

ECE 50 YEARS

1946-1996

COMMEMORATION OF A GREAT HERITAGE

Editors

B S Sonde, A Selvarajan

December 1996

DEPARTMENT OF ELECTRICAL COMMUNICATION ENGINEERING
Indian Institute of Science, Bangalore

Front cover: Founder's statue
J N Tata (1839-1904)

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DIRECTOR'S FOREWORD



The Founder of this Institute had a great vision in creating this Institution with emphasis on Chemistry and Electrical Technology. Although, the Department of Electrical Communication Engineering became an independent entity in 1946, it was part of Electrical Technology and identified as a separate section in 1923. The Department can be proud of its illustrious past and has contributed significantly to the development of this branch of engineering in the country. It has kept abreast of development in technology and has worked closely with government, public and private sector industries in the area. The alumni of the Department have brought laurels to the alma mater. The Department has major R&D interests in the broad areas of communication, microelectronics and signal processing. It has taken steps to modernize its curriculum and augment its interaction with industry. The Department can look forward to a glorious future. I am confident that the Department will be a key player in the country's effort to benefit from the communication revolution sweeping the globe. I have great pleasure in wishing the faculty, students and staff of the Department of the very best.

November 1996

G Padmanaban
Director

INDIAN INSTITUTE OF SCIENCE, BANGALORE
ECE 50 YEARS : 1946 - 1996
Golden Jubilee Publications

- Proceedings of International Conference on :
Emerging Microelectronics and Internconnection Technologies (EMIT'96)
(organized jointly with ISHM - The Microelectronics Society)
February 12-16, 1996
Published by New Age International (P) Limited; Publishers, New Delhi 496 pp

- Proceedings of Workshop on :
ECE Education and Research in India - Future Directions
July 12-13, 1996
Volume 1: Papers 130 pp
Volume 2: Report & Recommendations 38 pp
Published by Indian Institute of Science, Bangalore

- Proceedings of Conference on :
Communication Technologies (CT 96)
December 13-16, 1996 246pp
Published by Indian Institute of Science, Bangalore

- **ECE 50 YEARS - Golden Jubilee Commemoration Volume**
Published by Indian Institute of Science, Bangalore
December 1996 92pp

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EDITORS' PREFACE

Learned persons and eminent educationists have often said: "In a University what matters most is not imposing structures and laboratory facilities, it is not the strength of the student body, not even the distinctions won by the faculty members. What matters most is the quality of education that is imparted" This has been the motto of the Department of Electrical Communication Engineering (ECE) ever since its inception, now celebrating its Golden jubilee in the year 1996. Although ECE got its present status as a Department, the first of its kind in India, at the Indian Institute of Science in 1946, ECE teaching and research had commenced at the Institute many decades earlier as a part of erstwhile Department of Electrical Technology (ET). Several leading scientists and academics have led the ET Department and later its ECE Section which became a full fledged Department with high distinction and provided a sense of direction to the programmes: Research, Teaching, Scientific & Technical Advice and consultancy which has been of great strength to the Department. Also, merited students have come from far and near in the Country and also from abroad for higher education, training and research in advanced & emerging areas. Today, many of the alumni of the Department occupy key positions in education, science, industry, government administration and the like all over the world. In celebrating the Golden Jubilee of the Department, the faculty, staff and students of the Department are now paying a rich tribute to this great heritage. This commemorative publication "ECE 50 YEARS" is a major effort in this connection.

This book is divided into several chapters. Beginning with a historical perspective, tracing the origins of the Department and linking it with

the historical developments of the Indian Institute of Science in pursuit of excellence, the next chapter covers ECE - in retrospect based on the contributions and inputs from the faculty-past and present and alumni, down the memory lane of their association with the Department. The next chapter deals with ECE - today giving the present status of the Department, including its programmes and activities. The faculty/staff/students of the Department are listed here and the faculty profile is also included here. The next chapter covers a future vision of the Department focusing on the year 2000 sharpened by discussion and review at various levels in the Department. The concluding chapter covers the ECE strength, which gives a listing of all the Degree, Diploma awardees from the very beginning. This includes a listing of Ph D / M Sc (Engg) theses which were awarded degrees from the Department. Besides this text material, the book contains a veritable collection of photographs, interesting sketches, graphics and a few cartoons in a lighter vein.

It is hoped that the book will be a useful collector's item and a memento for everyone associated with the Department in its long record of service to education, science and industry in the Country. The encouragement and support received from colleagues, retired faculty, alumni and the Institute's administrations in organising this material is gratefully acknowledged.

Bangalore
November 1996

B S Sonde
A Selvarajan

DEPARTMENT OF ELECTRICAL COMMUNICATION ENGINEERING

INDUSTRIAL ASSOCIATE PROGRAMME

The industrial associate programme has been launched since April 1996 with the objective of facilitating interaction between the Industry and the Department for mutual benefit with a view to stimulate development in the areas related to electronics, communication, signal processing, and computers. This programme provides a forum for the exchange of ideas and information on a regular basis. It also enables the participating industries—Industrial Associates—and the Department to make use of each other's strengths and facilities towards developing a vibrant R&D culture.

The benefits to the Industrial Associates include opportunity to:

- Interact with the Department faculty to launch new activities, courses and programmes;
- Attend technical presentations on the current activities of the Department twice a year;
- Avail technical publications and brochures;
- Discuss technical problems and to solve them through consultancy projects at concessional fees;
- Have access to laboratories in the Department through faculty approval and concessional fees, where applicable;
- Have access to the Department library;
- Be informed about the seminars, short courses, tutorials and conferences in the Department, and be eligible for concessional fees if any;
- Approach funding agencies jointly with the Department;
- Add and update the expertise of their technical personnel;
- Pursue Masters and Doctoral programmes by their personnel;
- Benefit first from the ideas and products developed in the Department, and transfer technology from the Department at concessional fees;
- Strengthen R&D and improve the product or process at low cost.

The application form as well as any further information may be obtained from
Dr. Kumar N. Sivarajan /
Dr. Anamitra Makur
ECE Department
IISc, Bangalore 560 012
Phone: 309-2658 / 309-2745
Fax: 334-0563
Email: kumar / amakur @ece.iisc.ernet.in

Any industry or company in the areas related to electronics, communications, signal processing and computers can become an Industrial Associate by paying an admission fee of Rs. 10,000 and an annual (April to March 31) membership fee of Rs. 10,000 (for small-scale industries) or Rs. 20,000 (for medium-scale and large-scale industries). The Industrial Associates will be eligible for tax benefits on the fee paid for this programme.

1. A HISTORICAL PERSPECTIVE

A. EARLY PERIOD

1909

Establishment of Indian Institute of Science.

1911

Department of Electro Technics established, later renamed Electrical Technology (1913).

1923

Wireless Laboratory, later renamed Electrical Communication Engineering Section (1928) set up in the E T Department.

