14 years back has been catering to the needs of the students. The Book Bank service was augmented by way of enriching the collection both for Weaker section and General section as well increasing number of tickets that weaker section students can avail.

#### **8. Reorganizing Document Collection:**

**Reference Section:** The Reference Section was reorganised to facilitate easy consultation and browsing of reference books. The books and back volumes of periodicals in Stack I - V were newly labelled and re-arranged for easy browsing and retrieval.

#### **9. MALIBNET**

Central Library has become a fullfledged institutional member of the MAdras LIBRARY NETwork in March 1993 with the Director, IIT as one of the Founder Members. This programme is being co-ordinated by INSDOC Regional Centre, Madras. The Central Library has a terminal to search data interactively of the databases available at MALIBNET and this service is kept open for all Library users.

#### **10. Computerisation Work:**

Circulation module, book ordering and technical processing modules are operational in UNIX environment. These modules increases the efficiency of the services rendered at circulation counter as well as book ordering division. Serial control module in DOS environment is operational to monitor the current periodicals flow. OPAC is being planned to implement during the year 1994-95. Permanent loan data base has been created with about 22,000 records to monitor the flow of documents to various departments/projects.

The Library possess two CD-ROM databases viz., OCLC for books and INSPEC abstracting service for the subjects Physics, Electricals and Electronics, Computer and Controls. Engineering Index on CD-ROM is being subscribed for the year 1994. The Library has two CD-ROM drives connected to PC/XTs for reading the available CDs. Extensive use by the faculty, students and other staff members is being recorded.

The circulation system and book ordering are operational, the Serials Control and OPAC are to be implemented soon.

#### **11. Library Publications:**

New Additions to the Library (NAL) (fortnightly)

List of Periodicals (Subscribed by faculty)

## 12. Participation In Conferences/Workshops:

Sri R.Vengan, Deputy Librarian

1. Science and Technology Libraries : Librarian - A Manager. (Paper presented at the First Tamilnadu Library Conference 1993, University of Madras, 12-13th March 1993.)
2. State and Conditions of Public Libraries in Tamilnadu. (Paper presented at the First Tamilnadu Library Conference 1993, University of Madras, 12-13th March 1993.)
3. Participated in the Symposium on Bio-diversity inventries and monitoring with special reference to Mangrove cgo systems, MSSRF, Madras, 17 December 1993.

Invited Lecture:

1. Information Technology Modifications for Library and information services.(Summer School programme on Management Library Information Sciences in Engineering Colleges, 7 - 19, Jan.1993, Pondicherry Engineering College, Pondicherry, 1993.)

Sri M.Koteswara Rao, Deputy Librarian

1. Attended the National Convention on Automation of Libraries in Higher Education and Research Institutes, 19-20 February 1994, Ahmedabad.

## 13. Library and Information Service Statistics:

The follwing statistics reflect the overall performance of the Libaray and Information Services during the year under report.

### 1. Membership:

Institute Members (Staff & Students)	4,600
a. Outside Members	430
Individuals	(128)
Corporate	(12)
Industrial Associateship	(290)
Consultation Permits	1,260
b. Collection Development	
Books	2,541
Theses	82
Pamphlets and Reports	77
Microfilms/Fische	51
Book-bank (General)(BBG)	311
Book-bank (Weaker Section) (BBW)	173
Current Periodicals by Subscriptions	426
Current Periodicals by Exchange/Gift	185
Back Volumes of Periodicals added	2,840
Library collection upto March 1994	2,18,643
c. Library and Information Services - Circulation	
Number of Readers visited	1,57,200
Number of Volumes issued	1,77,500
Number of Volumes issued (BBG)	7,706
Number of Volumes issued (BBV)	6,100
Overdue & other charges collected	Rs.1,56,000/-
Xerox charges collected	Rs.2,40,000/-

### Reservation for Books

Registred	10,500
Fulfilled	

	9,700
<b>Department Loans</b>	
Department Loan	130
Permanent Loan	950
<b>Inter-Library Loans</b>	
Borrowed from other Libraries	100
Loaned to other Libraries	35
<b>Literature Search</b>	
Computer-based literature searches through DIALOG and CD-ROM databases	17
CD-ROM searches by users	410
<b>Reprint Service</b>	
From International Sources, i.e., British Library, Canadian Institute of Scientific Information, INSDOC, etc.	54
Translation services	1
<b>d. Audio-Visual Service</b>	
Number of Audio Cassettes	8
Number of Video Cassettes	21
Number of video programme screened	150
Number of persons attended	549
<b>e. Reprographic Service</b>	
Number of Xerox copies supplied	9,40,000
DTP output	12,562
Number of copies printed on Rotaprinter	5,81,740
<b>f. Binding</b>	
No. of Books and Journals bound (Internal)	2,019
No. of Miscellaneous Publications bound (Internal)	509
No. of Books & Journals bound through external binders	5,056
Departments works (miscellaneous)	2,328
<b>g. Visitors to the Library</b>	
Students from School (about 30 students per group)	8 Groups
Other Visitors	5 VIPS

## 5.9 Gymkhana

### Highlights of the year

After a lapse of nearly a decade, the existing Swimming Pool was renovated, recommissioned and thrown open for the use of the members from the 1st February 1994 thanks to the timely sponsorship from outside; interest free loan from the Institute and from the Students Welfare Fund and thanks to the heavy rain during the monsoon.

