NINETEENTH ANNUAL REPORT

1977 - 78

INDIAN INSTITUTE OF TECHNOLOGY, MADRAS

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SRI N. SANJEEVA REDDI

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I.I.T , Madras.

Sri Y.S. Nagaraja Rao,
Executive Engineer
I.I.T., Madras

Sri B. Raghupathi,
Superintending Engineer
C.P.W.D., Madras.

Sri P.K. Kandaswamy,
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D. Johnson Victor
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S. Ramani
D. K. Banerjee

B. Ramaswamy
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G. S. Laddha
M. Santappa
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Secretary :
V. Shanmugam, Deputy Registrar

CHANGES OCCURRED IN THE MEMBERSHIP OF THE VARIOUS BODIES DURING THE YEAR 1977—78

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Prof. C. S. Jha, Director, I. I. T., Kharagpur.	Sri Shankarlal, Director, I. I. T., Kharagpur.
Prof. N. M. Swami, Director, I. I. T, Delhi.	Dr. O. P. Jain, Director, I. I. T., Delhi.
Representative of the Central Government	Sri A. S. Gill, Additional Secretary, Ministry of Education and Social Welfare, New Delhi.

Representative of the Parliament :

Dr. Rajkumar Chakrabarti,
Plot No A/4, University Staff Quarters,
Raja Subodh Mallick Road,
Calcutta-32.

Dr. Prem Manohar, M. P.
16-C, Ferozeshah Road,
New Delhi.

Nominees of the State Government :

Sri R. L. Sreshta,
Director of Technical Education,
Government of Karnataka,
Bangalore.

Sri M. R. Dharmaiah Gowda,
Director of Technical Education,
Government of Karnataka,
Bangalore.

Dr. V. C. Kulandaiswamy,
Director of Technical Education,
Government of Tamil Nadu,
Madras.

Sri S. Vaiyapuri,
Director of Technical Education,
Government of Tamil Nadu,
Madras.

Nominees of Council :

Dr. S. R. Valluri,
Director,
National Aeronautical Lab,
Bangalore.

Sri P. S. Banerjee
Director
Hindustan Machine Tools Limited
Bangalore.

Nominees of the Senate :

Dr. S. K. Srinivasan,
Professor, Department of Mathematics
I. I. T., Madras.

Dr. C. Ramaswamy,
Professor, Dept. of Physics
I. I. T , Madras

Dr. B. S. Murthy,
Professor
Department of Mechanical Engineering,
I. I. T., Madras

Dr. P. S. Srinivasan
Department of Applied Mechanics
I. I. T., Madras

Finance Committee :

Sri S. Vedandhan
Deputy Educational Advisor (Tech)
Ministry of Educational and Social welfare
Government of India
New Delhi.

Dr. K Gopalan,
Ministry of Education and Social Welfare
Government of India
New Delhi.

Dr. V. C Kulandaiswamy,
Director of Technical Education
Government of Tamil Nadu
Madras.

Sri P. S. Banerjee,
Executive Director,
Hindustan Machine Tools Limited
Bangalore

REPORT BY THE DIRECTOR

Nineteenth Annual Report

(July 1, 1977—June 30, 1978)

The year 1977-78 has yet been another year of hectic activity for the Institute in its march towards attaining the goals for the realization of which it was established by an act of the Parliament, as an institution of national importance in higher technological education. The contribution made by the 12 departments including the three science departments; the 7 Research Centres including the Chemical Engineering Education Development Centre and the Mechanical Engineering Education Development Centre; the various Central Facilities, Services, and Sections such as the ICC, CEC, RSIC, Engineering Design Centre and the QIP the Institute hospital, the Institue Gymkhana, the students, faculty and staff, are no less than what they were in the preceding year. All these are in no small measure due to the sense of concern and identification of the students, faculty and staff of the Institute for and in the growth and development of the Institute. Equally important is the contribution of the people and the Government of the Federal Republic of Germany through their aid programmes. During the year under review, equipment worth Rs. 46·63 lakhs were received from West Germany.

Coming to the review of our activities during the year 1977-78, an attempt has been made to cover as many areas as possible.

The student strength in terms of Postgraduate and Undergraduate courses is 1078 and 1232 respectively. The ratio between UG and PG works out to 1 : 1.4. As an institution of higher technological education and research, the Institute is wedded to the philosophy of building up this ratio to parity so as to accelerate its research and development activities. Steps are progressively taken to bring about this Change and it will not be too long for us to attain this goal. i.e. 1:1-PG-UG Ratio.

At the last convocation held on September 9, 1977 with Shri Prabhudas B. Patwari, the Governor of Tamilnadu as the Chief Guest, 207 students were conferred the B. Tech Degree; 27 the M. Sc. Degree; 150 the M. Tech. Degree; 28 the DIIT; 18 the M. S. Degree

and 57 the Ph. D. Degree making up a total of 547. Of the 57 Ph. D. Degrees conferred, 37 were in the engineering disciplines.

DEPARTMENTS

Courses

While a new M. Tech. programme in 'Building Technology' and a 5-year B. Tech. Degree course in 'Naval Architecture' were introduced by the Civil Engineering Department, the Electrical Engineering Department revamped their M. Tech. curriculum, replacing 7 of the rigidly constituted elective streams by a broad based credit system of electives with a few compulsory core courses, with sufficient flexibility and ample freedom for the students to choose their electives.

The first batch of students of DIIT course in T. V. Engineering and M. Tech. Degree course in Maintenance Engineering are just completing their courses and will be passing out this year.

Arrangements for offering admission to a new M. Tech. programme in 'Production Engineering' have already been made and the first batch of students will be in position in the ensuing academic. session.

Laboratories and Equipments :

During the year under review, the Mechanical Engineering Department installed its Pulsed Ruby Laser Holographic set up; the Refrigeration and Air-conditioning Laboratory of the Mechanical Engineering Department installed (i) a Test Rig to facilitate calibration of Dew Point meters and sensors at very low values of dew points and (ii) An air-conditioning tunnel suitable for testing the performance of a wide variety of air-heating/cooling heat exchangers coils.

A gift equipment from Alexander von Humboldt Foundation was made to Dr. N. P. Kurien of Civil Engineering Department.

An Electrohydraulic stepper motor for research work/development work in the field of Electrochemical machining was received by the production Engineering and Machine Tool Section.

Conferences / Seminars / Short / Long Term Courses / Summer and Winter Schools

A number of short-term and Long-term courses, Summer and Winter Schools, Seminars and Conferences were organized during the year by the Departments of Applied Mechanics, Electrical Engineering,

Mechanical Engineering, Metallurgy, Chemistry, Physics, the Education Development Centres, QIP etc. The Short-term/Long Term Courses and Winter/Summer Schools are intended to help the staff of Educational Institutions, Research Organizations, Defence Establishments and the like. A number of foreign scientists participated in some of the programmes and delivered lectures for the benefit of the participants. Of the several programmes, mention may be made of the National Metallurgistst Day conducted on 14th November 1977 in fhe Department of Metallurgy when Shri B. Patnaik, Union Minister for Steal and Mines participated and (ii) the Asian Regional Workshop on Physics Education conducted jointly by UNESCO, COSTED AND UGC. 12 Foreign delegates from USA and UK, in addition to 70 from Indian Universities, participated. A Regional Physics Education Centre at this Institute, under the agencies of the UNESCO is contemplated.

Visits by Institute Faculty

Six Faculty members of the Department of Mechanical Engineering visited West Germany under DAAD/Humboldt Scholarships for periods ranging from three months with a view to update and keep themselves abreast of the research and development work carried on in leading West German Universities and industries.

Prof. M. C. Gupta of Mechanical Engineering Department, on invitation, attended the International Solar Energy Workshop held in Trieste, Italy and delivered lectures in the field of Solar Energy.

Projects

Currently the Institute has as many as 119 Projects sponsored by organizations such as the Department of Science and Technology, the CSIR, BHEL, ISRO, VSSC, Department of Atomic Energy; in addition to 16 Indo-German Projects sponsored under the Fourth Indo-German Agreement and 12 projects under Ocean Engineering Centre. The Projects are spread over almost all the Deparments of the Institute.

During the year, a total of 60 projects were completed. The number of patents taken/applied for by the Institute is 57. A sum of Rs. 80, 500/- has been realised through sale of Patents/Processes.

Award and Prizes

The honours won by the Faculty of our Institute such as :-

The Invention Promotion Award for 1977 awarded by the National Research and Development Corporation to Prof. B. V. A. Rao and Sri C. R. Subramaniam of Applied Mechanics Department;

The Invention Promotion Award for 1977 awarded by the National Research and Development Corporation to Prof. B. Ramaswamy, Dr. V. V. Sastry and Dr. G. Sridhara Rao of Electrical Engineering Department.

Sir B. N. Mukerjee Gold Medal awarded to Prof. V. C. Venkatesh, Production Engineering and Machine Tools Division., by the Institution of Engineers (India) for his paper entitied 'Machines of Flow Turning'.

E. P. Nicolaides Prize awarded to Prof. D. J. Victor of Civil Engineering Department by the Institute of Engineers (India) for his paper on 'Deformed Reinforcing Bars'

amply demonstrate the fact of outstanding contributions made by the Institute during the year.

Publications

Two books, one written by Dr. S. K. Srinivasan and Dr. G. Sampath of the Department of Mathematics, entitied 'Stochastic Models for Spike Trains of Single Newrons' and another entitied 'Numerical Analysis for Engineers and Physicists' by Drs. Subramanian, P. Achuthan and K. Venkataraman of the Mathematics Department have been accepted for publication by Springer Verlag, Hiedelberg, Germany and Springer Verleg, New York, U. S. A. respectively.

The Journal of Mathematical and Physical Sciences, an international research Journal of the Mathematics Department continued to attract good quality research papers. So far 11 volumes of 52 numbers have come out and the Journal is attracting 63 international research journals from abroad on exchange basis.

CENTRES

C. S. D.

The Centre for Systems and Devices established in the year 1971-72 with a generous grant of Rs. 1.25 crores from the Ministry of Defence for research and training activities in the field of Signal Processing Techniques, Semi-conductor Devices and Guidance/Control Systems, has fulfilled its targets in all the important project areas, during the year under review.

The Evaluation Committee appointed by the Ministry of Defence which visited the Centre in December 1977 has commended the work done by the Centre. The extensive work done in the Semiconductor

Device Laboratory has been equally appreciated by the Evaluation Committee. Applications have been made for obtaining patents on several processes and instruments developed in the area of Microwave Pin Diodes. The Evaluation Committee noted with appreciation the short-term courses conducted by the Centre for the benefit of the sponsoring organization. The Centre has continued to issue a number of technical reports to the concerned Research Defence Laboratories and other users which have been acknowledged to be highly useful to them. The Department of Science and Technology has sanctioned Rs. 8 lakhs for development of a new semiconductor devices technology. Negotiations are under way with the National Radar Council for a Project on signal Processing, involving Rs. 30 lakhs and for a Project on ' Electronic Navigational aids on a similar scale. '

Chemical Engineering Education Development Centre

The Chemical Engineering Education Centre, established and funded by the Ministry of Education, published, during the year, three books entitled :

(1) ' Principles of Electrochemical Engineering ' by Dr. L. W Schemilt, Mc Master University, Canada ;

(2) CHEMTECH II (Inorganic Products) and

(3) CHEMTECH III (Natural Organic Products)

The Chemical Age of India reviewing the CHEMTECH volumes wrote that these should adorn the shelves of every technical/research institution in industrial concern in the country.

In addition to the above. the Centre also published ar eport on ' The Norms for Facilities of Chemical Engineering Departments ' and prepared a draft of ' Curriculum and Syllabi for the 4-year Degree course in Chemical Engineering '. Arrangements are under way to prepare the manuscripts on (1) Unit Operations (2) Chemical Engineering Laboratory Manual and (3) Project Engineering of Process Industries, for publication during 1978-79.

Engineering Design Centre

The Engineering Design Centre set up with the objectives of undertaking design and development problems of multi-disciplinary character referred to the Institute by various industries and other

national organizations recently designed and developed, in association with the Centre Electronics Centre of our institute, a sophisticated Leather Processing Machine involving hydraulic and electronic control systems, for M/S. Solai Engineering, Madras. Some of the other development projects in various stages of completion are; Photogrammetric and Multispectral Camera and Special Spraying Equipment for sugarcane fields.

Fibre Reinforced Plastics Research Centre

The Fibre Reinforced Plastics Research Centre has made alround progress during the year 1977-78 in all its activities. New process facilities for press moulding and vacuum bag moulding have been set up. The notable research works during the year include the attempt to use jute as a reinforcement material for plastics. A research programme undertaken with the financial asistance of DST and UNIDO has demonstrated that jute reinforced plastics can be used for making low cost houses, fishing boats and silos. This work and the products have been presented in an open house in April 1977 and were extensively reported by press, radio, television and the news review of films division. Work is being carried out at the moment to develop prefabricated modular type houses using both glass-fibre-reinforced plastics and jute reinforced plastics composites. It is estimated that there is tremendous potential for exporting such houses to the Middle East Countries. Department of Science and Technology has also granted a new sponsored research project to develop machinery for converting glass fibre into commercially useable rovings and mats. The consultancy work has earned Rs. 76,378/- which forms about 4.7% of all the consultancy work taken up by the Institute during the year.

Materials Science Research Centre

The Materials Science Research Centre, established with a view to promoting and conducting inter-disciplinary research activities on special materials, completed successfully during the year, the posistor development project sponsored by BHEL Hyderabad. Three more projects have been assigned to the Centre on (i) the preparation and properties of certain superconducting materials (DST) (ii) Studies on the physics and chemistry of layer chalcogenides (iii) Development of critical resistor materials based on oxide perovkites (CSIR). Development work regarding the selective solar absorber coating materials and suitable ferromagnetics is on.

Mechanical Engineering Education Development Centres

The Mechanical Engineering Education Development Centre, set up by the Ministry of Education, engaged itself, during the year, in updating and upgrading the mechanical engineering undergraduate Curricula and interacted with a number of sister institutions in the southern region and held a large number of Seminars, Symposia and Study Group meetings.

A Seminar on 'The Role of Social Sciences in Engineering Education' was held on 26th August 1977 with the active participation of educationists, industrialists and socio-economists.

A group interaction programme between the Centre and the higher secondary school teachers in the Central School was held in December 1977 with a view to understand the problems which have arisen consequent on the introduction of the 10+2 pattern.

A blue print to serve as guidelines in establishing production engineering as a separate discipline in engineering colleges has been prepared and is ready for publication.

Two booklets (1) Master of Technology Degree Programme (Mechanical Engineering)—curriculum and course content and (2) Role of Social Science in Engineering Education—Proceedings of the Seminar, were brought out. In addition, four monographs viz., Mechanical Engineering Laboratory Manual and Production Process Hand Book—Vol. I, II. and III were brought out.

The faculty of the Centre has been enriched by the challenging tasks assigned to them and the Centre looks forward to serve the cause of engineering education in a significant way.