1.1 By the beginning of the 20th century, electrical science and engineering had already advanced to a great extent to become an important part of everyday life. At the same time, telegraph and telephone networks had progressed considerably on the world scene and Guglielmo Marconi had demonstrated wireless telegraphy across the Atlantic (1901). Besides, in the first decade of this century, electronics was taking its first steps through thermionic valves. It was in this period, India had just begun its electrical power generation schemes, viz., Cauvery hydroelectric power station near Mysore, thermal power stations in metropolitan cities and Tata hydroelectric power system near Mumbai, but, the electrical industry was yet non-existent in the country. In such a situation, the decision of the planners of the Indian Institute of Science to establish the Department of Electrical Technology (ET) as one of the first Departments of the Institute was indeed bold and far-reaching. This has enabled the Institute to lay a strong foundation for electrical science and technology in the country and provide an excellent base for education, R&D, industry and utilities in this area. Also, the Department could nurture electronics, communications and related areas, when they were introduced in its academic and R&D work in later years (Box A). As a result, the history of electrical/electronics/communications education and R&D in India is indeed synonymous with the growth of these activities at the Institute.

2. THE EARLY YEARS

2.1 The ET Department was planned, equipped and set up by Prof. Alfred Hay, the first Head of the Department, who joined the Institute in 1908. Being in the front rank of electrical engineering teachers in England and well known as the author of standard works on the subject, viz., Continuous Current Engineering, Alternating Currents, and Transmission & Distribution, he brought great prestige to the Department. It was a matter of great good fortune for the Department, that it had a person of Prof. Hay's stature to guide its destinies and foster its development in the early years. Through his many contributions and hard work, Prof. Hay laid a strong foundation for higher education and research in electrical engineering in India. Some of Prof. Hay's major achievements were:

- Planning and constructing building for the Department/ (the present Physics building housed ET until 1948);
- Setting up of laboratories/lecture halls/workshops in the new building;
- Launching the first post-B.Sc. (Physics + Maths), 3-year ET course in India, leading to Certificate of Proficiency (COP) Award;
- Highly selective (5-6/year) Student admissions based on merit only and on an all India basis;
- Training of laboratory / supporting staff in electrical skills;
- Thorough training of students through well focused, advanced level courses and research

B. EXTRACTS FROM W J POPE COMMITTEE REPORT (1921)

ET is the only Department at the Institute having regular courses, systematic lectures and practicals;

A range of valuable equipment/facilities have been established here;

42 students have graduated in ET in the first decade;

Vigorous training programme for new entrants should be emphasized; Advanced instruction should be encouraged in addition to original investigations.

C. PROF. K SREENIVASAN ON PROF. HAY'S TEACHING

... He was a marvellous teacher in his insight into and mastery of the subject and in lucidity of exposition. I have not met the like of him in all my long life. With remarkable economy of words and direct approach, he would illuminate even difficult ideas and concepts with great clarity ...

work - particularly in the areas of DC/AC machines and electronic / magnetic materials;

- Earning great respect and affection of the students.

Prof. Hay retired from the Institute in 1922 and returned to England. In recognition of his meritorious service, Prof. Hay was conferred the first Honorary Fellowship of the Institute in 1922. The Special Committee appointed by the Government of India to review the work of the Institute under the Chairmanship of Sir, William J Pope (1921) commended highly of the ET Department in its first decade (Box B).

Prof. K Sreenivasan, one of Prof. Hay's students (~ 1920) had this to say on his teaching excellence. (Box C).

2.2. Prof. J K Catterson - Smith succeeded Prof. Hay as the Head of ET Department in 1923. The Department saw a period of rapid growth and expansion under Prof. Catterson - Smith's stewardship. Major achievements in this period were:

- Revision and updating of the post - B.Sc. 3-year ET course; e.g., "thermionic valves" (both vacuum and gas-filled) and "Wireless" introduced as new subjects;
- Wireless laboratory set up (1923) and equipped, for the first time in India;
- Electrical Engineering laboratory upgraded by adding new machines and measuring instruments;

- First high voltage laboratory in the Country established, assisting the growth of electrical industries in the Bangalore area in later years; e.g., Government Porcelain Factory;

- Founding of the Electrical Engineering Society (1923) and launching of its publication, "Electro Technics" (1926). [The society and its publication continued through 1964-65];

- Wireless Laboratory renamed as Electrical Communication Engineering Section (1928); post of Assistant Professor in ECE created; S.R. Kantabet, an early student of the Department appointed as Assistant Professor in ECE (1928);

- Supplementary Course (1 year) in ECE for ET/BE graduates launched (1929-30);

- Research work encouraged - covering areas like short wave beam antenna arrays, short wave transmission and antenna testing;

- Many alumni becoming leaders and outstanding scientists / engineers in India and abroad.

Prof. Catterson - Smith was a man of vision and imagination with an artistic outlook. By what he did and achieved in a short time at the Institute, he became the founder of higher education and research in Electronics and ECE in India. Prof. Catterson - Smith returned to England in August 1930. At this time, the Department had a Faculty/Staff of 8 members: 1 Professor, 3 Assistant Professors and 4 Assistants. In recognition of his monumental contributions to the academic and research work at the Institute, he was also conferred the Honorary Fellowship of the Institute

**D. PROF K. SREENIVASAN
ON
PROF CATTERSON SMITH**

.... He was an admirable teacher; and he earned the esteem and affection of his students not only as a teacher and research guide, but also by his sympathetic understanding of them and his courtesy and helpfulness. He always endeavoured to bring out the best of them ...

**E. EXTRACTS FROM
RBS SEWELL
COMMITTEE REPORT (1931)**

Justification for a separate ECE Section in the ET Dept. Growing importance of ECE on the world scene.

1928: First Assistant Professor of ECE appointed; Two students also admitted; 1-year supplementary ECE Course started; 1931: Students number at 11, indicating growing interest in ECE.

Main activity: Teaching programme at level equivalent to B.Sc. (Engg) at British Univ.; Recognized by IEE (London) and IE (India); Sufficient evidence of high standard.

Facilities: Well equipped modern Wireless laboratory for teaching and research; A combined direction finding and wireless reception room set up; Linked to the main laboratory by telephone; Topics of interest: Telegraphy, Telephony and Radio.

Future: Studies in thermionics and radio measurements to be taken up; Additional equipment recommended.

(1930). Prof. K.Sreenivasan (An Assistant of Prof. Catterson - Smith in the 1920s) has this to say on Prof. Catterson-Smith. (Box D).

2.3. Prof. F N Mowdawalla, an early student of Prof. Hay in the post - B.Sc. 3-year ET course (1912-15) succeeded Prof. Catterson-Smith as the first Indian Head of the ET Department in June 1931. He brought with him his field experience of several years in the hydro-electric department in different states, superposed on his earlier experience as Assistant to Prof. Hay (until about 1920) and later as Assistant Professor (1924-26). Being deeply attached to the Institute, Prof. Mowdawalla developed the Department in every possible way. Besides being a strict disciplinarian, he was an excellent teacher and he earned the respect and admiration of his students. One of his major achievements was the commencement of the first 3-year course in ECE at the post - B.Sc. level in 1932 to replace the earlier 1-year supplementary ECE course. He also strengthened other sections in the Department and expanded the research programmes. But, in early 1932, Asst. Prof. Kantabel left the Institute to take up an assignment with the Govt. of India. At that time, Mr. K.Sreenivasan was appointed as the Asst. Professor of ECE, and Mr. S.P.Chakravarti as Lecturer. While, Asst. Prof. Sreenivasan concerned himself with Electronics and Radio, Mr. Chakravarti specialized in Telegraph and Telephone Communications on wires and cables. In this same period, the Govt. of India appointed a Review Committee under the Chairmanship of Lt.Col. R.B.S.Sewell. The Committee made many interesting comments on the ECE activities in the Department. (Box E).