### Inter IIT Sports Meet

The IIT Madras contingent did well in the 19th Inter IIT Sports Meet at IIT Bombay from 16.12.93 to 20.12.93. We had high hopes of regaining the General championship till the last day of the meet. But unexpected defeat in the games of Basket Ball, Cricket, Foot Ball and Hockey thwarted our attempts and with the result we had to satisfy ourselves by being placed second in the Meet.

We won Gold in Tennis, and Weight Lifting, Silver in Volley Ball, Foot Ball, Badminton and Cricket, and we got fourth place in Water Polo event.

Our girl contingent did well to obtain Bronze in Athletics against very high odds.

## **Sports Fest 1993:**

The Institute Gymkhana is organising the sport fest as an annual feature which attracts participants from the leading colleges in and around the city. The enthusiasm, sportsmanship and keen competition vying for top honours have endeared this festival the most sought after one and is marked in the sports calendar of every participating college.

This year also large number of colleges have participated and the feature of this year, was the superlative performance by Prashanth Vasu of this Institute who won the title for Tennis by beating all the players in straight sets. Our teams have done creditably well in other games but were beaten by the champion in the respective games.

Our Hockey, Foot Ball, Basket Ball, Volley Ball and Ball Badminton teams reached the semifinals. The experience gained thus was the launching pad for our boys at the Inter IIT Sports Meet.

## **All India Inter Collegiate Basket Ball Tournament 1994**

The All India Inter Collegiate Flood Lit Tournament attracted 23 men and 8 women teams. RVC Engineering College Bangalore won the Gerhard Fischer Trophy with Kerala Verma College as runner up for men; while Stella Maris College won the Kokila Rajaiah Trophy with Nirmala College as runner up for women.

## **The IIT Sportstar Inter Collegiate Cricket Tournament**

This year 22 teams took part in the IIT Sportstar Inter Collegiate Cricket Tournament. The inception of the award of Man of the Match (for 2 semifinals and final) which carried prize money of Rs.1000/- each was the main attraction of the year.

Vivekananda College won the final and retained the Sportstar Cricket Trophy, and Gurunanak College was the runner up. In the semifinal the eventual winners defeated IIT Madras by a very narrow margin.

## **Institute Open Bridge Tournament 1994**

The Institute Open Bridge Tournament was conducted from 25.2.94 to 27.2.94 under the auspices of the Institute Gymkhana.

Mr M J R Vasudevan and Mr T R Krishnan won the Pairs Event in East-West, while our students, Mr C V Shrinaath and Mr Ameer Saidu, got second place.

Q K Team won the first place in the Team Event-Swiss League and Venkatakrisna's Team got the second.

Mr K Pathmanabhan won the individual even with Mr S Subramanian as runner up.

## **Inter Hostel Tournaments**

The Schroeter Trophy for the General Championship evinced keen contest from Ganga, Godavari and Alakananda hostels in the beginning. Ganga by its sheer determination and final surge won the coveted trophy by a handsome margin for the third time in succession.

## **Staff and Students Interaction Tournament**

Enthusiastic participation by the staff and students featured once again this year for the following events:

Badminton, Ball Badminton, Cricket, Tennis, Bridge, Volley Ball.

## **Cultural Activities**

1. The inter-hostel competitions in Cultural events (literary fine arts) were conducted during the odd semester for the Lit-Soc Trophy. All the events were gone through without any problems and the trophy winner was decided in the month of October, the first time that the competitions were completed in the odd semester itself. This scheme will be followed from now onwards.



2. A new event, India Quiz, was introduced in the inter-hostel competition and was also treated as institute open competition. This was very well received with excellent participation from students and the campus residents. This is going to be a regular annual event.
3. Rolling trophies in six cultural events (Classical Music, Light Music, Western Music, India Quiz, General Quiz, and Elocution, Debate, Extempore) were instituted. These trophies were donated by six faculty members of the Institute in the interests of the student activities.
4. The new lecture-cum-group discussion series titled "AWARENESS" programme was initiated. Shri S Gurumurthy, noted social and political activist delivered the inaugural address titled "Globalisation and Cultural Plurality". The lecture followed by a question and answer session was very highly appreciated by the students and the staff who attended the programme.
5. In order to educate the students in various aspects of music two lecture demonstrations were held. The first one was by Smt Chandralekha Banerjee on Hindustani classical music and the other was by Shri Madurai G S Mani on "Classical music in films". Both the programmes were very well received.
6. Cultural festival Mardi Gras was conducted from January 21 to January 26, 1994. There was very good participation from college students from Madras and other cities of India and the competitions were held in about 40 cultural events. Professional shows in Classical music, Light music, Pop music and a professional play were the high lights of the evening entertainment programmes. They were very well received by the participants. Two new items introduced during Mardi Gras were a Lecture-Cum-Demonstration on Tap Dancing by Miss Jane Goldberg from USA., a Ford Foundation Scholar, and a Lec-Dem of drama by well known theatre personality of Madras, Mr Mithran Devanasan.
7. The Cultural activities of the year 1993-'94 came to an end with the Gymkhana day celebrations with Shri T T Vasu, President of Madras Music Academy, as the Chief Guest. He also distributed the various trophies to the winners.
8. In summary, the cultural activities of the Institute Gymkhana '93-94' were satisfactory with good participation of the students and the campus residents.