Centre For Policy Studies

The Centre for Policy Studies is planning to undertake research activities to identify appropriate technologies capable of uplifting the masses in rural areas - taking Leather Industry and Vegetable Oil Industry as typical cases. The industrial systems will be modelled so as to develop alternative models of rural growth. Another area of research will be modelling education systems with a view to optimise or to increase the cost-effectiveness.

A 'Cyclone Disaster Simulator' is being developed with the assistance of the Directorate of Town and Country Planning which is likely to lead to a major time-bound project.

CENTRAL FACILITIES, SERVICES, SECTIONS

Central Library

Successful completion of the Computerised Chem/SDI Pilot Project in collabotation with Insdoc, New Delhi, preparation of Computerised Bibliography on Futurology, stepping up the issue of publications from the BOOK BANK to the weaker sections of the institute and issuing text books on overnight loans to students are some of the high-lights of the Library.

Workshop

The Central Workshop was equipped with an Electroplating Shop and a new lathe of higher capacity. An ICC work - Heavy duty die for the polythene bag Industry was undertaken and machined for export order.

Central Electronic Centre

The Central Electronic Centre, primiarily concerned with the development and servicing of electronic instruments, in collaboration with Engineering Design Centre of our Institute and NRDC Delhi has designed, developed and fabricated an Electronic Control Unit and safety circuit for Leather Setting and Sammying Machine, for M/S. Solar Engineering, Madras. The control and safety unit incorporates advanced circuitry for reliable performance. In collaboration with MERADO and NRDC, the CEC has also designed and fabricated an Electronic Control Unit for M/S. Shalimar Engg. works, Calcutta.

Regional Sophistication Instrumentation Centre

The Regional Sophistication Instrumentation Centre sponsored by the Department of Science and Technology, houses sophisticated electronic equipments dealing with almost all branches of spectroscopy. Analytical services were provided to users within and without the institute. During the year, nearly 16,000 spectra were provided to outside users and an equal number of spectra were taken by IIT research workers. In the Winter of 1977-78 a national Seminar on Pulse Fourier Transform NMR Spectroscopy was conducted. Three foreign Professors delivered lectures and 60 scientists from Universities and National Laboratories and Industries attended the Seminar.

His Excellency the President of Ireland paid a visit to the Centre and commended the concept of the Centralised Instrumentation Service Centres.

Industrial Consultancy Centre

The Industrial Consultancy Centre which has been functioning since April 1973 brings about the transfer of know-how from all the resources of the Institute — comprising 300 teaching and research staff-members with expertise, 70 laboratories and research centres, workshops, library, computer centres etc.

During the year under review, the ICC has undertaken over 1000 assignments at a total cost of about Rs. 17.75 lakhs which represents an increased of about 50% over that of last year. About 35% of the turnover is deposited into the Industrial Research and Development Fund (IRDF) of the Institute and is utilized for creation of additional infrastructural facilities.

The consultancy jobs cover a wide range of activities like design and development, testing, calibration and certification to standards, fabrication, analysis, fault rectification and servicing, investigations etc., in several fields of engineering and technology.

The ICC functions under the direction of an ICC Advisory Committee under the Chairmanship of the Director which reviews all aspects of industrial consultancy work.

Dr. Hans Wagner who joined the ICC a year and half ago as Adviser is assisting in reorganiging the ICC The ICC works in close liaison with the Engineering Design Centre.

The ICC-News started in March 1977 serves to disseminate information on consultancy activities to the faculty members on various aspects of the functioning of the Centre.

With a view to plan the future growth of ICC, a questionnaire was prepared and issued to all faculty members and on the basis of the opinion obtained a report was released by the Director on 19th December 1977. The survey revealed the possibility of consultancy activities occuring in different directions to different extents. The conclusions provide a sound basis for evolving future policies by the Institute.

The ICC has also formulated a programme of visits by the faculty to industrial units with a view to elicit their views of the quality and utility of our services as well as to have an insight into the working of the companies. Such visits will help us in evolving our strategies in promoting consultancy activities.

Central Glass Blowing Section

The Central Glass Blowing Section is a well equipped modern unit catering to the research/scientific activities of the Departments and Centres including projects/schemes like CSIR, CSD, Defence Projects etc. by way of fabricating glasswares like Dewere, cryogenic apparatus, quartz apparatus, ground glass joints, etc. By way of industrial consultancy also, the Section was able to handle jobs for outsiders to a considerable extent. The amount of work done during the year 1977-78 is noteworthy;

for Departments	306	work orders	Value Rs. 33,000/-
for Projects	12	-do-	3,650/-
for I. C. C.	50	-do-	17,550/-
			54,200/-

Quality Improvement Programme

The Quality Improvement Programme, established and funded by the Ministry of Education to improve the standard and quality of technical education in India by training faculty members of engineering colleges for higher degrees and by conducting short-term in-service programmes, has admitted 215 scholars so far from various Engineering Colleges of this country. currently 16 scholars are working for M. Tech. and 33 for Ph. D. During the year, 10 short-term courses were conducted for the benefit of teachers of Engineering Colleges and industrial sponsored candidates.

Similar to the QIP of the Ministry of Education, the University Grants Commission has instituted a Teachers' Fellowship Programme for the benefit of Science teachers in affiliated colleges. Two batches of scholars totalling 29 have been so far admitted to the Mathematics, Physics and Chemistry Departments for Ph. D. work from various science colleges, under this programme.

Continuing Education Programme

The Continuing Education Programme is intended to establish closer association with practising members of the profession under which in-service refresher courses for scientists, engineers and technologists engaged in industry and other scientific and technical organizations are offered under two broad categories, viz., Short-term (2-week duration) and Long Term (longer duration) courses.

During the period July 1976 to February 1978, about 45 short term courses and 5 long term courses were organised. Besides, Symposia

and Workshops were also held under the auspices of the Continuing Education Programme.

Institute Gymkhana

For yet another year in succession, the institute has bagged the General Championship of the Inter-IIT Meet held in December 1977. This is the seventh successive year that the IIT Madras has been holding the Crown of General Championship. The Institute also won the Inter-collegiate Championship in Swimming.

The students of the Institute participated in several sports/cultural, literary events at Inter-Collegiate Competitions and Open Tournaments, Inter-University Tournaments and won many laurels to the Institute by maintaining their superiority in several fields. Mr. Ravi, Institute Table Tennis Captain has been selected to represent the State of Tamil Nadu for the Nationals and has been awarded a Scholarship (National Sports Talent Scholarship) by the Ministry of Education, Government of India.

The Mardi Gras, during the year, scaled new heights in the standard of literary activities. It was heartening that a wide spectrum of colleges from all over India participated in the Mardi Gras. The Fine Arts events such as Painting, Sketching, Clay Modelling and Photography attracted a huge audience to the festival. The new event called 'Music-cum-movie Quiz' proved to be quite popular. IIT also went on the TV with a cultural programme. The unique feature of the festival was the new design of the Prize Memento and the Souvenir released.

N. C. C. And N. S. S.

During the year while 115 students of the second and third year continued their training in the NCC unit, 65 first year students were enrolled fresh. The All India Vayu Sainik Camp held in Bangalore; provision of practical experience for 3 cadets, of the life and work in Air Force Station; the No. 29 Adventure Course held in Himalayan Mountaineering Institute, Darjeeling for C. U. O. K. Govinda Raj and a combined Training Camp of Senior Division Army, Navy, and Air Wing cadets held at Pallavaram Army lines were the highlights of the year. The Cadets of the NCC Unit took keen interest in the Gliding training imparted in the Glider Section at Air Force Station, Tambaram. Cadet Corporal T. Manivannan of II B. Tech. carried out a SOLO FLIGHT in a glider on 12th January 1978.

297 students including 18 women students were enrolled during the year in NSS. Apart from the continuation of the multi-purpose activities in the adopted village of Narayanapuram, educational activities in two other villages near the Institute, namely Velachery and Taramani were intensified. The response from the school children was excellent. A leadership camp for seniors and another one 'Youth for Flood Relief' and 'Youth for Rural Reconstruction' were held.

Campus

Construction of buildings for Ocean Engineering Centre, Rarefied Gas Dynamics, Rocket and Missiles, residential quarters, Vanavani High School, Nursery School, Kendriya Vidyalaya and water works system (all at about a cost of 51 lakhs) is in progress.

DETAILS OF THE REPORT

I. ADMISSIONS, DEGREES AND PRIZES

1. Student Admissions—1977—78

The number of new students and Scholars admitted to various courses (1977-78) is given in Table-1.

TABLE 1

Admissions 1977—78

Department	B. Tech.	M. Tech.	DIIT	M.Sc.	M.S.	Ph.D.	Total
Aeronautical Engg	11	8	—	—	6	2	27
Chemical	37	23	—	—	6	10	76
Civil	43	33	—	—	7	8	91
Electrical Engg	65	50	—	—	11	7	133
Industrial Engg	—	13	—	—	1	—	14
Industrial Mangement	—	11	—	—	7	1	19
Mechanical Engg	64	61	36	—	19	5	185
Metallurgy	22	21	—	—	3	4	50
Chemistry	—	—	—	15	—	19	34
Mathematics	—	—	—	17	—	9	26
Physics	—	—	—	15	—	12	27
Computer Science	—	19	—	—	8	—	27
Applied Mechanics	—	11	—	—	6	4	21
Naval Architecture	9	—	—	—	—	—	9
Total	251	250	36	47	74	81	739

The total of 739 includes the following :

Foreign nation students	... 17
Scheduled Caste students	... 24
Scheduled Tribe students	... 11
Women students	... 9
QIP scholars	... 20
Sponsored candidates	... 10

2. Students Strength

The total strength of students and scholars in the department are given below in the Table 2.

TABLE 2

Total students strength 1977-78

Department	Under-graduate course	Post-graduate course	Research	Total
Aeronautical Engineering	58	17	16	91
Applied Mechanics	—	22	48	70
Chemical Engineering	171	47	45	263
Civil Engineering	183	48	56	287
Electrical Engineering	304	91	44	439
Industrial Engineering	—	26	17	43
Industrial Management	—	21	21	42
Mechanical Engineering	324	102	103	529
Metallurgy	109	34	29	172
Chemistry	—	26	66	92
Mathematics	—	25	22	47
Physics	—	25	49	74
Computer Science	—	36	21	57
Total	1149	520	537	2206

The Total of 2206 includes the following:

Foreign Nation students	...	112
Scheduled Caste students	...	146
Scheduled Tribe students	...	14
Women students	...	68
QIP scholars	...	52
External registration candidates	...	67
CSIR scholars & sponsored candidates	...	106
Part-time candidates	...	140

3. Degrees Awarded

The number of degrees awarded at the fourteenth Convocation of the Institute on September 9, 1977 are given in Table 3. Sri Prabhudas Balubai Patwari, Governor of Tamilnadu, delivered the convocation address.

TABLE 3

Number of degrees awarded

Discipline	B. Tech.	M. Tech.	M.Sc.	M.S.	DIIT.	Ph.D.	Total
Aeronautical Engg	10	5	—	—	—	1	16
Bio-Engineering and Applied Mechanics	—	—	—	4	2	—	6
Chemical Engineering	38	18	—	1	—	1	58
Civil Engineering	38	20	—	—	5	9	72
Electrical Engg.	66	23	—	1	—	10	103
Engineering Mech.	—	1	—	—	—	1	2
Mechanical Engg	72	34	—	4	21	13	144
Metallurgy	28	12	—	2	—	2	44
Naval Architecture	12	—	—	—	—	—	12
Chemistry	—	—	11	—	—	8	19
Mathematics	—	—	7	—	—	4	11
Physics	—	—	9	—	—	8	17
Computer Science	—	15	—	—	—	—	15
Industrial Engg	—	11	—	1	—	—	12
Industrial Management	—	11	—	5	—	—	16
Total	267	150	27	18	28	57	547

The percentage of First and Second classes are given in Table 4.

TABLE 4

Class	B. Tech	M. Tech	DIIT	M.Sc.
First class with Distinction	14%	8%	10%	3%
First Class	73%	88%	69%	83%
Second Class	13%	4%	21%	14%

With this convocation in September 1977 the number of degrees awarded so far by the Institute is: B. Tech-3061; M. Sc.-432 M. Tech-1345; DIIT-137; M. S-104; Ph. D-328; Total-5407.

Prizes

The names of the academic prize winners for the year are given below:

1. *President of India Prize*: (For the student of the B. Tech degree course with the best Academic Record). — Sri L. K. Shivaji Ganesh, B. Tech.—(Electrical Engg) (Electronics)

2. *Governor's Prize*: (For all round Proficiency in B. Tech degree course) — Sri A. I. Rajasingham, B. Tech.—(Electrical Engg) (Electronics)

3. Merit Prizes for the students with the best academic record in each discipline of each course :

B. Tech Course:

Aeronautical Engineering	Sri N. Rajendran
Chemical Engineering (Reliance Heat Transfer Private Ltd., Prize)	Sri Pinjala Venkateswara Rao
Civil Engineering	Sri R. Sridharan
Electrical Engineering (Power, Siemens Prize)	Sri K. Chandrasekhar
(Electronics, Philips India Ltd)	Sri L. K. Shivaji Ganesh
Mechanical Engineering (Banco Foundation Prize)	Sri P. Ravindranath
Metallurgy	Sri N. Thiagarajan
Naval Architecture	Sri Baby Thomas

M. Tech. Course:

Aeronautical Engineering	Sri M. Mullainathan
Chemical Engineering	Sri S. Thiagarajan
Civil Engineering	Sri V. Mustafa
Computer Science	Sri Mahadev Satyanarayana
Engineering Mechanics	Sri C. Jabaraj
Electrical Engineering (Siemens Prize)	Sri K. Srivatsa
Industrial Engineering	Sri K. Kalyanam
Industrial Managament	Sri P. M. Jagannathan
Mechanical Engineering (Prof. B. Senguptao's Prize)	Sri G. Sethu

Metallurgy (Sri S. Anantharamakrishnan Memorial Prize)	Sri K. Ramakrishna Reddy

M. Sc. Courses

Chemistry	Kum. Sambavi Chandrasekhar
Mathematics	Kum. S. Savithiri
Physics	Sri. P. Sivasubramaniam

D. I. I. T.

Building Technology	Sri. Shiv Vinochandra Amritlal
Industrial Tribology	Sri Rajkumar Sodhia
Mechanical Engg (Design)	Sri S. Krishnakumar
Mechanical Engg (Production)	Sri Shiva Prakash
do (Part-time)	Sri T. R. Nagarajan

RESEARCH AND DEVELOPMENT

Research Publications and Patents :

On the basis of research and development work done at the Institute Seven Processes were developed.

The following Patents were obtained :

1. A method of Preparing Silica Gel having high absorption characteristics for use as a filler material in lubricating grease compositions (I. P. No. 142019)
2. A method of Preparing a fibre resistant composition (I.P.No. 142018)
3. A method of Separating Suspended particles from liquids (I.P. No. 142031)
4. A rotary jet grinder (I. P. No. 143085)

SPONSORED PROJECTS (1977-78)

Sponsored Research Schemes/Projects

The following 39 projects have been financed by various organisations. Department-wise details are given below. This is in addition to outgoing projects reported in the Annual Report 1976-77.