The laboratory facilities were improved

considerably by acquiring new apparatus, instruments and components. Cathode-Ray Oscilloscopes were also added to the Department for both instruction and research. The year 1932 was declared as the second International Polar year. Students and faculty conducted many interesting experiments by recording echoes from the ionosphere using locally developed apparatus, the results of which were later published in international journals. Prof. Mowdawalla, unfortunately left the Institute in July 1934, after only 3 years service as the Head of the Department.

2.4. The void created by the departure of Prof. Mowdawalla was filled by the arrival of Prof. Kenneth Aston (1935), who had long teaching experience at the University College, Cardiff in England. Prof. Aston had extensive knowledge and experience in electrical machine design. During Prof. Aston's term, the ECE activities grew further and also the syllabus for the course was revised in step with the prevailing trends. He also strengthened the Electrical Engineering Society, which became a major mouthpiece for dissemination of new knowledge in the subject by both the students and the faculty. Stalwarts like Prof. C.V.Raman also addressed the Society in this period, as can be seen from the technical programme of the Society for a typical year, 1942-43. (Box F).

The Government of India appointed another Review Committee in this period under the Chairmanship of Sir J.C.Irvine (1936), which commended highly of the ECE research and academic programmes in the department (Box G). In this period, national leaders like Mahatma Gandhi paid a visit to the Department (1936), which was a great inspiration to the faculty and

F. ELECTRICAL ENGINEERING SOCIETY

Programme for the year 1942-43

August 1942

- 2 Business Meeting, Elections
- 12 Wartime Recovery and Production of Nonferrous Metals in India: Dr. J.C.Ghosh
- 19 The Broadcasting Studio Building in Mysore; Dr. G.H.Koenigberger

September 1942

- 2 Specific Heat of Solids: Sir C.V.Raman
- 9 Location and Layout of Small Industrial Plants: Mr. H.S.Sidhu
- 16 Maintenance Problems in Engineering: Mr. A.Perry
- 23 Electrical Insulating Materials: Dr. S.K.K.Jatkar
- 30 Economics of Radio Industry: Mr. T.R.Jayaraman

November 1942

- 11 The Hydrogen Bond: Mr. G.R.Sivarama Rao
- 18 Colour photography: Dr. S. Dutta

December 1942

- 2 Locomotive and its Accessories: Mr.P.D. Madhekar
- 9 Recent Cosmic Ray Experiments: Mr. V.Sarabhai

January 1943

- 13 Some Aspects of Power Generation by IC Engines: Mr.K.B.Krishna Rao
- 20 Electric Kilns: Mr. Ramchander Rao
- 27 Gaseous Fuels for Automobiles: Mr. S.N.Choudhry

February 1943

- 3 Protective Devices for Transmitters: Mr. M.Madan Mohan
- 10 Measurement of Radio Field strengths: Mr. A.Abraham
- 17 Cathode Ray Oscillograph: Mr. M.Rahman
- 24 Electric Traction: Mr. S.N.Roy

March 1943

- 3 Business Meeting

students. Prof. Aston returned to England in 1944 at the conclusion of his assignment. At the same time, Asst. Prof. Sreenivasan went on deputation to Madras for another assignment. This period was also marked by major world events, like world war II and new discoveries in science and technology, particularly in ECE. This was perceived by the planners of the Institute, who decided to upgrade the section of ECE into a full fledged Department.

3. ECE SECTION TO ECE DEPARTMENT

3.1. The transformation of the ECE Section into a full fledged ECE Department was announced by Prof. J.C.Ghosh, Director of the Institute in 1946, almost anticipating the crucial role that ECE could play in independent India in the coming years. At this time Dr. N.B.Bhatt who was section i/c of ECE in the ET Department was assigned to officiate as the Head of the ECE Department. Prof. S.P.Chakravarti who had succeeded Prof. Aston as the Head of the ET Department was assigned to continue with the truncated ET Department. Dr.Bhatt brought in his knowledge, training and experience in electro-acoustics in USA to strengthen research in this subject in the new Department. Also, the 3-year post-B.Sc. ECE course was revised to be in step with the post - world war II advances in ECE. Very soon Asst. Prof. Sreenivasan returned to the Institute and he was made the first Professor and Head of the ECE Department. Being a person having long association with the Institute, first as a student, then as an Assistant and later as an Assistant professor, Prof. Sreenivasan devoted his full time and energy in planning and building up of the new Department. Major

G. EXTRACTS FROM JC IRVINE COMMITTEE REPORT (1936)

Popularity level of ECE/ET: Very high; out of 182 students admitted to IISc (1934-36), 50% at ECE/ET.

Recommended emphasis: Advanced instruction and research, in line with IISc policy; Progressively abolish junior classes to fulfill this.

Current research: Wave filters, Telegraph repeaters, Telephone transmission, Ionosphere.

Future: Education and research in Communication engineering and Sound recording to be taken up.

activities successfully, completed by Prof. Sreenivasan were:

- Planning and constructing a new building for the ECE Dept.; a modern E shaped building, of about 3000 sq.m floor area having wide corridors, functional laboratory/class/office rooms, workshop, stores and an auditorium. Besides, there was also an impressive foyer at the entrance. A well laid out garden in the front enhanced the beauty of the building. Although it was planned to have five floors for the building, only two floors were completed for want of funds. Laying of the foundation stone and opening of the building were both performed by Pandit Jawaharlal Nehru - India's first Prime Minister, (a rare occasion!)
- Many laboratories were set up and new equipment added.
- New faculty joined the Department and many visiting professors came from different parts of the world for short and long assignments; viz. Professors Norbert Weiner, P.H. Craig, Vincent C Rideout, L.I. Baida and A.I. Vishnevsky.
- The first analog computer in the country (PREDA) was established in the Department and new lines of research and training were launched using this facility.
- The post B.Sc. three year ECE course (D IISc) was fully revised and made up to date. Also, a PG course (DIISc-PG) was launched at the post B.E./DIISc. level, for the first time in India, to specialize in Electronics Engineering and Ultra-Shortwave and Microwave Engineering.

- Research work in different areas was encouraged and research Degrees leaving to AIISc were also conferred for the first time. Publication of research papers was also encouraged.
- Close association was established with the newly set-up public sector companies like Indian Telephone Industries Ltd. (1948) and Bharat Electronics Ltd. (1955). In addition, links were forged with national laboratories under CSIC, DRDO and other agencies.
- The Department also participated in a commendable way in the establishment of the Institution of Electronics and Telecommunication Engineers (1953) and Prof. Sreenivasan was elected as its III President during 1956-57.

3.2 By the time Prof. Sreenivasan retired from the Institute in 1959, the Department had attained an eminent position, not only in India but also abroad for the quality of its training and technical personnel it produced at different levels. The ECE alumni were occupying key positions in Education, Science, Industry, Utilities, Defence services as well as in the Government. This brought great prestige to the Department which brought world-wide attention. However, Government of India Review Committees appointed in this period viz., Alfred Egerton Committee (1948) & J.C. Ghosh Committee (1955) had divergent views. (Boxes H & I)

Prof. Sreenivasan was succeeded by Prof. S.V.C. Aiya (1959) who brought to the Institute his long experience in teaching and research in ECE as well as in administration at many institutions in the Bombay Presidency, in particular, College of

H. EXTRACTS FROM ALFRED EGERTON COMMITTEE REPORT (1948)

Recommendations: ECE 3-years course to be closed down soon; Such courses now available at many other locations in India. Concentrate on PG teaching and research.