## 6. STUDENT AMENITIES AND ACTIVITIES

### 6.1 Hostel:

All students admitted to IIT, Madras are required to reside in the hostels inside the campus. There are 11 men's hostels and 1 ladies' hostel with a total of 2396 single room accommodation. During the period under report there were 1816 men and 194 women students in these hostels.

Each hostel is administered by a Warden and an Assistant Warden. The Warden is assisted by a Hostel Council consisting of student Secretaries and the Assistant Warden in day-to-day functioning of the hostel. The Hostel Management is a centrally administered body and is in overall charge of the functioning of all the Hostels and the Central Supplies Unit. There are 294 hostel employees and they are responsible to the Hostel 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	Dr.P. Srinivasa Rao Professor of Mechanical Engg.
Assistant Registrar	Sri K. Ramaswamy
Name of the Hostel	Warden
Alakananda	Dr.M.S. Shunmugam Professor of Mechanical Engg.
Brahmaputra	Dr.B.S. Thandaveswara Asso. Professor of Civil Engg.
Cauvery	Dr.O.Prabhakar Professor of Metallurgical Engg.
Ganga	Dr.T.T. Narendran Asso. Professor of Hum. & Soc.Sciences
Godavari	Dr.N. Sivaprasad Asso. Professor of Mechanical Engg.
Jamuna	Dr.L.S. Ganesh Asso. Professor of Hum.& Soc.Sciences
Krishna	Dr.M. Ravindran Professor of Ocean Engg.
Mandakini	Dr.V.G. Idichandy Asso. Professor of Ocean Engg.
Narmada	Dr.S.D. Pathak Asso. Professor of Metallurgical Engg.
Saraswathi	Dr.S.K. Rakshit Asst. Professor of Chemical Engg.
Sarayu	Dr.Enakshi Bhattacharya Asst. Professor of Electrical Engg.
Tapti	Dr.M. Govardhan Asst. Professor of Mechanical Engg.
C.S.U.	Dr.P. Srinivasa Rao Professor of Mechanical Engg.

### 6.2 Central Supplies Unit:

The Central Supplies Unit is administered by a Warden. It procures the milk under the Milk Supply Scheme from the nearby villages and from Tamilnadu Co-operative Milk Producers Federation Ltd. and distributes to the student hostels, the residents of the campus and the staff of the Institute residing around the campus.

Under the Provision Supply Scheme, the Unit procures the items of major consumption from the wholesale suppliers and distributes them to the hostels, thus economizing on the mess expenditure in the hostel messes.

### 6.3 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 Chapter 8 - Campus Amenities.

### 6.4 (TN) Air Sqn. (Tech) NCC:

The Air Wing (Tech) NCC Unit is functioning at I.I.T., Madras from 16th September 1965 to provide NCC Training exclusively to the students population of the Institute. Regular IAF Officers and Airmen as PI staff are posted to this Unit and the strength is augmented by part-time Officers and other supporting civilian 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 of the Air Force elements and the Institute part-time Officers.

The organisation of the unit is as follows:

Commanding Officer	Wg Cdr B P LOHANI
Associate NCC Officers	Pit Officer A MANI

- Range Firing practice on Rifle, Revolver and 12 bore gun.
- One blood donation camp at NCC Building through Red
- Red Cross Society, Madras by 30 Cadets, One PI staff and Commanding Officer donated the blood.
- Cycle Expedition to Pondicherry by 14 Cadets.
- Pledging of eyes for donation by volunteer cadets.
- Pledging of anti-dowry by 68 cadets.

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 Scheme (NSS):

Fifty students of the Institute were registered for the N.S.S. for this academic year.

1. 30 students were teaching weaker children in the village of Taramani.
2. 10 students were teaching weaker children at Vana Vani School at IIT Madras.
3. 20 students were engaged in improving the ecology of our campus.

Apart from these regular activities, the N.S.S. also arranged the following activities.