S. No.	Name of the sponsoring authority	Title of the Project
	Aeronautics	
1.	Department of Science and Technology	Design development and fabrication of processing equipment for conversion of fibres into commercially marketable forms viz. (i) Chepped Strand Mat making machine and (ii) Roving making machine.
	Applied Mechanics	
2.	,,	Investigations of wind effects on lowrise buildings.
3.	I. C. M. R. Project	Development and testing of a variable flow rate drug infusion pump for intraveneous and intra-arterial infusion of Drugs.

4.	Department of Science and Technology	Development of Bio-Glass Ceramic for prosthetic applications.
5.	,,	Lasers in medicine.

Chemical Engineering

6.	C. S. I. R.	Grant in aid scheme on Fluid Energy Milling.

Chemistry

7.	Department of Science and Technology	Development and evaluation of analytical methodologies related to water problems.
8.	,,	Construction of a Microspectro-Photometer and polarized optical spectral studies of transitions metal compounds and some materials having semi-conductor property.
9.	C. S. I. R.	Synthetic and mass spectral studies on hetrocycles of biological importance.
10.	,,	Developmental studies in high temperature resistant polymers.
11.	,,	Investigations on photochemical and cyclisations of conjugated heterotrienes.
12.	,,	Hydration of Aryl Propargyl ethers etc.
13.	Department of Science and Technology	Matrix isolation spectroscopy (infra-red & Raman) of Halides etc.

14.	Department of Science and Technology	Studies of certain aspects of environmental surveillance and control.

Civil

15.	DAE Project	Strength and other related properties of heavy concrete.
16.	Department of Science and Technology	Load survey on office & residential buildings and for probablistic design.

Computer Centre

17.	,,	Computarized analysis of Aerial and Satellite Imagery.

Electrical

18.	,,	Detection and Measurement of Air Pollution using lasers.
19.	Electronics Commission	Design and Development of field systems for LOS Antennas.
20.	Department of Science and Technology	Development of ultrasonic Photodiodes (pin Photodiodes) etc.

Maths

21.	CSIR Scheme	Fluid dynamic aspects of blood flow and arterial diseases.

Material Science Research Centre

22.	Department of Science and Technology	Physics and Chemistry studies on the layered transition etc.
23.	,,	Hydrogen Energy System Technology study for India.
24.	,,	Studies of the preparations & properties of certain super conducting & related materials.

25.	CSIR Scheme	Development of PTCR materials based on Perovikito Oxides.

Metallurgy

26.	Department of Science and Technology	Indigenous, development of ceramic moulding technology for investment and other precision castings.
27.	,,	Receling of Grinding Swarf.
28.	Aero R & P	Development of nelting, fabrication and surface protection technology for Magnesium Alloys.

Engineering Design Centre

29.	Department of Science and Technology	Study on refractory insulating/ semiconduction of films and cuttings production by vapour/gas phase reaction and epitaxy.

Mechanical

30.	,,	Development Electronic surface finish measuring instruments of stylos type.
31.	,,	Advanced research in Turbomachinery.
32.	,,	Solar boosted heat pump systems.

Physics

33.	I. C. M. R.	Medical Diagnostics using Laser Speckle.
34.	DAE Project	Development of efficient Dye Lasers.

35.	C. S. I. R.	Nuclear quadruple resonance in some novel metal complexes of organic compounds.
36.	,,	Development of millimeter techniques for die-electric dispersion studies.
37.	,,	Electron spin Resonance studies in some copper complexes.
38.	,,	Study of Luminescence of Alkali Hallides and Hallates.
39.	,,	Development of Dyelasers.

RESEARCH CENTRES

The Energy Research Centre

Electrical Energy Division

This division is engaged in developing new techniques for the analysis and control of power systems. In particular, the following projects are being pursued.

1. Development of hardware and software for computer aided power system data processing and control sponsored by the Department of Science and Technology.
2. Development of hardware and software for load frequency control sponsored by Centre for Energy Studies, Indian Institute of Technology, Delhi.

The following projects were sponsored by the Industry, electricity boards etc.

1. Load forecasting by Tamil Nadu Electricity Board.
2. Short circuit studies by Tamil Nadu Electricity Board.
3. System distribution due to fluctuating loads by Tamil Nadu Electricity Board.
4. Development of load flow program with d. c. links for Tata Consulting Engineers, Bombay.

5. Voltage dip and stability studies for large alternator for BHEL, Hyderabad.

6. Voltage dip and stability studies for large alternators with synchronous and induction motor loads for BHEL, Hyderabad.

Solar Energy Division

The Solar Energy Division has been actively engaged in the research and development of solar thermal devices such as flat plate collectors, concentrators, desalinators, cookers, space coolers, refrigerators, power plants, etc.

The 3-ton open cycle solar dehumidifier-cum-cooler already designed and developed is undergoing further modifications in respect of absorption tower and a substitute for calcium chloride-water solution as the desiccant. An intermittent solar ammonia absorption system for space cooling/refrigeration, actuated by a flat plate collector, has been designed and developed. Based on the experience gained on this system, a continuous ammonia absorption cycle is being developed. This project is partly supported by the Centre of Energy Studies, I.I.T., Delhi.

A design for a solar still capable of producing 500 litres of pure water from saline water was provided to the Fisheries Department of the Tamil Nadu Government, and the solar distillation plant is under construction in Krusadai Islands near Rameswaram. A flat plate solar collector was designed, fabricated and supplied to the A. C. College of Technology, Karaikudi, for demonstration and instructional purposes, at the request of the College. Different types of inexpensive solar cookers are being designed and fabricated with a view to evolve a very cheep cooker acceptable to the poorer section of our community. Information concerning solar energy utilization is being disseminated to industries, research organisations and private users, who contact the Division, by having discussions, providing printed material and arranging demonstration.

Wind Energy Division

The Wind Energy division of the Energy Research Centre continued its activities in the testing of a 1 KW Vertical Axis Wind Machine in collaboration with BHEL R and D Hyderabad under the auspices of the Department of Science and Technology. Proto-type tests were conducted on the machine installed in Hyderabad. Based on its perfor-

mance, a few improvements have been incorporated to increase power production. The second proto-type is under fabrication for installation on the coast line near the city of Madras. A project for designing and developing an Aerodynamic brake for use with the wind machine has already been taken up.

ENGINEERING DESIGN CENTRE

The first of a series of Aerial Photo reconnaissance equipment, a Multispectral Aerial Camera has been designed and prototyped at the Engineering Design Centre.

The Multispectral photogrammetic Camera Project is estimated to pay back the total investmant in design development over the savings obtained by import substitution of the first five cameras and from then on effect considerable reduction in costs and foreign exchange spending on subsequent requirements. Besides competence building and creation of an advanced system group working in the closing of Technology gaps in the area of Instrumentation design, the project is expected to produce spin-offs in subsystems like lenses and controllers which would find application in Indian Industry.

The present project status :— The lab A Model has been completed and is being tested and proved, and the design and technology is in the process of being transferred to a production organisation for manufacture. The design advancement for the control circuitary has been started and is expected to be completed in time to be installed in the present camera. A micro Computer controlled model is being designed for advanced system applications.

The following Projects assigned by industries have been completed:

(1) Design and Development of Hydraulic Setting and Sammying Machine :- M/s. Solai Engineering, Madras and National Research & Development Corporation of India, New Delhi.

(2) Schematic Diagram of End Element Cutting Machine - IDL Chemicals, Hyderabad.

(3) Evaluation of Project Report for the manufacture of Roller Chains - Tamilnadu Industrial Investment Corporation, Madras.

The following project is in progress :—

Design and Development of Motorised Knapsack Sprayer - Monsanto Chemicals of India Ltd. ... Bombay.

FIBRE REINFORCED PLASTICS RESEARCH CENTRE

On Courses

The following courses have been offered by the faculty of the centre to the post-graduate student of other departments.

1. AE 638 Theory of shells.
2. Ch.E 725 Composite Materials.
3. A. S. 725 Composite Structures.

Educational Programme

The Centre has not offered any short term course during the year. The Centre has participated in the third Symposium on New Fibres and Composites held at Sasmira, Bombay. Two lectures were delivered by the faculty of the Centre during the Symposium. The Centre also participated in the Builders' exhibition held at Madras, where the various FRP products, house models and accessories, jute polyester house models etc. were exhibited.

Research and Development

Publications :

No. of papers published 10.

A 20 Tonne Universal Testing Machine has been added to the FRP Testing Laboratory. One 100 Tonnes FRP moulding press has been obtained under the Indo-French Collaboration programme.

A Vacuum bag moulding facility has been set up at the Centre.

Honourable Minister George Fernandes visited the FRP Research Centre in June 1978 in order to see the various activities of the Centre particularly the development work on Jute-polyester composites and their applications.

The Centre's R and D activities on Jute-polyester composites and their use for houses, boats, silos etc, have been extensively covered by the press, radio, television and New review of films division.

MATERIALS SCIENCE RESEARCH CENTRE

Important Lectures and Seminars

Title	*Speaker*
"Metal atom incorporation studies on Tenary chalcogenide superconductors"	A. M. Umarji, C. S. Sunandana and S. V. Rao at the Material Science Symposium, (BARC, Bombay) Rourkela.

"Hydrogen production by the photo-electrolysis of water using semi-conductor electrodes utilizing solar energy"	G.V. Subba Rao and M.V.C. Sastri, presented at the International Solar Energy Congress 1977, New Delhi.

Research and Development

Research Publications

(a) Papers : 7

(b) Monograms : "Intercalation in Layered Transition Metal Dichalcogenides", G. V. Subba Rao and M. W. Shefer—Accepted for publication as a chapter in the Book, by Raidal Publishing Co., Holland.

Sponsored Research Schemes and Projects :

(1) Development of Solid Materials for production of hydrogen using solar energy and for storage of hydrogen (DST, New Delhi).

(2) Preparation and properties of some superconducting materials (DST, New Delhi)—Collaborative Project with Physics Depts., IIT, Madras, and II Sc., Bangalore.

(3) Physics and Chemistry studies on Layered Transition Metal Chalcogenides and their intercalation compounds (DST, New Delhi)—Collaborative Project with Physics Dept., IIT, Madras.

(4) Development of PTCR materials based on mixed oxides (CSIR, Delhi).

Assistance to Industry

(1) Interpretation of X-ray structure data for CECRI, Karaikudi.

(2) Elimination of SrCo from BaCo from mixtures, done for Travancore Chemical Works (in progress).

New major equipments added

(1) Dual power supply.

(2) Microohm meter for electrical resistivity measurement.

(3) Ozaw potentiometer.

(4) Temperature controllers.

(5) Solid state stabilized power supply units.

(6) Rotary and diffusion vacuum pumps.

Equipment Fabricated

(1) Four probe resistivity apparatus for measurements on small single crystals and Pellets of semiconductor materials in the range 77-300 K.

(2) Two probe resistivity apparatus.

(3) Apparatus for measurement of Seebeck coefficient, compact in size, suitable for 2 pellets/single crystals of square cross section (5 mm) usable upto 400° C (Seebeck coefficient (S.) is an important electrical parameter for semiconductor as the sign of 5 relates to the type of majority carriers in the semiconductor).

(4) Dies of 1 cm circular and 5 mm square cross section have been fabricated from Bohler steel for making pellets for electrical and other measurements.

(5) Muffle furnaces, both horizontal and vertical to reach 1000°C have been fabricated indigenously.

(6) Laboratory H_2 supply unit (import substitution of the Elhygen generator).

(7) High-vacuum sealing unit (with parts procured from Indo Burma Petroleum Co., India).

Visitors to the Department

(1) Prof. Rustum Roy, Director, Materials Research Centre, Pensylvania State University, University Park, U. S. A.

(2) Prof. D. Chakravorty, Head, Advanced Centre for Materials Science, Indian Institute of Technology, Kanpur.

Developmental programme likely to come up in the near future.

Close collaboration in various research projects of mutual interest and national importance are under way between Materials Science Research Centre, I. I. T., Madras and Advanced Centre for Materials Science, I. I. T., Kanpur, A. C. College of Technology, Madras University, Physics Dept., Reactor Research Centre, Kalpakkam and IISc., Bangalore.

THE REGIONAL SOPHISTICATED INSTRUMENTATION CENTRE

This Centre houses sophisticated Spectroscopic instruments and provides services to the Institute and outside scientists in various spectroscopic and analytical fields. There is an almost 80% overall in-

crease in the use of the various instruments by the external users. The list below gives the number of special measurements provided during the year 1977-78. The numbers in brackets are those for 1976-77.

Spectrometer	*No. of spectral measurements*	
	I I T/Madras	*External*
XL-100 NMR spectrometer	461 (406)	363 (233)
A60 D NMR spectrometer	156 (173)	271 (66)
E4 EPR Spectrometer	1964 (2144)	892 (382)
FIR 30 Fourier Far IR	93 (10)	160 (60)
IR spectrometers, IR-12 & PE 257	1638 (1130)	1707 (1964)
DMR 21 UV-VIS Spectrometer	1268 (617)	651 (393)
Aminco Bowmann Spectrofluori meter	327 (19)	50
AA6 Atomic absorption spectrometer	3	50

During the year 1977-78 an automatic computer controlled single crystal X-ray diffractometer, CAD 4 Enraf Nonius, was installed. Orders for two more equipments a versatile Scanning electron microscope with energy and wavelength dispersive X-ray spectrometers and an EPR spectrometer with X, Q band and wideline attachment, have been placed.

A winter school on Fourier Transform NMR spectroscopy was conducted during Dec. 5-15, 1977. About 60 scientists from all over the country participated. During this year 69 Universities and 32 National Laboratories and Industries used our facilities. About 14 scientists visited our centre for research/discussion on spectroscopic measurements.

INDUSTRIAL CONSULTANCY CENTRE

The Industrial Consultancy Centre (ICC) set up in 1973 to encourage and promote consultancy work by the faculty and to tap the vast resources of the Departments and Centres for use by industries, has been recording a steady rise in industrial consultancy activities both in scope and in extent. The industrial consultancy jobs undertaken turnover for the period July 77 to June 78 are as follows :

No. of consultancy jobs approved ... 1100
Turnover for the above jobs ... Rs. 19.00 lakhs

The consultancy jobs covered a wide range of activities like design and development; testing; calibration and certification to standards; fabrication; consultation on manufacturing processes and planning;

analysis (chemical, metallurgical, soil samples, etc.) fault rectification and servicing; experimentation, technical investigations, etc., in several fields of engineering and technology.

During the period under review, ICC continued to have the benefit of the services of Dr. Hans Wagner as adviser, who developed the ICC into a well-knit independent organisation that has made a name for itself both in India and abroad as well.

ICC News

ICC started a Newsletter entitled 'ICC - News' to disseminate information on consultancy activities to the faculty members. Amongst other things, it covers matters of considerable interest to the faculty, such as important decisions of the ICC Advisory Committee, norms and procedures governing consultancy, information on major projects taken up at the Institute, abstracts of interesting information from other journals and so on.