Equipment/Facilities: Very meagre and mostly out of date; Reason for low research intensity.

Current research : Ionosphere; Non-synchronous vibrators for radio sets; MW radio transmission; UHF studies; Calibration of wavemeters; Reverberation recorder.

Work done for Govt. Depts.: 100 Hz standard signal transmission for P&T; Testing of UHF transmitters/receivers.

Future: Advanced training and research in the emerging areas of radio and radar.

Engineering at Pune. Prof. Aiya was also President of the IETE in 1958-59. Prof. Aiya advanced the teaching and research activities, strengthened the laboratories and associated facilities and enhanced the Department still further. Prof. Aiya's contributions were;

Launching of new research programmes, particularly in atmospheric radio noise and its interference to communication, as well as in transistor electronics and instrumentation.

Increasing Ph.D. and M.Sc. engineering registration of students, spotting out talent among them and providing scholarships.

Increasing interaction with national laboratories and industries to undertake new lines of research and advanced instruction.

Publication of research papers by faculty members and students and also preparation of research monographs (e.g. Relative efficiencies of Indian languages by Prof. B.S. Ramakrishna et al) and text books (Prof. B.S. Sonde, Prof M. Satyam, et al).

Setting up of two new buildings for the Department to house Acoustics laboratory and Electron Devices laboratory.

Admission of foreign students and sponsored defence service officers for ME course;

Revising and upgrading both B.E. & M.E. ECE programmes and making them more relevant to the needs of the Country.

Encouraging faculty members to develop new lines of research, new instruments and facilities

(e.g. Digital Computer Demonstrator by Prof. N.S. Nagaraja) and bringing in new interactions with other leading institutions in India and abroad. e.g. University College London (Prof. Harold Barlow and Prof. John Brown) Tohoku University Sendai, Japan (Prof. Kunio Mano); Research Institute of Atmospherics, Nagoya University, Japan (Prof. A. Kimpara).

3.3 By the early sixties, the Department had already become a bright spot in the ECE Education and Research Scene in India and was attracting the most talented students from all over the country. This was a time when new IITs were being set up in the country. A USA delegation headed by Prof. John D. Ryder, Dean of Engineering, Michigan State University which was visiting India in connection with the establishment of IIT/Kanpur, also visited the Department in the spring of 1961. Their impressions on the ECE Department and its programmes which were published in the Proceedings of the IRE (Box J) were highly laudatory. Another important event in this period was the gift of a bust of Heinrich Hertz from the Govt. of West Germany, which was formally installed in the foyer of the Department. Prof. Aiya not only brought cohesion among the various laboratories and teaching/research programmes in the Department, but also, he contributed a great deal to build up comradery among the students, the faculty and the supporting staff. The setting up of an ECE club, organising a number of cultural programmes, picnics, festival cricket match, etc. were indeed well appreciated by one and all. Another major programme in the period was the international Antenna Symposium arranged for the first time at the Institute, which attracted wide attention.

I EXTRACTS FROM J C GHOSH COMMITTEE REPORT (1955)

Main activity: 3-year DIISc (ECE) Course; 110 students trained during 1948-55.

Recommendations: DIISc (ECE) not to be closed, but to be strengthened; Reputed Course; Excellent training; Strong foundation for PG students; Admissions to be increased by 100% to meet the growing demands in the II plan period.

Launch PG Courses: Specialization in Electronics Engg, US&MW Engg. Line Comm. Engg, Acoustical Engg. based on AICTE grants received & new building available (since 1951).

Current research: US&MW Engg, Radio Wave propagation, Directional antennas, Pulse Techniques, Line communication, Acoustics; 40 papers published (1948-55)

4. NEW DEVELOPMENTS

4.1 On Prof. Aiya's departure from the Institute (1969) to take up a new assignment in the Govt. of India, Prof. B.S. Ramakrishna became the Head/Chairman of the Department. This was a period of major changes nationally and internationally and the Department responded to these in an admirable way.

New activities were launched in the Department in this period, viz., the Centre for Information Processing by DRDO under the ADGES programme of the Govt. of India (1971) and the Centre for Electronics Design Technology (CEDT) an Indo-Swiss project (1974). Many new faculty members joined the Department and new research and academic programmes were introduced. Of particular importance were research in Digital and Optical Signal Processing, SAW Devices, and post-graduate Diploma courses, both under CIP and CEDT. Besides, both the B.E. and M.E programmes were considerably updated and the unit system of instruction was introduced. Also, Ph.D. and M.Sc. (Engg) research was greatly enhanced. Sponsored students under QIP & External Registration Programme were also admitted for research conferments. These activities brought further prestige to the Department, as can be seen from the extracts of yet another Govt. of India Review Committee headed by Prof. T.R. Seshadri.

While the CIP was closed down in 1979, the CEDT was expanded and strengthened in the following years to become a leading Centre in Electronics Design and Technology, and a model for establishing similar centres in India and Abroad.

4.2 After Prof. B.S. Ramakrishna's term was over the mantle of leading the Department fell on Prof. N. S. Nagaraja who provided a mature and enlightened guidance and support to the various programmes. This was followed by Prof. N.N. Biswas, Prof. (Mrs.) R. Chatterjee, Prof. B.S. Sonde, Prof. M. Satyam, Prof. A. Kumar, Prof. V.U. Reddy in the succeeding years and now Prof. A. Selvarajan. During each of these periods, the Department has moved ahead on the strong foundation laid by its preceding Heads/Chairmen and has always strived to keep its flag flying high.

The great heritage of the Department has been its major strength. With the many sided achievements and academic/research contributions in ECE for over 7 decades, the Department is now looking forward to the next millennium with dedication and promise to enhance its contributions and reach in the service of the nation.

(See Table 1 and Figs 1-6 for growth of the Department)

Compiled and prepared by Prof. B.S. Sonde, based on personal discussions with and writings of (late) Prof. K. Sreenivasan and (late) Prof. S.V.C. Aiya. In pursuit of Excellence - A History of Indian Institute of Science by B.V. Subbarayappa (Tata McGraw Hill, 1993) and Platinum Jubilee Souvenir of EE Dept. (Dec. 1986) also were useful here. All the Contributions are gratefully acknowledged. (ECE Golden Jubilee Organising Committee).

J. IMPRESSIONS OF USA DELEGATION

TRAVEL STILL BROADENS. We return to report once more on travel - this time primarily to India to visit educational institutions.

Our first impression was of people, people everywhere - hands that must be kept busy, and mouths which must be fed. In talking with Indian engineers, and long-time British and American residents, we were told that India is indeed making progress on its population and economic problems. Our second impression was of the excellence of people in government and in colleges sure of their direction and that of India. In engineering education there was realization of the need for change, but some doubt as to the methods to be employed in bringing it about.

This doubt was not so apparent at a bright spot in the educational field - the Indian Institute of Science at Bangalore. We were taken in hand by Dr. S.V.C. Aiya, Head of Electronics and Communications, and also immediate past president of the Institute of Telecommunications Engineers of India. A fast tour revealed excellent research

facilities and plans for more. Areas of activity included atmospheric noise, artificial dielectrics, surface-wave transmission, information content of languages (for which India provides ample material), and some very pure acoustic- research on the Indian drum. We say pure, since the results are not likely to be applied to drum design, especially when the research shows the design produced by 2000 years of empirical effort to be correct!