1. A lecture by Swami Smaranananda, Head, Ramakrishna Math, Madras on "Swami Vivekananda's Message to the Youth" on 14.9.93 at CLT.
2. N.S.S. volunteers helped in the collection of clothes and utensils for Maharashtra earthquake victims in October 1993. Cash collections were also made and handed over to social service organisations.
3. A series of lectures was delivered by Prof NVC Swamy, Director, IIT Madras, on the subject "Karmayoga according to Swami Vivekananda" during the semester July-Dec. 1993.
4. A series of lectures was delivered by Prof NVC Swamy, Director, IIT Madras, on the subject "Bhaktiyoga according to Swami Vivekananda" during the semester Jan-Apr. 1994.
5. Dr Nagendra, Director, Vivekananda Kendra Yoga Research Foundation, Bangalore, delivered a lecture on "Swami Vivekananda, a Model for Model Youth" on 17.1.94 at CLT.
6. An inter-college/schools debate on the subject, "The Salvation of India lies in Religion and not in Materialism" was held on 17.2.94 as a part of the centenary celebrations of Swami Vivekananda's Chicago Address.

### 6.6 Student Welfare Fund:

During the year 1993-94 Sri A.V. Prakash, II M.Sc. and Sri P. Manikandan, Ph. D Chemistry were given loan of Rs.5000/- and Rs.2000/- respectively.

### 6.7 Guidance & Counselling Unit:

- More faculty and student counsellors volunteered to work in the Unit during this year than the previous years. The unit has 60 faculty and 115 student counsellors, currently.
- A Campus Guide was prepared updating information in the form of a booklet and was made available to every fresh student of under- graduate and post-graduate programmes.
- The first year B.Tech students were distributed to various student counsellors and faculty counsellors for individual attention immediately on arrival to the campus. A deviation this year, was that the student counsellors were chosen such that they lived in the same hostels in which their counsellees also lived. This had the benefit of informal meetings of the students even during late hours, if help was needed.
- The first year students with their parents and guardians were received by the student counsellors at Madras Central Railway station and were helped in settling down in their stay quickly in July, 1992.
- A get-together of all the counsellors and the parents guardians was arranged to make the fresh students feel much at home.
- Student problems were solved then and thereby the counsellors by paying individual attention to the needy.
- The Unit could identify many academically weak students and could arrange for guidance through the senior students who readily came forward to help in subjects like Mathematics, Physics, Chemistry and Engineering Drawing.
- A few problems of emotional nature also were attended to by the unit with the help of the medical officers of the institute.
- The unit helped the Medical Officers and the first year students to blood grouping of the first year students done.
- A lecture to students on "ill effects of drugs" by Dr.Rajkumar, the Psychiatrist of the institute was arranged by the unit and it was well received by the students.
- The counsellors of the unit met five times this year to exchange their views of each other for an efficient functioning.

### 6.8 Placement of Students:

During the period under report, the placement Office was able to arrange placements for 339 students of the Institute. The branch-wise details of placement made are given below:

Branch	No. of Students registered for placement	Number placed		Total	No Placed more than one job
		OC	SC/ST		
<b>I. B.Tech</b>					
1. Aerospace Engineering	10	8	-	8	-
2. Chemical Engineering	28	18	1	19	1
3. Civil Engineering	19	9	-	9	-
4. Computer Science	17	16	1	17	1
5. Electronics & Communication	32	28	4	32	10
6. Electrical Engineering	27	23	1	24	5
7. Mechanical Engineering	57	48	7	55	13
8. Metallurgical Engg.	21	15	-	15	3
9. Naval Architecture	6	3	-	3	-
<b>Total</b>	<b>217</b>	<b>168</b>	<b>14</b>	<b>182</b>	<b>14</b>
<b>II. M.Tech.</b>					
1. Aerospace Engineering	6	3	-	3	-
2. Applied Mechanics	8	4	-	4	-
3. Chemical Engineering	18	6	2	8	-
4. Civil Engineering	27	5	1	6	-
5. Computer Science	26	24	2	26	1
6. Electrical Engineering	27	18	3	21	-
7. Industrial Management	14	6	2	8	-

Branch	No. of Students registered for placement	Number placed		Total	No Placed more than one job
8. Mechanical Engineering	35	17	9	26	5
9. Metallurgical Engineering	4	1	1	2	-
10. Ocean Engineering	-	3	-	-	-
11. Solid State Technology	6	1	2	-	2
<b>Total II</b>	<b>174</b>	<b>86</b>	<b>20</b>	<b>106</b>	<b>7</b>

Branch	No. placed	No. got more than one job
<b>III. M.S.</b>		
1. Aerospace Engineering	3	-
2. Chemical Engineering	1	-
3. Civil Engineering	1	-
4. Computer Science	15	3
5. Electrical Engineering	8	1
6. Industrial Management	3	1
7. Mechanical Engineering	5	-
8. Ocean Engineering	1	-
<b>Total III</b>	<b>37</b>	<b>5</b>

IV Besides the above, the following were also placed.