Survey on the growth and limitations of Industrial Consultancy

A survey was conducted at IIT/Madras with the aim of generating data and viewpoints that have a bearing on Industrial Consultancy at IIT Madras from the persons who are actually engaged in this activity, viz., the faculty and other senior technical staff. Some of the important findings from the survey are:

Industrial consultancy activities provide a definitely positive means to staff to gain exposure to Industrial environment and practices, particularly for the group of staff members with no prior professional experience of whom more than half engaged themselves in Industrial Consultancy.

This strategy for acquiring industrial experience is in that the faculty member is exposed to a group of demanding and discerning ICC customers and thereby he tests and refines his own professional knowledge.

Shortage of supporting staff and shortage of time available for consultancy have been the major difficulties experienced in the execution of projects.

The present rate of utilisation of laboratory equipment can go up by 22.4% in future. The non-availability of equipment will therefore constitute a major limitation for future growth of consultancy activities rather than non-availability of man-hours and expertise, if the present activity-mix is maintained.

A number of other findings together with the recommendations have been arrived-at which will provide a sound basis for evolving future policies by the IIT authorities. The report of the above Survey was released by the Director, I.I.T. Madras on 19th December 1977.

Visit to Industries

I.C.C. along with faculty members of various departments has been visiting various industries in different sectors in and around Madras, with a view to touching upon their professional opinion on our consultancy services and inviting their suggestions for better services from I.I.T. The visits have indicated an eagerness of industries to utilise our resources.

Seminar on Patents

With the idea of creating patent-awareness among the Institute Faculty and Scientific World in the South, a Seminar on patents was conducted by I.C.C. on 31-3-1978. Papers were presented by a number of specialists in the field.

Lecture

ICC arranged a lecture on 24-8-1977 on 'Relationship between Industry and University in Production Engineering.' The speaker was Prof. Peters, Dean of Consultancy, University of Louvain, Belgium. The meeting was attended by the Institute Faculty and culminated in a lively discussion.

Participation

ICC participated in a seminar entitled 'Information for Industry' organised by Madras Library Association and a number of scientific bodies in India at the Technical Information Centre, Guindy Industrial Estate, Madras, during 5th to 7th August 1977. The areas in which ICC can offer its co-operation to the technical information for Industry were highlighted in the paper presented by ICC.

Public Relations

With a view to increase the tempo of Industrial Cunsultancy activities, ICC has brought out a multi-faceted Industrial consultancy activities of the various departments of the Institute. Further action is also on hand to bring out publicity material to suit the needs of individual laboratories.

INDO-GERMAN COLLABORATION

Under the IV Indo-German agreement, nine projects in the first Phase and seven projects in the second phase have been taken up and are in progress.

1. Design and development of multistage fluidised bed reactor.
2. Development of pretensioned pre-stressed concrete railway sleeper for the Indian Railways.
3. Development of high-speed digital link.
4. Heat transfer studies in electrical machines.
5. Speed-control of a squirrel-cage induction motor.
6. Centrifugal compressors.
7. Improvement of weld quality in wheels.
8. Preparation and investigation of magnetic properties of ferro-magnetic materials of technical interest.
9. Design and construction of cryogenic equipment.
10. Study of the formation and movement of the Saltwater inter face near Madras Coast leading to possible pollution of aquifers.
11. Systems approach to Engineering Design structural systems.
12. Development of Precast elements for Housing.
13. Microwave communication systems.
14. Development of alternate fuel for I. C. Engines.
15. Development of Precision, glass scales.
16. Utilisation of Solar Energy for Cold Storage of Food Products.

FRENCH COLLABORATION

The agreement with France for collaboration and assistance to the Aeronautics Department of this Institute is being implemented.

Dr. S. Krishnan, Asst. Professor, Department of Aeronautical Engineering and Prof. K. Balaraman, Department of Aeronautical Engineering have been deputed to France for training.

CONTINUING EDUCATION PROGRAMMES

The Institute has been very active in the area of continuing Education during the year 1977-78. The following Programmes were held during the period.

1. Design of Shallow Foundations.
2. Diesel Engines.

3. Spare Parts Management in Transport Undertakings.
4. Electronics and Instrumentation.
5. Finite Element Method and use of Computers for Structural analysis.
6. Particle Size Analysis.
7. Cobol Programming and Applications.
8. Advanced Welding Technology.
9. Centrifugal Fans & Compressors.
10. Case Studies in welding Technology.
11. HAL/BEML Technical Management Training Programme (Phase 1)
12. Process Planners Course.

QUALITY IMPROVEMENT PROGRAMME UGC TEACHER FACULTY IMPROVEMENT PROGRAMME

1. Serving Teachers Programmes

The number of teachers of Engineering Colleges admitted during the year is 8 for M. Tech. and 14 for Ph. D. Programmes. This brings the number of QIP scholars on rolls in 1977-78 session to-58.

For the year 1977-78, 15 teachers from colleges affiliated to University have been admitted. This brings the number of F.I.P. scholars on rolls to 30.

2. Short term Courses

1. Non-destructive testing of materials and component (10 participants in summer '77).
2. Matrix Computer methods in structural Analysis (26 participants in summer '77).
3. Advanced Industrial Engineering (32 participants in summer '77).
4. Rational Approach to design for strength (12 participants in summer '77).
5. Laser Technology and Applications (19 participants in December '77)
6. Computer Engineering and Applications (13 participants in December '77)
7. Microwave Circuit Theory and Measurements (10 participants in December '77)

8. Centrifugal Turbomachines
   (19 participants in December '77)
9. Applications of Laser Holography and Allied Technology to Engineering Problems
   (13 participants in December '77)
10. Analysis of Design of Bridge Structures
    (23 participants in summer '78)
11. Dynamic behaviour of offshore structures
    (31 participants in summer '78)
12. Systems Theory and its Applications
    (13 participants in summer '78)
13. Advances in Materials Processing
    (16 participants in summer '78)
14. High Vacuum Science and Technology
    (16 participants in summer '78)

IMPORTANT LECTURES AND SEMINARS

The following are some of the important lectures and seminars held at the Institute.

1. Sri Prabhudas B. Patwari, Governor of Madras, delivered the fourteenth convocation address on 9th September 1977.
2. Dr. Y. Nayhdamma delivered the A. L. Mudaliar Lecture on "Developing Science for Development" on 6th August 1977.

STAFF

During the year

3 professors; 1 Chief Design Engineer; 3 Assistant professors; 38 Lecturers; 14 Lecturers Grade II; 1 Stores and Purchase Officer; 1 Design Engineer; 1 Lady Medical Officer; 1 Anaesthetist-cum-Medical Officer; 1 Paediatrician; 5 Senior Technical Assistant joined the Institute. Many internal candidates qualified themselves for higher posts. This brought the total academic staff strength 375 and non-academic staff strength to 1312—The total number of Institute employees came to 2122 including the work-charged staff.

INSTITUTE GYMKHANA

Sports and Games Activities

The Institute team in Hockey, Foot Ball, Basket Ball, Volley Ball, Swimming, Tennis, Cricket and Athletics participated in the Madras Collegiate Athletic Association Tournaments this year also qualifying for the final position in the first division.

External Tournaments

The Hockey, Badminton, Basket Ball, Swimming, Table Tennis, Foot Ball, Volley Ball, Tennis and Chess teams have participated in Open Tournaments conducted by the Stanley Medical College, Betram tournament, Y. M. C. A. and A. M. Jain College this year also. The Institute Swimming team secured the 2nd Place in the Tamil Nadu State Swimming Meet.

XIII Inter I. I. T. Meet

Our Institute retained the General Championship Trophy for the 7th year in succession winning Basket Ball, Volley Ball, Badminton, Hockey and Athletics.

Nationals

Our Institute Table Tennis Captain Mr. R. Ravi was awarded with Sports Talent Scholarship for the year 1977-78 and has represented the Tamil Nadu in the National Table Tennis Championship.

Cultural and Literary Activities

The Cultural and Literary activities of the Gymkhana reached its peak during January 1977 when the Cultural Festival (Mardi Gras) was organised for Inter-collegiate competition on All India in Literary, Cultural, Photography, Paintings and Fine Arts also. There was a good response from outstation colleges from far off places like Delhi, Kanpur, Kharagpur, Hyderabad and Bangalore.

The Institute Gymkhana also made its mark this year also in the field of Literary and Cultural competitions organised for Colleges in the City by winning many Trophies and Shields.

General Secretary for 1977-78 Sri Ananda Reddy

NATIONAL SERVICE SCHEME

The strength of the NSS was 297 in the Ist Semester and 246 in the 2nd Semester of the year. Three special camps with a total strength of 124 were held during the year. The NSS has adopted Narayanapuram Village for its concentrated activities directed towards the Economic Development and the sociological development of the Village. The NSS Volunteers work in close co-ordination with the Centre for Rural Development of the Institute which is engaged in bringing up a Rural Technology Complex near the adopted Village on 94 Acres of low-lying land assigned free by the Government of Tamil Nadu to the Institute. The main emphasis of the Technology Complex is Transfer of Appropriate Technology to Rural areas. The NSS is also engaged in Adult-literacy and Non-Formal Education Programmes in two other villages near the Institute, Taramani and Velachery. The NSS Volunteers are a well

motivated group, have endeared themselves to the villagers and made themselves acceptable to the Rural Community as Catalysts for the desired transformation of the Rural Community.

Centre for Rural Development

It is imperative that the intrinsic and effective development of a country has to start from below, i.e., from the village level up. This alone can be the proper direction of development since about 70 percent of the people of our land live in the Rural Sector.

Experience of the past has shown that in the Rural Setting, Economic Development must at least run parallel to General Social Development. It can even be said that Economic Development may as well precede Social Development. It is with this philosophy in mind that IIT, Madras, has started A CENTRE FOR RURAL DEVELOPMENT (CRD) three years back. The emphasis is on Transfer of Appropriate Technology available already in a large measure at the Institute to the Villages to generate immediate and future employment for the villagers within about 10 k.ms. of the CRD area by making use of available raw materials and their proper Management and also through Labour Intensive Small Scale Industries. An energy complex combining Bio-gas, Solar Energy and Wind Power is being set up near the village along with Appropriate water Management. Every effort is taken to develop the Complex in such a manner so that this 'Programme Packet' can be repeated in other villages with the necessary modifications.

The NSS Volunteers of the Institute form an important wing in initiating and implementing some of the activities in the RURAL TECHNOLOGY COMPLEX. The Departments of Civil Engineering, Mechanical Engineering, Chemistry, Applied Mechanics and the Central Workshops and the Engineering Unit of the Institute ars actively engaged in initiating, implementing and following up Meaningful Programmes in the 'RURAL TECHNOLOGY COMPLEX' with the active involvement of the Under-Graduate and Post-Graduate Students.

CONSTRUCTION OF BUILDINGS

The following are some of the important buildings which are in progress or were completed during the course of the year.

List of works Completed

1. Construction of 'D' type quarters (2 blocks)
2. Construction of E-1 Type Quarters (2 blocks)
3. Construction of Married Officers Hostel (1 block)
4. Constuction of Research Scholars Quarters
5. Extention to structures Laboratory

6. Construction of F.R.P. Centre.
7. Construction of 3 additional Bays near B.S.B.
8. Supply of A.C. Plant for the Radio active Laboratory.

Works in Progress

1. Construction of Ocean Engg. Centre
2. Construction of a buiiding for Rarefied gas dynamics
3. Construction of a building for Rocket and Missiles Lab.
4. Construction of a building for F. R. P. Centre
5. Construction of First floor over Vanavani High School
6. Construction of Nursery School Building
7. Half block of Married Officers Hostel

BUDGET AND INSTITUTE EARNINGS

Budget Proposals

(i) Approved budget and the expenditure for the year 1977-78 :

Approved budget (Net) 1977-78	Rs. 428.67 lakhs
Amount allotted by the Ministry	Rs. 428.67 lakhs
Actual expenditure (Net) 1977-78	Rs. 364.77 lakhs

(ii) Budget proposals for Revised Estimates 1978-79 and Budget Estimate 1979-80.

(Figures in lakhs of Rupees)

	Actuals for 1977-78	Budget for 1978-79	Revised Estimates 1978-79	Budget Estimates 1979-80
(1)	(2) Rs.	(3) Rs.	(4) Rs.	(5) Rs.
Recurring :				
(a) Ocean Engg. Centre	0.65	13.00	12.50	14.50
(b) Other than Ocean Engineering	356.01	417.57	395.00	432.00
Non-recurring :				
(a) Ocean Engg. Centre : Buildings	12.22	9.00	9.10	1.50
Equipments and others	7.70	13.00	13.40	9.00
(b) Other than Ocean Engineering :				
Buildings	30.46	61.55	65.00	75.00
Equipments and others	26.01	87.71	102.06	122.42
TOTAL	433.05	601.83	597.06	654.42
Less Income	68.28	50.79	65.25	65.34
NET	364.77	551.04	531.81	589.08

AERONAUTICAL ENGINEERING

On courses

A revised M. Tech. Programme in Aeronautical Engineering common to Aerodynamics, Structures and Propulsion during the first year and facility to take electives in the II year in any of the three disciplines was introduced from July 1977. This replaces the earlier M. Tech. programme wherein students, are diverted to any of the above three disciplines and students belonging to one discipline were not exposed to courses in the other two disciplines.

Education Programmes :

Lecturers by visiting Scientists from France.

(Dr. Phillepe Cazin, Dr. Georges Meauze and Dr. Faulmann)

Lecture given by Mr. Horne, Queen's University of Belfast, U.K.

Lecture given by Prof. C. F. Hansen, Head of the Physical Gas dynamics, NASA, USA.

Research and Development : Research Publication

(a) Papers : Total number published during the year - 9.

(b) Monogram : Recent Developments in Higher Order Boundary Layer Theory.

Author : N. R. Rajappa and M. Arunachalam.

Publisher : Dept. of Aeronautical Engg. I.I.T. Madras.

Sponsored Research Schemes and Projects

(a) ARDB : Design and Fabrication of Low Density Tunnel.

(b) Projects : 20

Assistance to Industry - ICC

Development of a Computer Programme Analysis and Optimisation Studies of Solid Propellant Rocket Motor for DRDL (Hyderabad)

Indo-French Collaboration

The Value of Assistance :

In the first year of capital assistance a hydraulic press costing about FF 125,000 has been acquired by the FRP centre.

Any Other Information :

Additional Space / Laboratory etc. Provided

An extention to the existing gas dynamics laboratory was sanctioned. A small building with a floor area of approximate (3360 sq. ft. is nearing completion.

Two closed sheds of about 1200 sq. ft. area each for solid and liquid rocket motor experiments and one rocket testing facility with 3 cubicles and two tank storage facilities with a total area of about 800 sq. ft.

New Major Equipments

(1) New Compressor costing .25 lakhs for the use of wind tunnels.

(2) 50 channel strain measuring system—data logger (Rs. 65,000)

(3) A hand-operated UTM for testing low load structural models (Rs. 8,000)

(4) Synchronised optical elements for photoelastic bench (Rs. 6,500)

Visitors to The Department

(1) Beltermahn (member of the German Government's 2 - men inspecting team)

(2) Dominique Hittner Cultural Attache from French Embassy in New Delhi.