Being a professor-part time we willingly accepted Dr. Aiya's invitation to address a meeting of students, faculty, and Bangalore communications engineers, and we can at least report that the event was enjoyed by the speaker.

Bombay, Madras, Calcutta, Delhi all were points of educational interest and the Taj Mahal surpassed all words or pictures. We returned ready to go again.

John D. Ryder

(Reproduced from Proc. IRE, 49, 11, p.1613, November 1961)

K. EXTRACTS FROM T R SESHADRI COMMITTEE REPORT (1971)

Recommendations: BE Course to be broad based; Newer areas to be considered. ME Course to be of 2 years duration. BE/ME teaching to be reoriented to include a large basic science component. 1 year Course in peripheral fields to be introduced for research students.

Current research: Acoustic standards, Architectural acoustics, Atmospheric radio noise studies, Random vibrations, Statistical theory of communication, Transistor circuits, Wave propagation antennas and microwave techniques.

Future: Research and advanced instruction to be emphasized.

Table 1. Progress of ECE Teaching Programmes at the Institute

Year	Programme	Year	Programme	Year	Programme
1911	Electrical Technology (ET) Dept. set up; Systematic lectures and training in ET started; Post-B.Sc. 3-years Course launched; Certificate of Proficiency Award to successful students.	1958	Award of Degrees in place of DIISc at IISc; BE (ECE) = DIISc; ME (ECE) = DIISc (PG)	1975	A new 1-year DIISc (PG) Course launched for sponsored BE(ECE)/MSc (Phy) Degree holders; Specialization; Electronics Design and Technology; This Course upgraded to M Tech (ED) since 1987.
1923-25	Planning and setting up "Wireless Laboratory" in ET Dept. for training and research in electronics and radio; Courses in electronics and radio introduced for ET students in final year; First time in India.	1963	Restructuring ME (ECE) based on the Thacker Committee Recommendations; Emphasis on Mathematics, Materials Science and Technology and Instrumentation as core subjects; Rigorous theoretical/experimental analysis and research/design oriented project work as part of curriculum; Course duration : 2 years.	1981	Introduction of 7 point Grading System in lieu of earlier 5 point Grading System, for better resolution in grading.
1928-29	Wireless Laboratory renamed as Electrical Communication Engineering (ECE); Section Supplementary course (1-year) in ECE launched for ET/BE graduates.	1970	Restructuring BE/ME programmes at IISc under the unit system; Credits fixed for theory/practicals/project work; Average term load: 16 credits; Flexible Curriculum: Core, Electives, Project work; 5-points Grading System in place of marks system; First time in India.	1983	Restructuring ME (ECE) based on the Nayudamma Committee Recommendations; 3 Semester (1 1/2 year) programme - emphasis on advanced level courses and project work; Qualifying thorough GATE essential for admission; A new 4-year Post-B.Sc. ME (Int) (ECE) course launched; First time in India ; Post-B.Sc. 3-year BE(ECE) continued for the time-being.
1932	Post-B.Sc. 3-years ECE course launched in ET Dept.; First full-time ECE course in India.	1971	Centre for Information Processing (CIP) set up in ECE Dept. sponsored by Min. of Defence. (CIP continued until 1979).	1986	Post-B.Sc. 3-year BE (ECE) course of long standing phased out.
1946	ECE Section/upgraded to ECE Dept.	1974	A new 1-year DIISc (PG) Course launched for sponsored BE (ECE)/MSc (Phy) Degree holders; Specialization: Digital Communication & Data Processing.	1991	Electrical Sciences (ES) Divisional Review of ME (Int) Course; Strengthening and Restructuring Course work by introducing Divisional core subjects, specifying new Departmental Core subjects, addition of new electives and providing 1 full year for project work.
1947	Course work evaluation based on examinations and award of marks commenced at IISc; Diploma of IISc (DIISc) award in place of earlier Cert. of Prof.	1974	Centre for Electronics Design & Technology (CEDT) set up in ECE Dept. supported by DOE, UGC, SDC (Indo-Swiss Agreement), to train design engineers and technologists needed in electronics industry. First time in India ; CEDT now a full-fledged Centre in IISc since 1983.	1996	Divisional Review of ME and ME (Int) courses in ES Division; Decision to phase out ME (Int) (ECE) course, strengthening of ME (ECE) course and launching new ME Courses in emerging areas jointly with other Depts/Centres.
1956	DIISc (PG) in Electronics Engg/Ultra Short and Microwave Engg/Line Comm. Engg of 12 months duration for DIISc (ECE)/BE(ECE) Degree holders; Advanced level Courses, Project Work, Industry/R&D Lab training emphasized; First ECE PG Course in India. Deemed University status for IISc.				