M.Sc.	Chemistry	4
M.Sc.	Physics	1
M.Sc.	Mathematics	4
Ph.D	Civil Engineering	1
Ph.D	Computer Science	2
Ph.D	Physics	2

Adviser, Placement and Training  
Public Relation-cum-Placement  
and Training Officer

Prof. M A Parameswaran

Sri A K Pattabiraman

## 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 1993-94 are as follows:

### 7.1 B.Tech.

SC/ST students admitted in B.Tech. programme upto the academic year 1993-94 were sanctioned the concession of free messing plus Rs.70/- p.m. out of pocket expenses exemption from payment of tuition fees and hostel rent as per the post-matric scholarship rules. As on 31.3.94, 26 students were benefitted. 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 62 students got benefitted. The year-wise details of such students are also given in Table 7.1.

**Table 7.1**

Year	Merit-cum-means scholarship	Free messing (basic menu) and pocket allowance concession to SC/ST students
I	11	2
II	13	3
III	17	6
IV	17	21
<b>Total</b>	<b>58</b>	<b>32</b>

In addition to the above the Institute sanctioned a notional prize of Rs.100/- to the top ranking 23 B.Tech. students in JEE.

### 7.2 M.Tech.

Students who joined M.Tech. programme admitted through GATE were awarded scholarship at Rs.1800/- per month. During the period under report 199 fresh scholarships and 168 renewed scholarships were given, the department-wise details of which are given below:

**Table - 7.2**

Sl.No.	Dicipline	No. of M.Tech Scholarships awarded	
		Fresh	Renewal
1.	Aerospace Engineering	2	6
2.	Applied Mechanics	8	8
3.	Chemical Engineering	20	18
4.	Civil Engineering	22	27
5.	Computer Science and Engg.	31	26
6.	Electrical Engineering	32	26
7.	Industrial Management	23	13
8.	Mechanical Engineering	45	34
9.	Metallurgical Engineering	8	5
10.	Ocean Engineering Centre	1	3
11.	Solid State Technology	7	2
	<b>Total</b>	<b>199</b>	<b>168</b>

**7.3 M.Sc.**

Students admitted in M.Sc., programme were sanctioned Rs.300/-p.m. merit scholarship. Exemption from payment of tuition fee were also given to certain students. During the period under report 20 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 freships without tuition fees in all semesters
Chemistry	I	7	4
	II	6	3
Mathematics	I	7	3
	II	6	4
Physics	I	5	2
	II	8	3
	<b>Total</b>	<b>39</b>	<b>19</b>

**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 116 students received this fellowship of whom 28 were fresh scholars. The department-wise details of the fellowship awarded and renewed are given below:

**Table - 7.4**

Sl.No.	Dicipline	No. of M.Tech Scholarships awarded	
		Fresh	Renewal
1.	Aerospace Engineering	1	3
2.	Applied Mechanics	3	8
3.	Chemical Engineering	1	4
4.	Civil Engineering	5	13
5.	Computer Science and Engg.	5	16
6.	Electrical Engineering	5	16
7.	Humanities & Social Sciences	1	6
8.	Mechanical Engineering	4	15
9.	Metallurgical Engineering	1	2
10.	Ocean Engineering	2	5
	<b>Total</b>	<b>28</b>	<b>88</b>

**Ph.D.**

Scholars who are admitted for Ph.D full-time programme in Engineering fields are sanctioned Rs.2400/- for first two years and Rs.2500/- for another 3 years per month based on their progress. Scholars who are admitted for Ph.D fulltime in the Science fields are sanctioned Rs.1800/- p.m. for first two years and for another three years Rs.2100/- p.m. During the period under report 321 students obtained fellowship of whom 39 were fresh scholars. The department-wise details of the fellowships awarded and renewed are given below:

**Table - 7.5**

Sl.No.	Dicipline	No. of M.Tech Scholarships awarded	
		Fresh	Renewal
1.	Aerospace Engineering	1	7
2.	Applied Mechanics	5	16
3.	Chemical Engineering	9	23
4.	Chemistry	4	64
5.	Civil Engineering	3	22
6.	Computer Science and Engg.	2	13
7.	Electrical Engineering	2	9
8.	Humanities and Social Sciences	-	15
9.	Mathematics	-	14
10.	Mechanical Engineering	8	37
11.	Metallurgical Engineering	3	16
12.	Ocean Engineering	2	15
13.	Physics	-	31
	<b>Total</b>	<b>39</b>	<b>282</b>



## 8. WEAKER SECTION AND FOREIGN STUDENTS

### 1.B.Tech.:

As per the GOI 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 60% of the marks obtained by the last student of the general category to get qualified for admission. 30 SC/ST students joined B.Tech programme during the academic year 1993-94. Students admitted against SC/ST reservation quota are given following benefits:

1. Travelling allowance (IInd Class train fare/ordinary bus fare) from the place of residence to Madras to join the B.Tech programme.
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 and students admitted from the academic year 1991-92 their parents income should be RS.24,000/- net per annum or below as per Government of India order.

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. 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.