(3) Lectures given in the department by the following experts during the year.

(a) Dr. R. Narasimha, Professor, Dept. of Aeronautical Engg., Indian Institute of Science, Bangalore.

(b) Dr. N. M. Reddy, Dept. of Aeronautical Engg., Indian Institute of Science, Bangalore.

(c) Prof. A. C. Jain, Dept. of Aeronautical Engg., Indian Institute of Technology, Kanpur.

Dr. G. Subramanian gave 4 lectures on Modern Methods of Structural Analysis for Practising Engineers in Guindy Engineering College.

Special lectures on Finite Element Methods for Practising Engineers for a Short Term Course in Civil Engineering Department, IIT Madras.

Lectures on Matrix and Grid Analysis for a short term QIP Programme.

Development Programme in Future

Developments of facility for Moire Method of Structural Analysis.

APPLIED MECHANICS

On courses

New Programmes Introduced

2 year M. Tech. Programme in INDUSTRIAL TRIBOLOGY

New courses introduced

AM 710-Advances in Finite Element Method.

Changes made in Curriculum : BES 820 Advanced topics in Medical Physics.

BES 857 Advanced Topics in Bionics and Bio-medicine.

MET 651 b. Materials Technology was introduced instead of MET 651-Material Science & Technology in the first Semester of the M. Tech. (Engineering Mechanics)

Education Programme

Quality Improvement Programme/UGC Teachers Fellowship Programme.

Serving Teachers Programme

Course	No. trained so far	No. on rolls
M. Tech. Engineering Mechanics	2	—
Machine Dynamics	6	1
Ph. D.	9	6

Short-term courses conducted

Application of Laser Holography and Allied Techniques to Engineering Problems (2 weeks in Nov. 1977—13 participants)

Behaviour of Offshore Structures (3 weeks in May-June 1978—31 participants) (Co-sponsored by QIP and Ocean Engineering Centre)

Important Lectures and Seminars

Title	Speaker
Wind Energy	Dr. Heiner Dorner, University of Stuttgart, W. Germany.

Energy Programmes	Dr. Lyndon, L. H., of M. I. T. (U. S. A) Energy Laboratory on 27-1-1978 under the aegis of Fluid Mechanics Laboratory.
Blood Flow in curved tubes	Prof. K. B. Chandran, School of Medicine, Tulane University, U. S. A. on invitation.
Modern Development in Ultrasonics in medicine	R. C. Chivers Scientist from England.
Voluntary Control of Reflex Responses	Charles, Sidney, Jordan Visiting Professors at South Carolina Medical University, U. S. A.

Research and Development

Research Publications
Total No. of papers published 27

Sponsored Research Schemes and Projects

1. Stress Analysis of Large Turbine Casings by B. H. E. L, Hyderabad.
2. Wind Energy Project in collaboration with B. H. E. L., (R and D)
3. Wind Effects on low rise buildings.
4. Development of 'General purpose Offshore Structural Analysis Programme with special reference to Structural Dynamics and Computer Plotting by Ocean Engineering Centre, IIT, Madras. Improvement of the existing Analytical capabilities of SAPIV-sponsored by the Ministry of Defence, Aeronautics R & D Board.
5. BARC Project on 'Development of High Speed Air Bearings for Nuclear Research Applications'.
6. DST Project on 'Performance Testing of Bearings and Lubricants'.
7. Acoustic qualification tests on Apple Solar panels, sponsored by I.S.R.O.
8. Development of 'General Purpose Offshore Structural Analysis Programme with Special Reference to Structural Dynamics and Computer Plotting'.

   (Sponsored by Ocean Engineering Centre, IIT, Madras.)

9. Blood flow - CSIR
10. Lasers in Medicine - DST
11. Multispeed Drug infusion pump - ICMR.

Assistance to Industry-ICC

1. Computer Analysis of the Main frame for Ingersoll Rand Factory Building.
2. Determination of Young's Modulus of Brake Materials Rane Brake Linings Ltd., Madras.
3. Finding the Breaking Load for the Chain Link-E.I.D. Parry (India) Ltd., Madras.
4. Testing of Fabricated Steel Chain Bar for Cane Carrier, E.I.D. Parry (India) Ltd., Madras.
5. Determination of Centre of Gravity on an Aluminium and Steel Beam of Power, Loss Test pendulum Associated Technologists, Madras.
6. Testing of Spings-English Electric Co., Madras.
7. Calibration of two vane-type anemometer for M/s. Gautam Enterprises, Madras.
8. Design of Spiral Pump, Larsen & Toubro, Bombay.
9. Design of Cement Mills, Cement Research Institute of India, Delhi.
10. Retainer Consultancy, KCP Ltd., Madras.
11. Earthquake simulation studies, Hivelm (P) Ltd., Madras.
12. Fatigue tests on High Voltage Electrical Transmission Line for M/s. Best and Crompton Engg., Madras. M/s. EMC Ltd., Calcutta, and Line Products, Bombay.
13. Vibration Test on Auto seat for Driver's comfort M/s. Ashok Leyland Ltd., Madras.
14. Seismic vibration tests on lightening arrestors-M/s. Insulators Ltd., Madras.
15. Noise Level measurements of mobile diesel generator set, Power Centre (P) Ltd., Madras.
16. Fabricated and supplied one Biofeed back Monitor to Institute of Medical Sciences B.H.U., Varanasi.

Equipment Fabricated

1. Hardware Code converter to interface Hindustan Teleprinter to Microprocessor.

2. Pure Tone Audiometer
3. Multi-channel Biological Magnetic recorder
4. Digital Serial-in/Serial-out and parallel-in parallel-out magnetic recorder.
5. Intel 8080 microprocessor based biological data acquisition and processing system.
6. Ultrasonic echocardiograph.
7. Multi-element cardiac visualization system.

Invited Lectures by the staff

1. Lecture delivered by Prof. N.V.C. Swamy on the 'Aerodynamics of vertical axis wind-machines' under the aegis of the Aeronautical Society of India at M. I. T. (Madras-44).
2. Dr. S. Narayanan delivered a series of lectures in the special course on Random Vibrations for Senior Engineers of the Indian Railways, 169th session, Institute of Advanced 'Track Technology, Pune, and also on Random Vibrations, Theory and Applications' sponsored by Aeronautical Research and Development Board, Ministry of Defence, Govt. of India at IIT, Bombay.
3. Dr. N. Ganesan deliverd a lecture on Dynamic Balancing at ths National Productivity Council, Madras.
4. Dr. A. S. J. Swamidas Delivered lectures on Finite Element Methods in a short Term Course organised by BHEL R and D Hyderabad.

Visitors to the Department

Prof. K. B. Chandran, School of Medicine, Tulane University, U.S.A.
Developmental Programme likely to come up in the near future.

1. Acoustic Holography Laboratory.
2. Biofeedback instrumentation.
3. Development of proposal for devices for rural health centres and static medicare delivery system.
4. Variable flow rate drug infusion pump.
6. High pressure dye injector.
6. Laser applications in medicine.
7. Erogonomics laboratory.
8. Ultrasonic imaging of deep structures of the body.
9. Biomechanics Laboratory.

17. Conducted experiment to find the effect of Vedic chanting on the humans as reflected by EEG, ECG breathing rate and skin resistance changes for Abhinava Vidyatheertha Swamigal Scientific Research Academy, Madras-600 028,

Indo German Collaboration :

Assistance received and	DM 22,729/-
Staff went to Germany under this scheme	Dr. K. M. Patil, Asst. professor, DAAD Fellowship.

Special honours/distinctions conferred on the members of the staff with details.

Republic Day award for Invention promotion for developing 'Thyristor controlled wire spool winding unit' by NRDC to Dr. B. V. A. Rao and Mr. C. R. Subramaniam.

Additional space/Laboratory.

New Tribology Lab, adjacent to Vibration lab.

New Equipment.

1. Pulse Generator type 214A.
2. Camera Housing (Asshipentax) with accessories.
3. Function Generator.
4. Storage Oscilloscope.
5. Sonnet Stereo Tape recorder.
6. Intel 8080 Micro-processor.
7. Z 80 Microprocessor Board
8. Hindustan Teleprinter.
9. Philips Oscilloscope.
10. Expirograph.

CHEMICAL ENGINEERING

Education Programmes

Continuing Education Programmes

Short Term Course

A Short Term Course in Particle Size Analysis was organised from 28-11-1977 to 9-12-1977 for the fifth time since it was started in 1970 with 12 participants from various industries.

Quality Improvement Programme/UGC Teacher Fellowship Programme

(a) Serving Teachers Programme :

No. trained so far for M. Tech. ... 4

No. on rolls in Ph. D. (QIP) ... 1

Important Lectures and Seminars

Prof. M. M. Sharma, University Department of Chemical Technology, Bombay has delivered a lecture.

Research and Development

(1) Research Publications

(a) Papers : Total number published in Journals ... 17

(b) Books/Monograms.

Title : 'CHEMTECH II' (Manual of Chemical Technology, Vol. II)—Inorganic Products.

Authors : Dr. D. Venkateswarlu, Professor of Chemical Engineering, Indian Institute of Technology, Madras.

Publisher : Chemical Engineering Education Development Centre.

Year : 1977

Title : 'CHEMTECH III' (Manual of Chemical Technology, Vol. III) Natural Organic Products.

Authors : Dr. D. Venkateswarlu, D. S. Rao and K. R. Upadrashta.

Publisher : Chemical Engineering Education Development Centre.

Year : 1977

A method of condensation of steam for use in steam-heated equipment for obtaining higher heat transfer coefficients than in filmwise condensation, I. P. No. 141838.

A method of preparing a fire resistant composition, I.P. No. 142018.

A method of preparing silica gel having high absorption characteristics for use as a film material in lubricating grease compositions, I. P. No. 142019.

Sponsored research schemes and projects :

Thermal instabilities in flow boiling loop—DAE Scheme.

Multistage fluidisation investigation in cold model.

C.S.I.R.

Preparation and characterisation of catalysts-C.S.I.R.

Studies on reciprocating gas-liquid contractor-C.S.I.R.

M/s. Brakes India Limited, Madras.

Assistance to Industry I.C.C.

(1) Consultancy on the design and Development of a fluid bed dryer—M/s. Larsen and Toubro Ltd., Bombay,

(2) Development of a process for Bio-gas generation from solid wastes - M/s. Wheels India Ltd., Madras.

(3) Assistance in examining a case of failure of compressor in one Industry.

(4) Pesticide concentration for R. R. L., Hyderabad using Thin Film Equipment.

(5) Pesticide concentration for R. R. L., Jorhat.

(6) Spray Drying of Barium Ferrite slurry for Auroville Electronics and Allied Industries, Pondicherry.

(7) Concentration and Spray Drying of Neera for Tamil Nadu Palmgur and Fibre marketing Co-operative Federation, Madras.

(8) Spray Drying and Drum Drying of Aldehyde cellulose on solution for Bush Boake & Allen, Madras.

The work on A. B. S. Resin project is in progress.

(9) M/s. Wavin India. Ambatur, Madras.

Standardisation and quality control of HDPE pipes.

(10) M/s. Mettur Beardsell, Madras. Standardisation and quality control of expanded polystyrene.

(11) Corporation of Madras.

(12) Directorate General of supplies and Disposal.

Indo-German Collaboration

(a) Projects under this scheme.
Design and Development of Multistage fluid bed reactor.

(b) Value of assistance received.
Equipment costing approx. DM 30,000/- has been ordered and received under the project from Germany.

As part of programme under the project, Dr. Y. B. G. Varma visited Technical University, Berlin for a period of 3 months from July 1977.

Special honours/Distinctions conferred on the members of the staff with details :

Dr. D. Venkateswarlu has been appointed as a Director of Madras Refineries Ltd., Madras.

Visitors to the Department

Prof. Botteril, Birmingham University.

Prof. M. M. Sharma of U.D C.T., Bombay.

Invited Lectures delivered by the staff

' Modelling Fluid Solid System I and II ' Summer School on Fluidization Engg. held at Surathkal, May 1978.

' Parameter Estimation '—Seminar talk by Dr. P. R. Krishnaswamy at the University of New Brunswick, Canada, March, 1978.

Any other information not covered under the heads mentioned above which is likely to reflect the progress and achievement.

Conducted lecture and Laboratory courses for LPRI organised by Plastic and Rubber Institute, Indian section.

Conducted a course in Polymer Science and Technology for M.Sc. Applied Chemistry course of Madras University organised by Government Engineering College, Guindy, Madras.

CHEMISTRY

(a) Serving teachers programme
No. on rolls working for Ph. D. : 9

(b) Short term courses conducted
A course on 'Petrochemistry' of 3 weeks duration was conducted by Prof. Dr. Karl Griesbaum of the University of Karlsruhe, West Germany, in the Department. There were 30 participants.

Important Lectures and Seminars

TITLE	SPEAKER
Rational Molecular Engineering	Prof. Rustum Roy
Perspectives in Annulene Chemistry	Prof. Dr. E. Vogel

Cologne type.

Symposium in Chemistry	Jointly by the Dept. and the Vivekananda College, Madras during second week of March 1978.

Sponsored Research schemes and Projects

1. Catalysed reactions involving photochemical stimulation sponsored by the CSIR.
2. Dye Lasers .. ... (Jointly with Physics Department) sponsored by the Department of Science and Technology, New Delhi.
3. Development of newer dyes for laser studies (jointly with Physics Department) sponsored by the Department of Atomic Energy, Bombay.
4. Low Temperature resins sponsored by ISRO, Trivandrum.
5. Syntheses and mass spectral studies on heterocycles of biological importance sponsored by CSIR.
6. Nuclear quadruple resonance in some novel metal complexes of organic compounds (jointly with Physics Department) sponsored by CSIR.
7. High temperature resins sponsored by CSIR.
8. Behaviour of neutron irradiated zinc oxide sponsored by the Department of Atomic Energy.
9. Treatment of Ilmenite plant effluents sponsored by Dhrangadhara Chemical Works, Sahupuram, South India.
10. Analytical methodology in environmental pollution sponsored by the Department of Science and Technology, New Delhi.
11. Studies on certain aspects of environmental surveillance and control sponsored by the Department of Science and Technology.
12. Hydro-desulphurisation reaction on molybdena-alumina supported oxides of cobalt ' nickel and copper ' sponsored by CSIR.
13. Photo induced catalytic reactions on semi conductor oxides (catalytic effects of light) sponsored by Department of Science and Technology, New Delhi.
14. Selective solvation of ions in mixed solvents sponsored by CSIR.

Departmental Projects : 11

Assistance to Industry - ICC

As in the previous years, analytical services making use of the various equipments available in the department have been rendered to a number of establishments.

Special Honours/Distinctions Conferred on the Faculty Members of the Staff With Details

One faculty member of the department left for Holland on an assignment as Visiting Professor. Two other members were awarded the Senior Fellowship of the Alexander von Humboldt Foundation, West Germany for carrying out advanced research. Another faculty member has been awarded a post-doctoral fellowship in U.S.A.