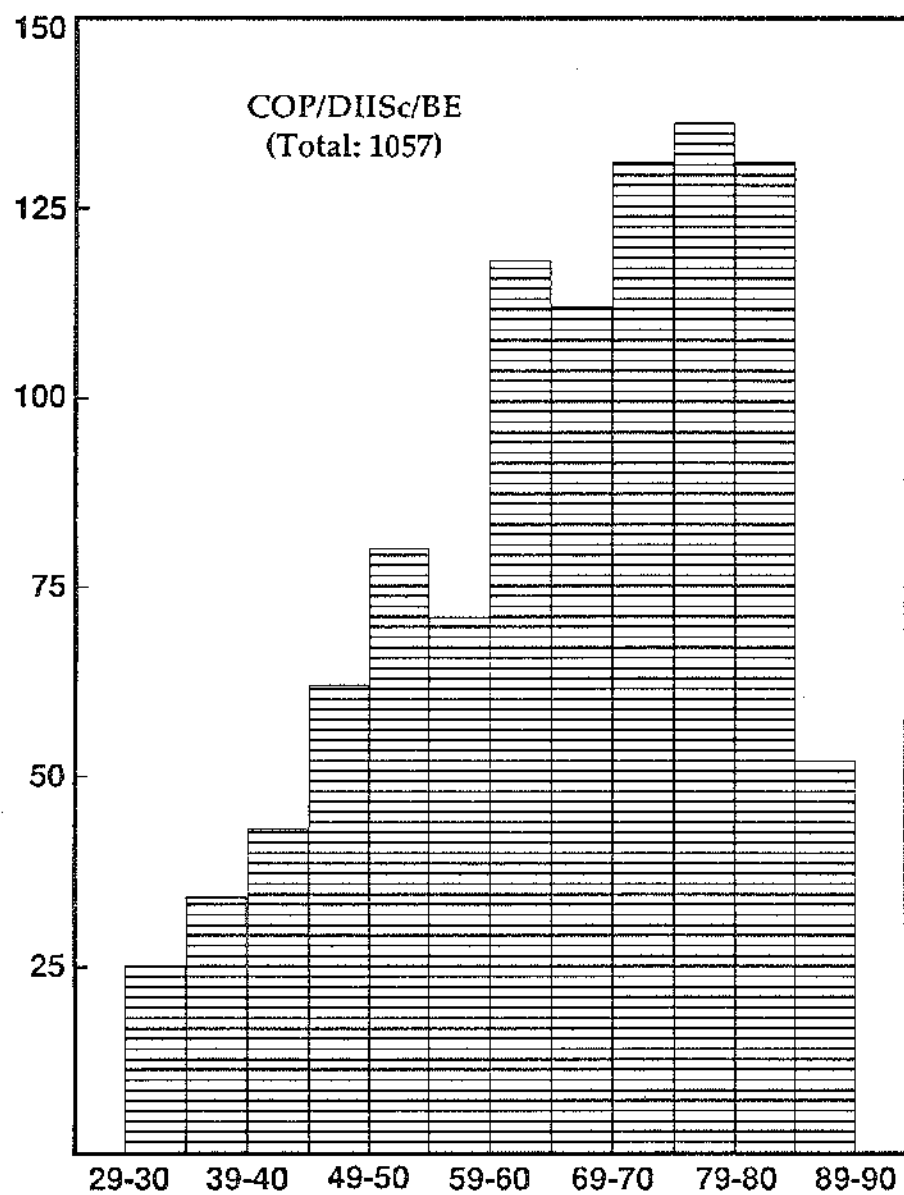


Fig. 1. Progress of BE(ECE) conferments

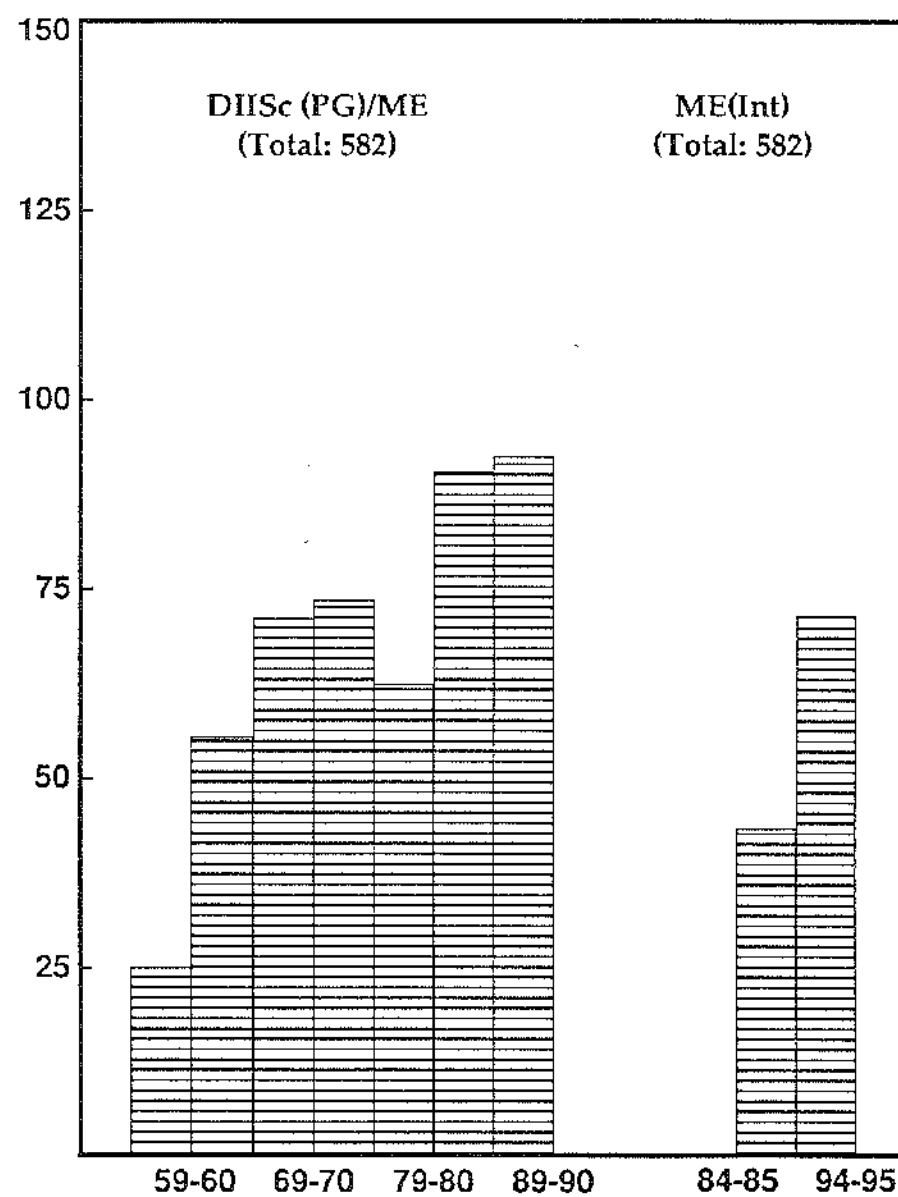


Fig. 2. Progress of ME(ECE) conferments

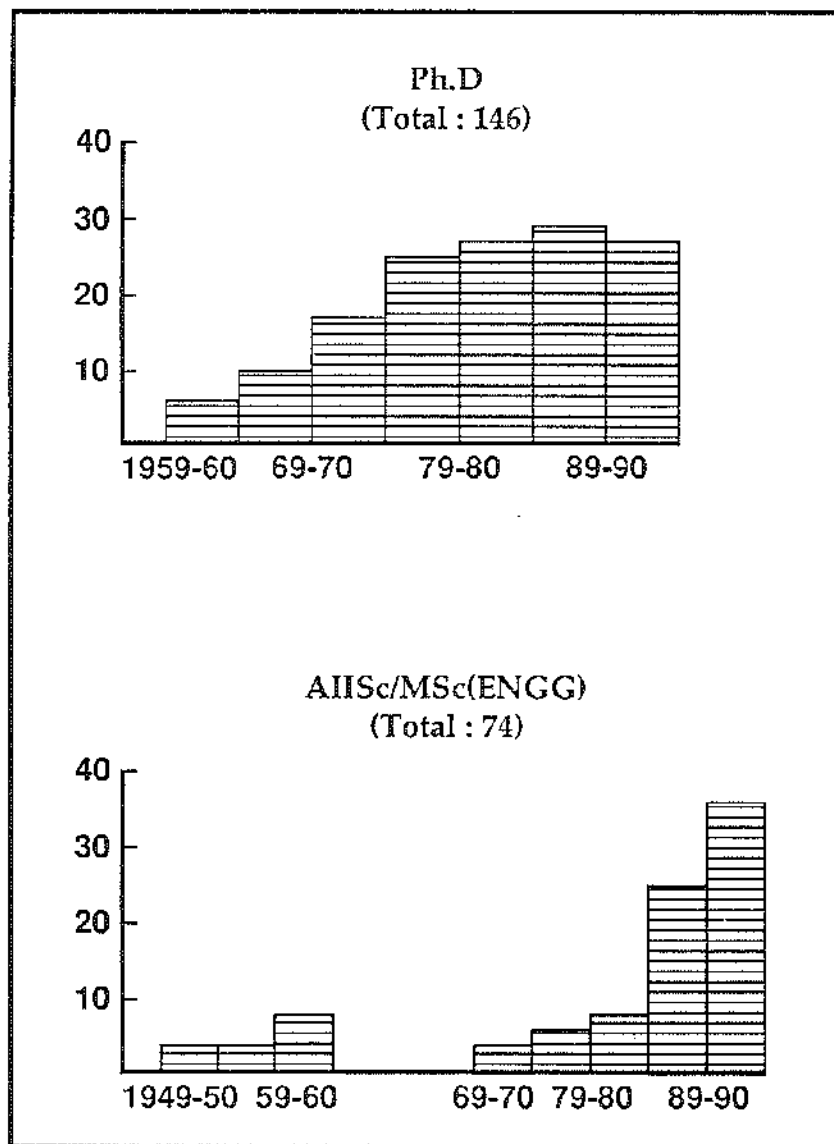


Fig. 3. Progress of ECE Research conferments

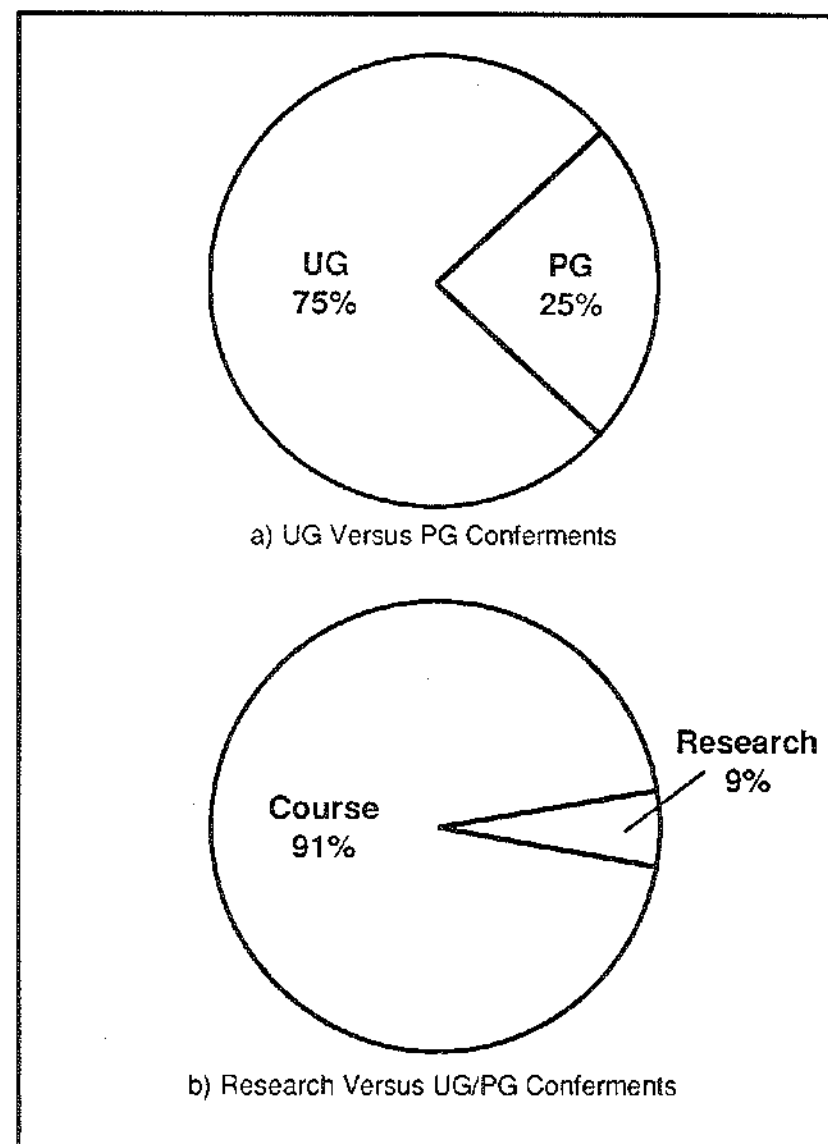
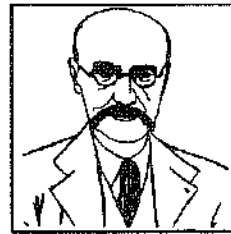


Fig. 4. Breakdown of Course/Research Degrees Conferred

Fig. 5 ECE / ET AT THE INSTITUTE : A CHRONOLOGY

ET

1908-22 Alfred Hay
Prof. & Head



1911 Establishment of ET Dept

1923-30 J K Catterson-Smith
Prof. & Head



1931-34 F N Mowdawalla
Prof. & Head



1936-42 K Aston
Prof. & Head



1944-47 S P Chakravarti
Prof. & Head



ECE

1923-25 Wireless Laboratory setup

1928 Redesignated as ECE Section

1928-32 S R Kantabet
Asst. Prof. & Section i/c



1932-44 K Sreenivasan
Asst. Prof. & Section i/c



1946 Establishment of ECE Dept

1946-47 N B BHatt
Asst. Prof. & Dept. i/c



1947-59 K Sreenivasan
Prof. & Head



1959-69 S V C Aiya
Prof. & Head



Fig. 5 (contd.)