4. Drawing instrument (Mini-drafter) free of cost.
5. Help in getting placement. Wherever possible, industries are requested to conduct separately interview for SC/ST students and the requirements for these students are lower than that of the general category.
6. During Counselling prior to the admission, the advisor explained each student the requirements of different branches. This helped the students in choosing suitable branch depending upon the capability and taste of each student.
7. When a student finds tough in the chosen branch, he is allowed to switch over to other branches depending upon vacancies.

### 2. 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 programme and they are not required to write JEE again. IIT Madras and IIT Bombay are conducting the Preparatory course for one batch in alternative years. During 1993-94, 55 students have joined the Preparatory course at IIT Madras.

### 3. M.Tech/M.Sc.,

22.5% of the seats are reserved for students of SC/ST community. At present these students are admitted through GATE examination when they obtain 2/3 of the percentile of the last student of the general category. 43 SC/ST students were admitted to M.Tech degree course during the academic year 1993-94. In Physics Department all the SC/ST students who wrote the written test for M.Sc., admission are called for interview. The cut-off marks was 2/3 of the mark scored by the last student of the general category. The

Chemistry Department and Mathematics Department conducted 2 entrance tests each. For SC/ST students the cut-off mark was 2/3 of the mark scored by the last student of the general category. One student in Physics Department and one student in Chemistry Department joined the M.Sc., programme. Students admitted against SC/ST reservation quota are given 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. Both Public Sector and Private Sector Industries were reminded on the obligation of recruiting SC/ST students and other special steps were taken to enhance the recruitment of this category of students.
3. Scholarship as given to all students.

#### 4. Foreign Students

During the academic year 1993-94, 13 and 2 foreign students joined B.Tech and M.Tech programme respectively. 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 15 foreign students are as follows

B.Tech		M.Tech	
Bangladesh	6	Iran	2
Sri Lankan	3		
Malaysia	4		

During the period under report 55 foreign students were on the rolls. The programme and nation-wise details of them are given below:

S.No.	Country	B.Tech	M.Tech	Ph.D	Total
1.	Bangladesh	17	-	-	17
2.	Egypt	-	-	3	3
3.	Iran	1	2	3	6
4.	Malaysia	6	-	-	6
5.	Mauritius	1	-	-	1
6.	Nepal	1	-	-	1
7.	Srilanka	21	-	-	21
	<b>Total</b>	<b>47</b>	<b>2</b>	<b>6</b>	<b>55</b>

## 9. CAMPUS AMENITIES

### 9.1 Engineering Unit:

The Engineering Unit of this Institute is responsible for construction of new buildings and maintenance of the campus.

During the period under report the following works were completed:

S.No.	Name of Work	Amount (Rs. in Lakhs)
1.	Construction of a Building for Structural Dynamics Lab. of Civil Engg. Department	28.00
2.	Construction of a laboratory building for Supersonic Combustion facility at Aerospace Engineering Department	2.71
3.	Construction of open sump, Wave flume and wave absorber unit at Ocean Engg. Centre	21.55
4.	Drilling 10 Nos. Additional bore wells in IIT campus	4.50
5.	Construction of under ground sumps 4 Nos. at residential zone	3.05
6.	Renovation and modification works to 12 rooms (west wing) at Taramani Guest House	7.30
7.	Providing leak proof treatment in SAC	3.40
8.	Providing and fixing precast RC sunshades at HSB	3.87
9.	Providing street lights at sewage pump house from SAC building	1.24
10.	Providing service connection to Security staff quarters and Mess staff quarters	1.51
11.	Replacing main feeder from RSS to pillar box (6B) near E1 type Bus stop	1.94
12.	Replacing over head line into underground cable in pillar box near Doctors' quarters from Post Office	1.75
13.	Providing power connection for 175 kW Multi element wave maker in Ocean Engg. Centre	1.89
	<b>Total</b>	<b>82.71</b>

### 9.2 Institute Hospital

The Institute Hospital consisting of 35 Beds, renders medical facilities to students and staff. Hospital offers out-patient and patient services for Medical, Surgical, Obsertic, Cynaecological, Paediatric, 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 (Mrs.) Lalithakumari, M.B.B.S., D.G.O.	Medical Officer
Dr (Mrs.) S Aruna	Medical Officer
Dr (Mrs.) C Sridevi, M.D., D.Ch.	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 Rrao, M.S.MNAMS, FICS	Consultant Surgeon (Part-time)
Dr S Rathnamala, M.B.B.S., D.O.	Eye Specialist (Part-time)
Dr R Rajkumar, M.D.,DPM	Psychiatrist (Part-time)
Dr A Sadhana Saraswathi, M.B.B.S.	Junior Medical Officer
Dr G Subashree, M.B.B.S.	Junior Medical Officer
Sri L Palaniappan	Lay Secretary

Ambulance services 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, diptheria, tetanus and whooping cough. Family Planning Operations are also conducted at this Hospital besides counselling.