Major Equipments Added

1. Perkin-Elmer Infrared spectrometer 710 B
2. Toshniwal Bomb calorimeter.

Visitors to the Department

Mr. D. Venzloff, Consul General of Federal Republic of Germany, Madras, Dr. J. S. Anderson from United Kingdom, Dr. J. S. Mahendran, Secretary, Foreign Relations, Sri Lanka, Dr. Robert Rein from U.S.A., visited the Department during the course of the year.

Invited Lectures delivered by the Staff

Four faculty members (Drs. V. Ramakrishnan, K. Narayanan, V. Mahadevan and S. R. Ramadas) delivered lectures in the City Colleges. Dr. M. S. Gopinathan delivered lectures at Bhaba Atomic Research Centre, Bombay, Central University, Hyderabad and Indian Institute of Technology, Kanpur. Dr. D. V. Ramana gave lectures at Indian Drugs and Pharmaceuticals Ltd., Hyderabad.

A Brief Indication of Developmental Programme likely to come up in the Near Future

A scheme on 'Atmospheric science and pollution' (on an inter-institutional and inter-disciplinary basis in collaboration with Mechanical Engineering Department will be taken up soon. The scheme envisages detection on pollutants both gaseous and particulate, development of simple and reliable methods for their estimation and also includes the development of suitable oxide catalysts for conversisn of automobile exhaust pollutants to harmless gases.

The Department is also engaged in the development of new materials for use in electronic and magnetic devices.

Work is also contemplated on the development of new energy sources especially electrochemical energy devices much as fuel cells and non-aqueous battery systems.

CIVIL ENGINEERING

Quality Improvement Programme

(a) Serving Teachers' Programme :

M. Tech. ... 2

Ph. D. ... 10

(b) Analysis and design of brick structures : (3 weeks in Jan. 1978—23 participants)

Important Lectures and Seminars

TITLE	SPEAKER
"Failure of pre-stressed concrete silo due to chloride corrosion of reinforcement.	Dr. Ing. J. Plaehn, Professor, Technical University, Hannover (West Germany)

Research and Development

Research Publications :

(a) Papers ... 20

(b) Books/monogram ...

Title : Essentials of Bridge Engg.

Author : D. J. Victor

Publisher : Oxford IBH, New Delhi

Year : 1978

Sponsored Research Schemes & Projects :

(a) 1. Development of a Pre-tensioned Pre-stressed Concrete Railway Sleeper for the Indian Railways (Indo-German Partnership Project)

2. Systems Approach to Engineering Design—Structural Systems (Indo-German Partnership Project)

3. Development of Precast Elements for Housing (Indo-German Partnership Project)
4. Investigations on Concrete Made with Factory-made portland Pozzolana Cements (Sponsored by IRC and RDSO)
5. Investigations on Weldability of High Strength Deformed Bars (Sponsored by ISI, New Delhi)
6. Load Surveys on Office and Residential Buildings and Formulation of Criteria for Probabilistic Design (Sponsored by the Department of Science & Technology, New Delhi)
7. Investigations on the Behaviour of Inverted Hypar Shells (Sponsored by the C. S. I. R., New Delhi)
8. Structural Properties of Heavy Concretes (Sponsored by the Department of Atomic Energy)
9. Optimum Design of Structural Systems : (Sponsored by the C. S. I. R., New Delhi)

(b) Departmental Projects only : 43

Assistance to Industry—ICC :

The department has been very actively engaged in giving consultancy services for major Industries like ECC, BHEL and others.

Indo-German Collaboration

Projects under this scheme :

1. Development of Pre-tensioned Pre-stressed Concrete Railway Sleeper for the Indian Railways (Indo-German Partnership Project).
2. Systems approach to Engineering Design—Structural Systems (Indo-German Partnership Project).
3. Development of Precast Elements for housing (Indo-German Partnership Project).

Value of assistance received

Staff who have gone to Federal Republic of Germany under this scheme.

1. Dr. P. Srinivasa Rao
2. Dr. T. P. Ganesan

3. Dr. C. S. Krishnamoorthy
4. Dr. H. Achyutha
5. Dr. M. S. Subramanyam
6. Dr. H. Suresh Rao

Visitors to the Department
1. Prof. Plaehn, FRD
2. Prof. Kordes (Aachen) FRD
3. Prof. Ignatiev, Bulgaria

Invited lectures delivered by the staff :

Dr. R. Radhakrishnan,
at the College of Engg.
Guindy, Madras.

A brief indication of developmental programme likely to come up in the future.

1. Setting up of Standard Ventillation room in the Building Sciences Section.
2. Setting up of a Vibration Bed in the Structural Engg. Lab.

COMPUTER SCIENCE

On courses

Any additional information

(a) The courses have been improved upon by use of better and recent text-books.

(b) Projects for student theses are chosen to be in consonance with general requirements in the Indian industries in the area of Software Development.

(c) A proper proportion between concepts and practice in the curriculum has now been evolved.

Education programmes

(i) Continuing Education programme :

COBOL programming and business applications Nov. 29-Dec. 23, 1977. 29 participants .

(ii) Quality Improvement Programme :
Computer Engineering and Applications.

Nov. 27—Dec, 16 1977 : 14 Participants.

(iii) Other courses conducted :

Computer oriented statistical methodology May 30-June 18, 1977. 49 participants (Conducted jointly with ISI Calcutta) Workshop on Computer Communication Systems and Software (Conducted jointly with CSI Madras Chapter) April 8-9 1978. 57 participants.

Important lectures and seminars

Title	Speaker
TPBV problems in ordinary differential equations	Prof. L. Fox, Oxford University.
Data Base applications in the Federal Republic of Germany	Mrs. Asha Cramer, GND West Germany.
Error recovery in LR (K) parsers	George Pooneen, DEC Maynard, Mass.
Modelling of Knowledge in Artificial Intelligent Systems	Dr. C. V. Srinivasan, Rutgers University, U. S. A.
Protection and Locking in Data Base Systems	Kapali Easwaran, IBM San Jose, U. S. A.

Research and Development

(a) Research publication : 10

(b) Patents processed :

Unit for simultaneously recording two signals on a single track of a Cassette recorder.

(c) Sponsored research schemes and projects :

(i) Computerized Analysis of Aerial and satellite imagery : sponsored by DST.

(ii) On-line inquiry system for Science and Technology information : Sponsored by DST.

(iii) Computerized Hospital Information System : Sponsored by Department of Electronics.

(iv) Selective Dissemination of Information :
Jointly with INSDOC sponsored by DST

Assistance to Industry

Details of Research and Consultancy Projects :

No.	Project	Agency
1.	Developing an integrated simulation model for Nutritional status applicable to the State	Tamilnadu Nutrition Food Dept.
2.	Developing an econometric model for Fertiliser recommendation based on maximum yield and maximum profit	Agriculture Dept. Government of Tamilnadu
3.	Developing an algorithm for ABC	MPC
4.	Computer model for distributed network analysis	College of Engg, Guindy, Madras
5.	Computerised Production distribution and warehousing system for efficient operations	Madras Fertilisers
6.	Tuberculosis prevention analysis of data	ICMR
7.	Invoicing system to improve cash flow	SPIC
8.	Discounted Cash-flow Analysis	Madras Refineries
9.	Advisory consultancy on Software and Computer systems	TCS
10.	Computer programme for optimum Diedesign	C. D. C., Coimbatore

Indo-German collaboration

Digital Link to connect PDP-11 and IBM 370/155 Assistance received Rs. 75,000/-

Other information

UNDP project jointly with SERC of the CSIR, Madras. Remote Job entry facility through a Digital Link between SERC and I. I. T., Madras Computer Centre.

Special honours/distinctions conferred on staff with details

Prof. C. R. Muthukrishnan has been invited to become a member of the IEEE.

Prof. Mahabala has been invited to become a member of the executive council of INSDOC.

Any other information

Major equipment added : Two alphanumeric displays and one Communications Controller (from SERC under UNDP)

Invited lectures delivered by staff

(i) Professors C. R. Muthukrishnan and H. N. Mahabala delivered lectures at the National Seminar on Software Development held in Hyderabad. Oct. 14, 1977.

(ii) Prof. C. R. Muthukrishnan was invited to give a lecture during the course on Advanced Computer Systems held at ASCI Hyderabad.

(iii) Prof. C. R. Muthukrishnan lectured to the R and D division of BHEL, Trichy on Data Base systems.

Any other information not covered above which is likely to reflect the progress and achievements

The Computer Centre has promoted Computer Applications in Engineering, Social Sciences and Management Optimization. As a result of this the centre has earned by way of computer charges a revenue of Rs. 27,00,000/- during 77-78.

Future Plans

(a) Computer facility is to be expanded for,
   (i) Meeting the requirements for a large facility in the region, especially for Data Base applications.
   (ii) For providing Time-sharing so that education and training needs can be adequately met.

(b) Developmental activity in the area of Computer Graphics and Computer Aided Design.

DEPARTMENT OF ELECTRICAL ENGINEERING

On courses

Changes made in curriculum : New M. Tech. curriculum introduced from 77-78 session.

D. I. I. T. Programme in TV Engg. first batch came out.

A method of general electives with limited core subjects in new M. Tech. curriculum.

Education Programmes

Quality Improvement Programme/UGC Teacher Fellowship Programme :

(a) Serving teachers programme :

(b) List of short term courses conducted :

(1) QIP-STC on Microwave Circuit Theory and Measurements. Nov., Dec. 77 (3 weeks)

(2) QIP-STC on System Theory and Aerospace Applications, May 1978 (3 weeks)

(3) ISTE Winter School on Digital System Design, Dec. 77 (4 weeks)

(4) CSD-STC on Laser applications to Guidance April 78, (10 days)

List of important lectures and seminars

Title	Speaker
Lectures on Control Engineering Using Thyristors	Prof. Dr. Ing. J. Holtz of Gesant Hoch Schiile Uppertal, W. Germany.
Visit and Discussions	Prof. P. Besslich from University, Bremen, W. Germany
Lectures on Television Engineering	Prof. Renber, & Prof. Johannson of T. U. Branuechweigh, W. Germany.

Research and Development

(i) **Research Publications**

(a) Papers : 460
Books/monogramme : 30

(ii) Patents : 13

(iii) Sponsored research schemes and projects (including ICC)—28

(iv) **Assistance to Industry-ICC**

The department has also contributed industrial consultancy and testing through ICC, as per following details :

Year	No. of jobs	Turn over
74-75	106	Rs. 0.93 lakhs
75-76	127	,, 1.31 ,,
76-77	124	,, 1.60 ,,
77 Apr.-Oct.	67	,, 0.66 ,,

Indo-German Collaboration

(1) Projects under this scheme :

(a) Data link between PDP 11 and IBM 370 computers

(b) Speed control of induction motors using thyristors

(c) Microwave communication systems

(2) Staff who have gone to Federal Republic of Germany under this scheme :

(i) Dr. D. K. Banerjee

(ii) Dr. B. Ramaswami

Special honours/distinctions conferred on the members of the staff with details

NRDC award to Dr. B. Ramaswami, Dr. G. Sridhara Rao and Dr. V. V. Sastry.

A brief indication of developmental programme likely to come up in the near future.

With the advent of new areas of specialization in electrical engineering and electronics and the consequent demand for additional streams of specialization, the new M. Tech. curriculum for the department as introduced in 1977 has provided for a common credit system for the course, with a few core courses and large measure of elective courses so as to make it possible for students to specialize in any desired field, while the Dept. does not have to run a large number of separate streams with separate courses for each. This provides for an optimal utilization of the available faculty and laboratory facilities to cater to a wide variety of postgraduate specialisations while minimising the total number of course offered. A representative example of the areas of possible specialisation as of 1977 are given below :

1. Television Engineering.
2. Semiconductor devices and IC Technology.
3. Electronic Circuits.
4. Digital Techniques.
5. Microwave Engineering.
6. Communication Systems.
7. Signal Processing.
8. EMI Production and analysis.
9. Laser Technology.

10. Electrical instrumentation & measurements.
11. Electrical Networks and Systems.
12. Power Electronics (Thyristor control).
13. Control Systems Engineering.
14. Guidance and Control.
15. High Voltage Engineering.
16. Power Systems Engineeriag.
17. Electrical machines, drives and traction.

MATHEMATICS

Education Programmes

(i) Continuing education programme for teachers of Kendriya Vidyalayas conducted in 1977.

(ii) Quality Improvement Programme/UGC Teacher Followship Programmes.

(a) Under the Ph. D. programme for the Faculty Improvement- 10 scholars are admitted.

Research and Development

(a) *Papers* : During the above period 22 papers were published in reputed Journals.

(b) Books/monograms

1. G. Sampath and S. K. Srinivasan, 'Stochastic Models for Spike Trains of Single Neurones'-Lecture-Notes Series-Springer Verlag, West Germany (1977)
2. R. Subramanian, P. Achuthan and K. Venkatesan 'Numerical Analysis for Engineers and Physicists' - Translation of Dr. R. Zurmuhl's Praktische Matnematik' from German to English - Springer Verlag (1977)
3. S. K. Srinivasan, K. M. Mehata-'Probability and Random Processes Tata-Mcgraw Hill (1978)

Indo-German Collaboration

Dr. P. Achuthan visited the University of Karlsruhe, W. Germany on re-visiting programme from 1-7-1977 to 30-9-1977.

Major Equipments Added

Micro-Computer Model 2200 (Procured from M/S, Hindustan Computers

Visitors to the Department

1. Prof. G. Glatz of the University of Karlsruhe, W. Germany
2. Prof. G. Brazinski of the University of Lille, France
3. Dr. K. Gopalaswamy, The Flinders University of South Australia
4. Prof. H. Heyer, the University of Tubingan, W. Germany

Any other Information not Covered

The Journal of Mathematical and Physical Science, a research Journal international in character, Published by this department continues to attract good quality research papers. So far 11 volumes, 52 numbers and 6700 pages have already been published. Under the mutual exchange of publication programme initiated by this Department as on date we are receiving 63 International Research Journals from abroad.

Developmental programme likely to come up in the near future:

Intensive research and developmental activities are proposed to be taken up in the following areas.

Analysis, Fluid Mechanics and Solid Mechanics Probability and combinatorial Mathematics, Graph Theory, Theoretical Physics and Statistics.

MECHANICAL ENGINEERING

On courses :

New courses introduced : Solar energy utilization,
Combustion in swirling flames.

Education Programmes :

i. Continuing Education Programmes :

(a) Training course for instrument technicians - 28-11-1977 to 9-12-1977—17 Participants

Conducted in collaboration with Madras Productivity Council.

(b) Workshop on vehicular air pollution control (1st-6th August 1977-37 participants).

(c) Tutorial course on 'Electronics, in Automotive engines' - Institution of Electrical and Electronic Engineers (India)—February 1978.

(d) ISTE Summer School on Fatigue Design (May 1 to May 14, 1978; 21 Participants),

(e) Advanced training course for HAL Process Engineers (13th Feb, to 21st April, 1978; 23 Participants).

(f) Short term course on Centrifugal fans and compressors for Scientists and Engineers (2nd May to 12 May 1978).