The Statistics on the activities of the Hospital between 1.4.93 and 31.3.94 are as follows:

1.	Total No. of outpatients	96,589
2.	Total No. of inpatients	180
	Male:	238
	Female:	
3.	Emergencies attended	3,008
4.	Dressings	14,865
5.	Injections	11,747
6.	Deliveries	2
7.	Pathology	
	Urine	4,659
	Motion	3,402
	Blood	6,045
8.	Bio-Chemistry	
	Blood sugar	3,172
	Urea	406
9.	Operations	
	General Surgery	81
	ENT Operations	37
	Eye Operations	15
	Minor Operations in Surgeon's room	176
10.	E C G	602
11.	Obstetric Procedures	
	I.U.D.	9
	Vaginal Douches	26

#### 9.4 Banks:

State Bank of India main Branch is functioning in the campus with two extention counters - one at shopping centre and the other near Narmada Hostel.

An extension counter of Canara Bank is also functioning in the campus from 7-01-94.

#### **9.5 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.

#### **9.6 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.

#### **9.7 Open Air Theatre:**

The Open-Air Theatre is utilised for screening Films by Film Club during week end and for other functions of the Institute and Schools.

#### **9.8 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.

#### **9.9 Cafeteria:**

There are two Canteens - namely Akshaya and Modern Cafe, in the campus to cater to the needs of staff and students.

#### **9.10 Bus Services:**

The Institute is having Omni Buses which provides transport facility to the staff, students and residents of the campus.

#### **9.11 Campus News:**

The Campus News is published every Friday highlighting the important events of the Institute.

## 10. FINANCE AND ACCOUNTS

The financial year of the Institute corresponds with that of Government of India i.e. 1st April to 31st March of the following year. 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 5.11.93 recommended the non-plan revised estimates 1993- 94 (Gross) for Rs.2594.00 lakhs. With regard to Budget Estimates 1994-95, no specific amount was indicated. Similarly with regard to Plan the amount of Rs.300 lakhs would be reviewed again and additional funds if available would be released accordingly.

The general view of the revised estimates approved for 1993-94 by Finance Committee is given below:

	Rs. in Lakhs			
Head	Budget Estimates for 1993-94		Revised Estimates	Budget Estimates
	(as proposed)	(as allocated by the Board of Governors)	1992-93 as per Finance Committee	1993-94 Head(as proposed)
<b>Non-Plan</b>				
Recurring	2714.50	2517.00	2594.00	2802.15
Non-Recurring	14.40	10.00	-	20.00
<b>Total Non-Plan</b>	<b>2,728.90</b>	<b>2527.00</b>	<b>2594.00</b>	<b>2822.15</b>
<b>Plan</b>				
Recurring	31.12	35.25	35.25	37.50
Non-Recurring	316.45	264.75	264.75	296.75
<b>Total Plan</b>	<b>347.57</b>	<b>300.00</b>	<b>300.00</b>	<b>334.25</b>
<b>Income</b>	314.35	374.00	374.47	405.05

### Audit

The Audit Report and the Annual Accounts of the Institute for 1992-93 in English and Hindi versions are being placed separately on the tables of Parliament with due certificates of the Accountant General, Tamilnadu and Pondicherry.

The accounts of the Institute for the year 1992-93 was audited by the Accountant General between July 93 to September 1993. The Audit Report (English version) on the accounts of the Institute for the year 1992-93 was sent to the Ministry of Human Resource Development, on 18.2.94.

The salient features of the 1992-93 accounts are given below:

Item	(Rs.In Lakhs)
<b>I.Receipts:</b>	
1. Opening Balance	1289.19
2. Grant from GOI	2184.00
3. Institute Receipt:	
Fees, etc.	29.91
Application Fees	68.45
Income from Vehicles	8.07
Income from Buildings	37.05
Other receipts	197.47
	-----
	340.95
4. Recovery of Advances	46.09
5. Deposits	1291.58
<b>Total</b>	<b>5151.81</b>
<b>II.Payments:</b>	
a. Capital account:	
1. Buildings and Constructions	110.10
2. Furniture, equipment and fittings	
Departments	45.55
Research Centres & Central Services & Others	42.99
3. Library	88.54
4. Others	84.12
	30.97
<b>Total (a)</b>	<b>313.73</b>
b. Revenue Account:	
1. Academic Departments/Centres:	
Pay & Allowances of Tech. Staff	468.04
Pay & Allowances of Non-Teaching Staff	213.73
Department expenses	101.52
Library including staff salary	34.44
Central Workshop including staff salary.	49.05
Indo-German Projects	1.03
Research Centres including pay and allowances CEC & AC Unit)	39.08
Centres, Central Services working expenses	13.60
Rural Development Research Activities	1.80
Institute Scholarship	195.94
Other items	65.34
NCC, NSS and NSO: Pay & allowances & others	3.09
2. Central Administration:	
Pay & Allowances	151.07
Hostel	72.03
Stores Pay & Allowances	12.50
Security & Fire fighting	5.85
Lawns & Garden	2.42
Service & Maintenance	173.28
(Telephone, Power, Water, Furniture repair & Maintenance, Oil, Petrol, etc.)	
Medical Dispensary	30.14
Atheletics and Gymkhana	17.55