Quality Improvement Programme / UGC Teachers fellowship programme

(a) Serving teacher programme :

	No. trained	No. on rolls
M. Tech.	23	10
M. S.	—	2
Ph. D.	15	10

(b) Short term courses conducted :

(i) Workshop on Solar Thermal Devices (January 24-28, 1978)

(ii) Advances in Centrifugal Compressor Technology (December 9-24, 1977)

Important lectures and Seminars

	Title	Speaker
(i)	'Tool Wear'	Dr. Lorenz of the University of Melborne, Australia, Organised by Production Engg. Section.
(ii)	' Cutting Tool Materials - Current Trends'	Dr. Ing. Venkatesh.
(iii)	'Electro Chemical Machining'	Dr. H. Haitmann, Visiting Prof, West Germany.
(iv)	'Developments in NC Machining'	Prof. Berthold Lectures delivered.
(v)	'Trends in Metal Forming'	Prof. Eberlein Lectures delivered Visiting Professors from East Germany, Organised by Production Engg. Section.
(vi)	'Recent Advances in axial flow compressor research'	Dr. H. Gallus, Aachen Technical University, Aachen.
(vii)	'Two-dimensional cascade research'	Dr. Lawaczek.
(viii)	'First Inrernational Conference on Centrifugal Compressor Technology',	I. I. T., Madras.

(ix) Seminar on roll of social sciences in Engineering Education.

(x) Lectures on Solar Energy Utilization Combustion, Hydrogen production and Technical Thermodynamics. — Prof. Dr. K. F. Knoche, Aachen Technical University, West Germany.

Research and Development :

Research Publications :

(a) Papers : 86

(b) Books/Monograms :

1. V. C. Venkatesh and H. Chandrasekharan, 'Experimental Techniques in Metal Cutting' (under publication).
2. K. A. Bhaskaran and A. Venkatesh - 'Problems in Engineering Thermodynamics' - Tata-Mcgraw Hill Book Publishing Co, Ltd., 1978.

Patents :

Patents processed : one patent applied for.

Sponsored Research Schemes and Projects :

(a) Sponsored Research Schemes :

1. CSIR ; Holographic techniques and stress analysis.
2. Department of Atomic Energy,
   Holographic techniques and stress analysis and non-destructive testing.
3. Department of Science and Technology :
   Development of a Laser Interferometer.
4. Electronics Commission of India :
   Design and Development of Printing Units.
5. Ministry of Defence : F-95 Camera Design, Development and Fabrication.
6. Department of Science and Technology : Design and Development of Multipurpose fully reversible axial flow turbomachine.
7. Kirloskar Oil Engines : Vehicular pollution studies.

8. Structural Engineering Research Centre, Madras; Concrete pipe making machines.
9. CSIR : Development of three-dimensional stress technique for production tooling problems.
10. DST : Design and Development of Surface Finish Measuring Instrument.
11. CSIR: Technology of preservation of fruits, vegetables and marine products.
12. BHEL : Design and Development of 1 ton and 10 ton solar absorption refrigeration plants.
13. BHEL and MBB, West Germany : Design and Development of a 10 kw solar power plant.
14. Aero (R and D) Board : High Speed Centrifugal Compressor.
15. Aero (R and D) Board : High speed cascade tests.
16. CSIR : Splitter vanes for centrifugal impellers.
17. CSIR : Rotating vaneless diffusers for centrifugal blowers.
18. DST : Surge control of Centrifugal compresssors.
19. DST : Advanced research in centrifugal turbomachinery.

(b) Departmental Projects : 47

Assistance to Industry-ICC

1. Calibration of Temperature measuring instruments.
2. Thermophysical property measurement.
3. Evaluation of performance of process power plants etc.
4. Analysis of certain characteristics of a prototype of P. series engines-for M/s. Simpson & Co. Ltd., Madras.
5. Analysis of Mill Roll Failure-for M/s. Dunlop India Ltd, Madras.
6. Calibration of Dynamometers for M/s. Bharat Heavy Electricals Ltd., Madras.
7. Level luffing of jib cranes for M/s. Chitram & Co., Madras.
8. Design of a screw conveyor for M/s. Metalloys, Madras.

9. Design of EOT Crane for M/s. Indian Commerce and Industries Co, Madras.
10. Performance evaluation of cast and forged milling cutter.
11. Calibration of gauges and surface finish measurements.
12. Calibration of dew point sensors for Madras Atomic Power Projects, Kalpakkam.
13. Evaluation of Heat Transfer and Pressure Drop Data for Finned Tube Heat Exchangers for M/s. Bharat Heavy Plate and Vessels Ltd., Visakhapatnam, A. P.
14. Testing of oils, Pressure gauge and calibration of thermocouples.
15. Testing and developmental work in I. C, Engines (5 projects)
16. Testing of reciprocating compressors.
17. Testing of centrifugal fans.
18. Design and consultancy for BHEL cascade tunnels.
19. Tool Maker's Microscope (NRDC)
20. Coin sorter (Marshall and Sons, Madras).
21. Water Turbine Development for BHEL, Bhopal.

Indo-German Collaboration

S. No.	Title	Value of assistance	Expert staff from W. Germany	Indian staff to W. Germany under the scheme
1.	Precision glass scales	DM 50,000(WG)	—	—
2.	Heat Transfer in Electrical Machines	Rs. 69,400(IIT)	—	K. V. Chalapathi Rao
3.	Alternative fuels for I.C. Engines	DM 50,000(WG) Rs. 70,000(IIT)	—	—
4.	Utilization of solar energy for cold storage of food products	DM 50,000(WG)	—	V. Seshagiri Rao
5.	Tandem-vaned centrifugal impeller	DM 50,000(WG)	Prof.H.E. Gallus Aachen	G. Gopalakrishnan

Special honours / distinctions conferred on the members of the staff :

1. Dr. M. C. Gupta, Professor of Mech. Engg. has been elected as a Director of the International Solar Energy Society, which has its headquarters in Melbourne, Australia.

2. Dr. M. C. Gupta, has been invited to deliver a few lectures to the participants of UNESCO sponsored course on SOLAR ENERGY CONVERSION at Trieste, Italy, in September 1977.

3. Dr. R. Natarajan, Professor of Mech. Engg. was appointed as member of the International Editorial Board of Fuel (London) from May 1976.

Any other information

New Major equipments added

Hotwire anemometer, oscilloscopes, potentiometer recorders, solarimeters.

Fabricated

Two stage axial pump of capacity 80 KW

Test stand for gear dynamics

Test stand for friction and wear in small sleeve bearings

Thread whirling attachment, Electronic level, Burnishing tool set-up

Square turning attachment, Abrasive jet machining.

Solar cooker, solar refrigerator, acoustic burner.

Visitors to the department

1. Prof. Dr. Techn. F. Pischinger, Head, Institute for applied Thermodynamics, Technical University of Aachan, W. Germany.
2. IR.G. Prast, Manager, Cryogenics Research, Philips Research Lab. The Netherlands.
3. Prof. T. M. Sabine, School of Physics and Materials, NSW Institute of Technology, Australia.
4. Mr. Frances de Winter, President, Atlas Corporation, Santa Cruz, California, U.S.A.
5. Dr. Knut Berndorfer, MBB, W. Germany.

6. Dr. N. C. Sheridan, Dept. of Mech. Engg., University of of Queenzland, Australia.
7. Mr. C. J. Swet, U. S. Dept. of Energy (ERDA) U. S. A.
8. Dr. J. G. Symons, Research Scientist, CSIRO, Australia.
9. Prof. Bottcher, KFA Julich, W. Germany.
10. Prof. Dr. K. F. Knoche, Director, Institute for Technical Thermodynamics, Aachen Technical University, Aachen, West Germany.

Invited Lectures delivered by the staff

1. Dr. K. N. Seetharamu—Applications of FEM to Heat Transfer, BHEL, Trichy.
2. Dr. V. C. Venkatesh—College of Engg,, Guindy, National Productivity Council, Madras.
3. Dr. V. Radhakrishnan—College of Engg., Guindy, ISRO Thumba, M. P. C., Madras.
4. Dr. H. Chandrasekaran—College of Engg., Guindy, NPC, Madras Regional Engg. College, Trichy.
5. Mr. P. Ramachandran—NPC, Madras, MPC, Madras.
6. Mr. J. F. Rahman—ISRO, Thumba.
7. Dr. R. Krishnamurthy—NPC, Madras, ATI, Madras.
8. Dr. M. C. Gupta—UNESCO sponsored course on Solar Energy Conversion, at Trieste, Italy.
9. Dr. R. Natarajan—On Heterogeneous Combustion at the Concordia University, Montreal, Canada.

Developmental programme likely to come up in the near future

1. Fundamental studies in heat and mass transfer.
2. Fluidized Bed Heat Transfer.
3. Heat Transfer in two-phase flows.
4. Alternative fuels including hydrogen bio-gas and alcohols.
5. Pollution control problems in I. C. Engines.
6. Fundamental studies in combustion, air movements etc., in engines.

7. A centre for gear testing has been proposed.

8. Several test set-ups for instructional purposes are planned. Activities in the fields of mechanisms transmissions and failure analysis will be stepped up and diversified.

9. Construction of new drawing halls and concerned staff-rooms is expected to be taken up.

10. It is planned to set up equipment for hydraulic transportation of granular solids and pneumatic transport of powders at high concentration.

11. Developments in the field of ECM. EDM, and USM and Metal Cutting in areas such as surface production, surface integrity and stress analysis are likely to come up.

12. Solar boosted Heat Pumps - Sponsored by Dept. of Science and Technology, New Delhi.

13. Long term test programme of 10 KW Solar Power Plant.

14. Development of Solar refrigeration and airconditioning.

15. Utilization of geothermal fluid for power generation.

16. Cooling, freezing and drying of food production--determination of thermophysical properties of food products.

17. Performance and evaluation of refrigeration and air-conditioning components.

18. Development of acoustic burners.

19. Gobar gas burners.

20. Investigations on spray combustion, swirling combustion reaction kinetic studies using shock tube, turbulent combustion flames quenching studies.

21. Development of continuous solar refrigerator, compound parabolic concentrator, solar regenerator, for use in air-conditioners and thermal storage systems are all being pursued.

22. Thermal Energy Storage.

METALLURGY

Education Programme

The Department offers graduate programme in Metallurgy and Post-graduate programme in Metallurgy with specialisation in the following fields :

1. Iron and Steel Technology
2. Materials Technology
3. Metal Casting
4. Metal Forming
5. Metal joining

Techincal meetings under the auspices of the local chapter of the Indian Institute of Metals and lectures by visiting specialists were arranged as usual.

The following seminars/conferences and courses were held :

1. The 15th National Metallurgists day and 31st Annual Technical meeting of the Indian Institutes of Metals was organised under the auspices of the local chapter of the Indian Institutes of Metals, for the first time held in this part of the country.

A two-week course on "Advanced Welding Technology" was organised for the industries under the continuing education programme.

In addition to the above, lectures were also delivered by the staff members of the Department to the Advanced Training Institute, Guindy; the National Productivity Councils at Madras, Salem and Trichy; the Regional Engineering College, Trichy; the College of Engineering, Guindy and the Indian Railway Institute of Mechanical and Technical Engineers, Jabalpur.

The following projects are being actively pursued in the Department :

1. Improvement in welding quality of wheels-Indo-German Project.
2. Welding characteristics of Nickel Steels—Ministry of Defence/DMRL.
3. Development of melting, fabrication and surface protection technology of Magnesium alloys—Ministry of Defence/ARDB.

4. Properties of materials of construction at low temperatures-jointly by the Metallurgy and Physics Departments of I. I. T., Madras and the Indian Institute of Science, Bangalore.

5. Recycling of grinding swarf—Department of Science and Technology.

A project of "Welding of Dissimilar metals and alloys used in the Nickel Industry" has been proposed to the Department of Atomic Energy.

The Department continued, as usual, to maintain good liaison with outside Industries and assist them on technological matters through the Industrial Consultancy Centre, I. I. T., Madras. One of the major activities undertaken during the year under purview has been training of Welding personnel for industries like Bharat Heavy Electricals, Madras and Bhopal on modern processes.

Several Patents are being developed for commercial exploitation.

PHYSICS

Education Programme

(a) A course on 'Vacuum techniques' organised for teachers in Engineering College and other instiutions.

(b) A UNESCO-COSTED seminar on 'Demonstration Experiments in Physics Education. Teachers from many COSIP sponsored programmes, besides delegates from several countries in the Asian Region participated in the seminar.

(c) A course on 'Laser Applications' for college teachers.

Quality Improvement Programme/UGC Faculty Improvement Programme

Under this programme ten teachers from various universities/ institutions are presently working for their Ph. D. degrees in the department.

Important lecturers and Seminars

	TITLE	SPEAKER
1.	Liquid Crystal Application	Dr. G. Roberts, University of Durham —U. K.
2.	Demonstration Experiments in Lasers.	Dr. J. W. Mc Gowan, University of Western, Ontario, CANADA.

3.	Applications of Rubber	Dr. B. C. Sekhar, Chirman Rubber Research Board, MALAYSIA.
4.	Experiments in Electronics	Prof. M. R. Bhiday, Poona University.
5.	Experiments in Mechanics	Prof. Saraf, University of Jaipur, Rajasthan.
6.	Learning techniques in Electronics	Dr. Crellin, UNESCO-Bangkok.
7.	Digital Electronics	Dr. L. Dart, University of California, U.S.A.
8.	Semiconductor Electronics (A course of 20 lectures.)	Dr. Reubber, Fritz Haber Institute, Berlin, W. Germany.

Research and Development

(i) Research publication

Total number of papers published 47

Number of Ph. D. during the year 6

Participation in International Conferences

Dr. S. Radhakrishna, Dr. S.B.S. Sastry, Dr. K. V. Reddy and Dr. B. V. R. Chowdary participated in the International Conferences on Defects on Insulating Crystals at Gatlinburg, USA.

Dr. S. Radhakrishna participated in the UNESCO Expert group meeting on Physics Education at Penang, Malaysia.

Prof. R. Srinivasan, Head, Physics Department participated in the International Conference on Lattice Dynamics, Paris, France. Dr. K. V. S. Rama Rao participated in the International Conference on Magnetic Resonance in Banff, Canada.

Sponsored research schemes and projects

	Title	Sponsored by
1.	Development of Information Storage devices.	CSIR

2.	Development of Cryostats for the study of some properties of materials at low temperatures.	CSIR
3.	Cooling System for IR detectors.	AERO and R and R Board
4.	Development of optical modulators.	DEFENCE
5.	Medical Diognostics using Laser Speckle.	ICMR
6.	Design and fabrication of Lecture Demonstration apparatus.	COSTED
7.	Surface states of semiconductors at high and ultra high vacuum.	CSIR
8.	Properties of materials of construction at low temperatures.	DST
9.	Development of rotating Dewar for Liquid Helium with transfer coupling.	BHEL, Hyderabad
10.	Investigation of semi-conducting crystals at microwave frequencies Theory of point, defects in oxides.	DST Dept. of Atomic Energy
11.	Spin wave resonance and nuclear magnetic resonance in ferromagnets.	CSIR

Departmental Projects 2

Indo-German collaboration Projects

1.	The projects under this scheme	
	(a) Preparation and investigation of magnetic materials of technical interest.	Dr. K. V. S. Rama Rao Dr. Weiss
	(b) Design and construction of cryogenic equipment like centrifugal pumps etc.	Chief Coordinator Prof. R. Srinivasan Dr. Klipping
2.	The staff who have joined as expert from Federal Republic of Germany.	Dr. Klipping Fritz Haber Institute

HUMANITIES AND SOCIAL SCIENCES

On Courses

New courses introduced :	Three new courses are introduced. Two of them offered to Applied Mechanics and one to Metallurgy.