3. Works and Mtc.		
Pay and Allowances and other expenses		192.59
4. General Expenses		
Postage, Liveries, Stationery, Printing etc.		29.99
Travelling		6.70
Leave Salary, reimbursement of stamp duty, sundries etc.		8.83
PF/Gratuity/Pension		230.88
Advances		74.26
Deposits		1286.19
5. Closing Balance		1357.14
	<b>Total II</b>	<b>5151.81</b>



## LIST OF MEMBERS OF COUNCIL OF IITS

Name of the Representing Organisation	Name and Address
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2. Chairman of each Institute (Ex-officio)	
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ii. Bombay	Dr. D.V. Kapur 405, Aradhana Apartmemts Sector-XVIII, R.K.Puram New Delhi 110 066
iii. Madras	Dr. M.S. Swaminathan (Chairman, Board of Governors IIT Madras) Chairman, M.S. Swamination Res. Foundation 14, II Main Road, Kotturpuram, Madras 600 085
iv. 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.
v. Delhi	Dr. P.J. Kurien Chairman, BOG IIT Delhi) AB-12, Pandora Road New Delhi-110 003.
3. Director of each Institute (Ex-officio)	
i. Kharagpur	Prof. K L Chopra Director IIT, Kharagpur 721302.

- |  |  |
|--|--|
| ii. Bombay   | Prof. B Nag<br>Director<br>IIT, Bombay 400 076.  |
| iii. Madras  | Prof. N V C Swamy<br>Director<br>IIT, Madras 600036.   |
| iv. Kanpur   | Prof. R C Malhotra<br>Director<br>IIT, Kanpur 208 016.   |
| v. Delhi   | Prof. B C Nakra<br>Offg. Director<br>IIT, New Delhi 110 016.   |
| 4. Chairman<br>University Grants Commission<br>EX-Officio            | Prof. G Rama Reddy<br>Chairman<br>University Grants Commission<br>Bahadur Shah Zafar Marg<br>NewDelhi 110 002    |
| 5. Director-General<br>Council of Scientific & Industrial Research   | Dr. S K Joshi<br>Director-General, CSIR<br>Rafi Marg, New Delhi 110 001.   |
| 6. Chairman<br>Indian Institute of Science<br>Bangalore (Ex-officio) | Dr. Raja Ramanna<br>Chairman<br>Indian Instt. of Science, Bangalore 560 012.                                     |
| 7. Director<br>Indian Institute of Science<br>Bangalore (Ex-officio) | Prof. C N R Rao<br>Director<br>Indian Institute of Science, Bangalore 560 012.                                   |
| 8. Three Nominees of the Central Government                          |  |
| i. To represent the Ministry concerned<br>with Education             | Sri S.V.Giri<br>Secretary to Government<br>Min. of Human Res. Dev. Dept. of Education<br>New Delhi 110 001.      |
| ii. To represent the Ministry of Finance                             | Ms. Sujata Chauhan<br>Financial Adviser<br>Min. of Human Res. Dev.<br>New Delhi 110 001.                         |
| iii. To represent any other Ministry                                 | Dr. D Swaminadhan<br>Member (Tech & Higher Education)<br>Planning Commission<br>Yojana Bhavan New Delhi 110 001. |

9. Nominee of the All India Council for Tech. Education  
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Chairman, AICTE  
Indira Gandhi Sports Complex (Coaching Block)  
Indira Gandhi Indoor Stadium, New Delhi 110 002.
10. Nominees of the visitor  
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(Maximum - Five)  
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Scientific Adviser  
Tamilnadu Pollution Control Board  
25, Dr. Radhakrishnan Salai, Madras 600 004.  
  
Dr. A P J Abdul Kalam  
Scientific Adviser to the Minister of Defence  
South Block, New Delhi 110 011.  
  
Dr. Vasant Gowariker  
Scientific Adviser to the Prime Minister  
2, Lodi Estate  
New Delhi 110 003.  
  
Dr. M M Sharma  
Dept. of Chemical Engg.  
Univ. of Bombay, Matunga, Bombay.  
  
Dr. Kamla Chowdhry  
(Former Prof. of Management)  
IIM, Ahmedabad  
Flat No.2A, 33 Prithviraj Road, New Delhi.
11. Three Members of Parliament  
(Two from Lok Sabha and  
one from Rajya Sabha)  
Shri Indrajit Gupta, MP  
41 Western Court New Delhi.  
  
Shri Anandgajapathi Raju, MP  
Poosapati  
6, A.P. Bhavan  
  
Prof.M.G.K. Menon  
77 Lodi Estate, New Delhi 110 001.
12. Secretary  
Sri S.D. Awale  
Jt. Education Adviser(T)  
Min. of Human Res. Dev.  
Dept. of Education, New Delhi 110 001.

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