Education Programmes

IIT-IAMM Certificate course in Materials Management (for the benefit of teachers of Engineering Colleges and advanced Summer School in Industrial Engineering was conducted for two weeks from 13th June 1977)

HAL BEML Management Training Programme from 11-11-76 to 7-5-77

Quality Improvement Programme/UGC Teacher Fellowship Programme.

(1) Serving teachers programme

No. of trained and on rolls in each of these courses (M. Tech/ MS/Ph.D.) - two

(2) Short term courses conducted (3 weeks in December 1975, 21 participants.)

Important Lectures and Seminars

TITLE	SPEAKER
' Organization and Administration '	Dr. Ashok K. Sahni, Indian Institute of Management, Bangalore.
Project Evaluation & Capital Budgeting Stopping Rules Management Production Functions Promotion and Salaries in Competitive Business Organizations	Dr. M. Beekman, Visiting Professor's special lectures.

Research and Development

Research Publications : (i) Papers — Two

(ii) Books/monograms — Four

Sponsored Research Schemes and Projects

(i) Identification of the Goals of Engineering Education
(ii) Hydrogen Energy Systems Technology for India.

Assistance to Industry—ICC

The Department has completed two consultancy assignments and there are two on going assignments.

Invited Lectures Deliverd by the staff

Several faculty members have participated in executive development programmes organized for industry such as Shaw Wallace & Co., Administrative Staff College, Madras Productivity Council etc.

REPORTS OF CENTRAL SERVICES AND FACILITIES

CENTRAL LIBRARY

The Central Library continued to get Scientific book periodical and Xerox copies of technical University, Berlin under Indo-German Collaboration programme. The Central Library which has become the partial archieves in India for Scientific and Technical films of the Encyclopaedia Cinematographica of Gottingen, West Germany has continued to serve the scientific community of India by loaning its films.

A selected bibliography on Centrifugal compressors was brought out on the occasion of the First International Conference on Centrifugal Compressor Technology held at the Institute.

Extension to library building as envisaged in the original plan is under active consideration. This is mainly for housing its growing collections and seating its increasing number of clientele which has acquired new dimensions during the year under review as the Library's holdings far exceeded the optimum limit of 1,00,000 volumes. The system of overnight loans of textbooks for the students introduced last year continued to be popular. The inter-library co-operation among the various libraries continued during the year under review. As in the previous year the SDI service continued to be favourably received both by the internal users and external subscribers to the service.

With the formation of Ocean Engineering Centre a sum of Rs. 1.6 lakhs was made available to the Library for purchase of books and periodicals.

Mr. V. S. Nazir Ahmed, the Librarian had been away for over 2 years on UNESCO's assignment to set up a National Documentation Centre in SUDAN.

Sri C. Deenadayalu, Deputy Librarian attended the 7th IATUL Conference at LOUVAIN, BELGIUM and visited DORTMUND, West Germany for studying on—line library automation. He also attended the World Congress of Librarians in Brussels and IFLA-UNESCO pre-session Seminar on "Resource sharing in Libraries in Developing Countries."

Mrs. J. Durairaj, Asst. Librarian Mr. K. Sankaran and Mrs. Usha Krishnan, attended seminars/conferences at Madras and Bangalore respectively.

Statistics on other Library activities

Library Membership :

1.	Institute Members (Staff & Students)	—	5,003
2.	Outside Members : Individual	—	55
	Corporate	—	30
3.	Consultation permits	—	52

Circulation :

1.	No. of readers visited	—	84,486
2.	No. of volumes issued	—	93,287
3.	No. of reservations for books : Registered	—	4,782
	Fulfilled	—	4,720
4.	Amount of overdue and other charges realised	—	37,597
5.	Inter-Library-Loans : borrowed for Institute members.	—	240
	Lent out from Institute Library	—	168

Acquisition

Books and bound volumes of periodicals	—	5,132
Pamphlets and reports	—	2,804
Microfilms and microfiches	—	129
Ph. D. Thesis	—	288
Total intake during the year	—	8,353
Total accessions upto June '78	—	1,60,042

Current Periodicals

By subscriptions	—	1,139
From Technical University, Berlin (under aid)	—	62
By Exchange/gift	—	147
		1,348

SDI recipients :	Internal	—	101
	External	—	44
LDN recipients :	Internal	—	40
	External	—	17
Translations arranged		—	10

Reprographic Service

Microfilms made	12,500 Frames
Korestat copies on tracing sheets made	23,830 pages
Korestat copies on tracing sheets made	1,722 sheets
Gevafax Copies	63,727 pages
Paper and Metal Masters made for offset printing	1,700 nos.

Binding

No. of books and journals bound for Library	1,776
No. of stationary forms and registers bound	1,105
No. of publications (reports, etc.) of departments bound	1,196

Printing work

1. Growth & Limitations of Industrial Consultancy at IIT Madras, 1977 104 p — 350 copies
2. Proceedings of the Conference on Centrifugal Compressor Technology, 1976 425 p — 135 copies
3. Library Stationary & Registers — 1,105

CENTRAL WORKSHOP

Assistance to Industry

No. of work orders undertaken directly from outside organizations (July 77—March 78)		...	56
do	Through Department	...	42
			98

Details of Assistance

Manufacture of precision gears, Repair and Calibration of pressure gauges, Dynamic balancing of fan impellers and variable speed pulleys. Jig-boring for dies and Grinding of electrodes for Madras Atomic Power Project.

Staff who have gone to Federal Republic of Germany under this Scheme :

Mr. B. Francis Xavier, Mechanic A of the CWS was deputed to West Germany for training.

Major Equipments Added :

Spark Erosion Machine installed in Instrument Shop.

Development Programme likely to come up in the Near Future

After getting new equipments from West Germany, Gear Box assembly (manufacturing) Intricated castings (F & NF) and allied items will be taken up on R & D Basis.

HOSPITAL

Staff

Dr. (Miss) A. B. Marikar, M. D., D.G.O., is the Hony. Adviser for the hospital since 21-1-1976. Dr. M. S. Prakas, M.S., F.I.C.S., is the Medical-Officer-in-charge and Surgeon (including Orthopaedics). At the Annual Conference of Surgeons of India in December 1977, he was the Chairman for one of the Scientific Sessions.

Dr. P. M. Palani, M.D.,—Senior Medical Officer (Physician) (Part-time, for more than 16 years.

Dr. A. L. Annamalai, F.R.C.P., F.C.C.P., F.I.C.A., D.T., M & H.,Senior Medical Officer (Physician) (Part time)—since 1-10-1976.

Dr. T. Ramadass, B.Sc., M.S., F.I.C.S., (USA) E.N.T. Surgeon, (Part-time) since 24-12-1976.

Dr. (Mrs.) Shanta Krishnamurthy, M.B.,B.S., D.G.O., on one year's leave from 19-9-77, extended her leave for another two years and in her place Dr. (Mrs.) Lalitha Kumari, M.B.,B.S., D.G.O. has been appointed from 12-1-1978.

Dr. (Mrs.) Radha Rajagopalan, M.B.B.S., A. B.—Paediatrician from 16-3-78.

Dr. T.P. Alaganantham, M. B., B. S., the Resident Medical Officer and Dr. N. A. Jayavelan, M. B., B. S., are the Junior/General Duty Medical Officers.

Dr. Sumathi Khangoankar, M. B., B. S., D. A., — full time anaesthetist and General Duty Medical Officer, Since 4-7-1978.

The Medical, Surgical and specialist services (E. N. T. Gynaec, and Obst. Paediatrics) both out-patient and in-patient services have been heavy, and continued services throughout the 365 days of the year have been maintained.

As usual, the Medical units attendance is heavy and in February—March 1978 there was a 'Flu' epidemic among the students and campus population and was contained by active measures.

The Card-cum-file system started in 1976 continues to be operable and contains the whole family's health index. Colour coding for Hypertension, Diabetes, Asthma, Myocardial Infarction, Pulmonery Tuberculosis, and Drug Allergy have been initiated. For the first time, "Drug Committee" was formed, of the Senior Medical Officers of the institute for the purchase of drugs.

Plans have been sumitted for a full-fledged Surgical and Labour Theatre with post-operative wards for men, women, and children and an annexe for intensive care.

Statistics

Total out-patient attendance	...	84,782
Total in-patient attendance	...	950
Surgical Out-patient	...	11,500
In-patient	...	152
No. of major operations	...	22
No. of Minor operations	...	270

No. of Dressings	...	10,560
E. N. T. Operations	...	52 (Tonsillectomies Mostoidectomies)

Statistics :

Gynaec. and Obst. (Lady Medical Officer joined on 12-1-1978.)

Total No. of Out-Patient cases	3,093
No. Antenatal cases (Tuesdays)	257
No. of New Antenatal cases	61
No. of deliveries conducted	27
No. of In-Patients	65

Operations :

Tubectomy	3	10
D & C	4	
M. T. P.	3	

Paediatrics :

(Joined duty on 16-3-1978 upto 30-6-1978) & (1-7-77 to 30-6-1978.)

No. of Out-patient attendance.	8,751
In-Patient attendance	18
DPT and Polio	215
Vit. A. Drops.	98

(T.A.B. and small pox vaccination has been started)

Plans for a Bio-Chemistry Laboratory and X-ray plant (basic necessities) has been put upto the administration and sanction of the same would further help in the treatment of patients. The students' N. S. S. Medical wing has been ably helped by the Resident Medical Officer Dr. T. P. Alaganantham and Pharmacist Sri S. P. Kasturirangan on Saturdays at Narayanapuram.

PLACEMENT OFFICE

During the year 1977-78 nearly 150 companies/establishments, from Public and Private sectors contacted the Placement Office. Representatives from 55 companies visited this office and conducted campus interviews.

In recent years there has been an increase in the demand for employment of post-graduate and it is gratifying to note that an increased percentage of our post-graduate students have secured employment as a result of efforts made by the Placement Office.

The Placement office continues to keep in touch with as many industries and organisation as may require technically qualified personnel and furnishes them with information about the courses offered with specialisations in the various branches, to enable them to have detailed information about the talents available from among the graduates of the Institute. Since the Institution has on its rolls students from foreign countries also. Placement Office sponsors these students to employment organisations in their home countries.

This office has also been handling an increasing number of applications from students of B. Tech. and M. Tech. degree courses for practical training during the summer vacation. While enabling the students to acquire practical experience, this training also serves to help the industries in making use of their services and assessing their potential.

The Placement office also looks after the work pertaining to the Alumni Association of the Institute.

Information regarding the Placement position of the alumni of the year 1976-77 is given below :

Total passed out (Graduates and Post Graduates)		547
Engaged in further Studies	(a) In India	31
	(b) Abroad	58
Employed Abroad		13
Employed in India	(a) Public Sector	161
	(b) Private sector	90
Deceased		1
Position not known (Mostly post-graduate)		193
		547

NATIONAL CADET CORPS

No. 4 (TN) Air Sqn (Tech) NCC.

This Unit has been sponsored by Indian Institute of Technology, Madras and is responsible to impart NCC Air Wing Training to the Cadets who are students of IIT, Madras.

Officer commanding	:	Wg. Cdr. L. M. Ramamurthy
Administrative Officer	:	Flt. Lt. B. N. Misra
NCC Part Time Officers	:	Flt. Lt. V. Subramaniyam and Fg. Officer. K. V. Chalpati Rao.

Enrolment

NCC training is spread over THREE academic year i.e. Six semesters. New enrolment is confined to the Ist year B. Tech students. During the acadamic year of 1977-78, the enrolment in the Ist year was restricted to only 32 cadets since there was a backlog of about 40 cadets who had not completed the required FOUR semester training during the prescribed period and they were to be catered for in the first half of the training year. The total strength of the cadets in the Air Wing was 200 which is the prescribed strength of the unit.

Training

Keeping the aims of the NCC in-view, training was imparted to the I, II and III year cadets in accordance with the prescribed syllabus. Basic and advance Military training was also given to the cadets in all the three years of training. The specialised technical training to the cadets covered the two technical branches of the Air Force Viz. Mechanical and Electronics. The training was imparted to cadets by qualified Air Force instructors as well as NCC part Time officers who are well qualified in their subjects.

Cadets of this unit were given Gliding training also. Only a few of them could spare more time for this and two or three cadets had more than 50 Glider launches to their credit. One of the cadets came out successfully with SOLO Glider flying. Efforts will be made to give Gliding to more cadets this year.

Camps and Special Courses

Annual Training Camp of this unit was held during the month of Dec/Jan 1977-78 along with the sister Units under Group "B".

Cadets from this Unit took part in the Camp and showed keenness in the camp training and camp discipline. They participated in the Social Service tasks alongwith cadets from other Units and did a good job earning appreciation from higher authorities.

Nine Cadets from this unit attended the All India Vayu Sainik Camp held at Bangalore from 26-5-78 to 8-7-78.

Blood Donation

Cadets from this Unit are in no way lagging behind from other NCC cadets in State in spite of their heavy academic schedule. On 8 Oct. 1977, 30 cadets of this Unit donated their BLOOD at Indian Red Cross Society, Egmore, for which the Hon'ble Governor of Tamil Nadu has issued letters of commendation.

Ceremonial Parades

The cadets of this Unit presented a Guard of Honour to the Hon'ble Governor of Tamil Nadu, Shri B. Prabhudas Patwari on 9 Sep. 77 on the occasion of XIV Convocation of the Institute.

Certificate Examination

NCC Certificate "B" & "C" examinations were conducted in the Unit in the month of March this year. 22 cadets passed the "B" certificate examination and 12 passed the "C" certificate examination. They deserve appreciation for having completed the training and coming out successfully in the examinations.

Refresher Course

Fg. Offr. K. V. Chalapati Rao, Part-Time NCC Officer of this unit attended the S.D. Refresher Course (Air Wing) at AF. AC., Coimbatore during Oct., Nov. 1977. The Officer faired well in the course and got SECOND position in whole of the course.

Social Service Course

Flt. Lt. V. Subramaniyam, Part Time NCC Officer of this Unit attended Social Service Course at School of Social Service, EGMORE, Madras in the month of June 1978.

Promise Day Parade

The promise day parade is held every year during the month of August during the INDEPENDENCE week to administer the NCC Promise to all the cadets. Prof. R. G. NARAYANAMURTI is Director I. I. T. took the salute during the promise day parade held on 12 Aug 77 and administered the promise to all the Cadets. He also handed over the "B" & "C" certificates and various other Camps and Courses certificates to the successful cadets during the training year 1976-77.