ECE

1969-74 B S Ramakrishna
Prof. & Head/Chairman



1971 Establishment of Centre for
Information Processing (CIP)*
(B S Ramakrishna Prof. i/c
1971-79)



1974-77 N S Nagaraja
Prof. & Chairman

1974 Establishment of Centre for
Electronics Design and
Technology (CEDT)
+ (B S Sonde
Prof. i/c 1974-81)



1977-78 N N Biswas
Prof. & Chairman

1978-79 B S Ramakrishna
Prof. & Chairman



1979-81 R Chatterjee
Prof. & Chairman

ECE

1981-85 B S Sonde
Prof. & Chairman



1985-88 M Satyam
Prof. & Chairman



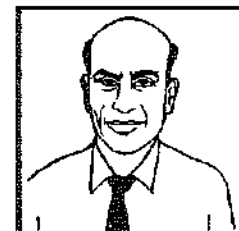
1988-92 A Kumar
Prof. & Chairman



1992-95 V U Reddy
Prof. & Chairman

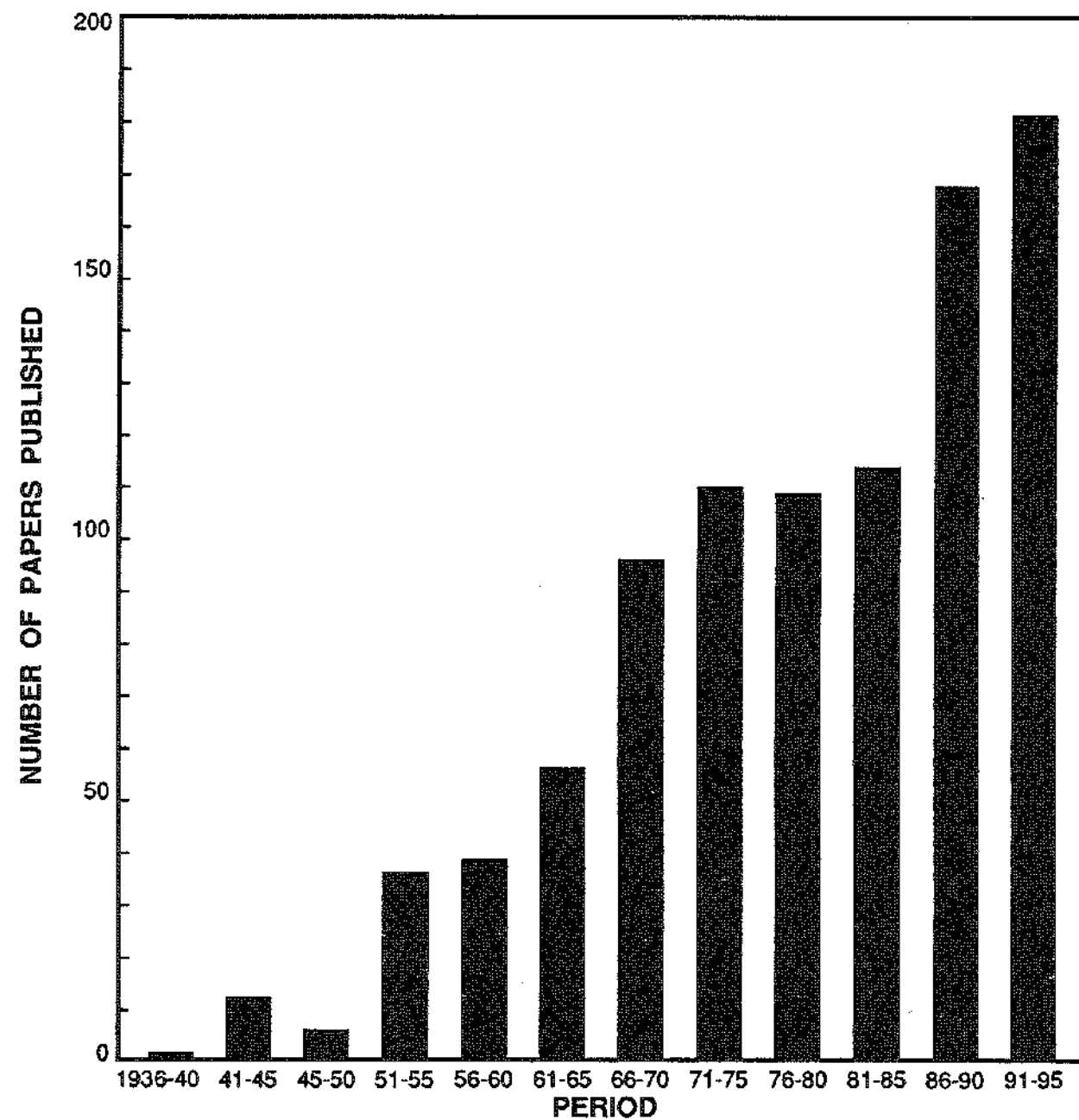


1995- A Selvarajan
Prof. & Chairman



* CIP closed down in 1979 + CEDT now an independent centre.

Fig. 6. Growth of ECE Publications



2. ECE - IN RETROSPECT

1. INTRODUCTION

1.1 Universities are places which make exacting demands on the intellectual resources of the students and the teachers alike. They are also the places which create bonds of friendship, mutual regard and affection which last a lifetime. On both these counts, we, the alumni of the ECE Department of IISc are singularly fortunate. While the high standards of achievement set by the founding fathers of the Institute and assiduously nurtured by succeeding generations have stood us all in good stead in our professional careers, the bonds of friendship have been a great source of joy. I am yet to meet an ECE student who does not have happy memories of the good days spent at the Institute or does not recall with genuine pleasure not only the scholarship of the teachers, but also their fads and foibles. The teachers cherish with equal warmth the contributions of students who passed under their guidance. The article, the material for which was called from various sources including several alumni, is a trip down the memory lane (See Box A) as well as a tribute to the ECE Department and the great traditions established by it.

2. SOME REFLECTIONS

2.1 Prior to the birth of the ECE Department, training and research in the areas of electronics and communication were carried out in the Department of Electrical Technology (ET). Students with a Bachelor's degree in physics and mathematics were admitted to the ET Department for a 3-year course leading to the award of the Certificate of Proficiency in Electrical Technology. About 10-12 of these students branched off for specialisation in communication in the 3rd year. A separate Department of ECE

was carved out of the ET Department in 1946 for reasons that are some what obscure and apparently not entirely academic. Professor S. Sampath, a distinguished alumnus, who was then a 2nd year student in ET, recalls a traumatic incident associated with the birth of the ECE Department. Professor S.P.Chakravarti tendered his resignation from the post of the Head of the Department of Electrical Technology as a mark of protest against the decision made by the Institute to split the ET Department and 'relegate' him to the post of the head of the newly created ECE Department. In his farewell speech, delivered in the presence of the then Director of the Institute, Sir J.C.Gosh, Professor Chakravarti stated his view that the unilateral decision of the Institute authorities to separate ET and ECE was a grievously wrong one that would prove detrimental to both the disciplines! What would have happened if the bifurcation had not taken place would never be known; but fortunately, the two Departments with separate identities have continued to flourish in a spirit of cooperation.

2.2 Dr. N.B.Bhatt, who later became the Founder Director of the Solid State Physics Laboratory at Delhi, took charge of the new ECE Department pending the appointment of the permanent head. Dr.Bhatt had come to the Institute from the M.I.T., USA, with a reputation for his work in electro-acoustics, and taught applied electronics besides the subject of his specialization. He advised the young Sampath, who had initially opted for the ET stream to change his option to ECE. The young man took the advice, fascinated as he was by the style of Dr.Bhatt's teaching and the quality of his mind, and has never regretted it. This is just one example of the qualities of head and heart of the great teachers of the Department that enabled them to win the trust and respect of

the students.

2.3 Another experience, again involving Dr. Bhatt, has been narrated by another old student Dr.D.L.Subrahmanyam, a leading consultant in electronics and electroacoustics. After getting his Master's degree in applied physics, Subrahmanyam joined the ECE Department as a research scholar and worked in 1946 on the project in electronic instrumentation under the guidance of Dr.Bhatt. The project was to design and build a logarithmic amplifier for displaying the exponential decay of sound in enclosures as a straight line on the CRT screen. The unit was built and named as Reverberograph. After completion of the project, Dr.Bhatt requested Sir C.V.Raman, then Head of the Department of Physics, to visit ECE Department for a demonstration. Much impressed by the demonstration, Sir C.V.Raman, in his characteristic enthusiasm, persuaded Dr.Bhatt and his student to write a paper for the Journal of the Indian Academy of Sciences within 48 hours to beat the deadline for publication. The paper was communicated to the journal by Sir C.V.Raman himself, and was published. This demonstration of mentorship and encouragement made a tremendous impact on the young Subrahmanyam and spurred him on to scale still higher peaks in his scientific career.

2.4 Soon after the formation of the ECE Department, the Certificate of Proficiency Course was converted to a Diploma (DII Sc) course, and with this change, a system of evaluation of students' performance based on examinations and award of marks commenced at the Institute. The curriculum for the ECE course still had much in common with ET. In its early years, the ECE Department also shared many facilities like the

workshop, laboratories, and lecture halls with the ET Department which was then located in the building now occupied by the Department of Physics. By today's standards, the ECE Department then was miniscule in every sense—about 15 students in each year, 4 or 5 faculty members, and about half a dozen rooms which served both as laboratories and office rooms for the staff. In the words of Professor B.S.Ramakrishna, who served on the faculty of the Department with distinction for over 30 years, the annual budget of the ECE Department in those days would not fetch today a lunch for an international seminar it hosts. Yet, this small corner in Bangalore attracted some of the choicest students from all over the country. The process for selecting the students was quite simple. At that time there were some 20-25 universities in India, and there was some kind of a fuzzy grouping of them into north, south, east and west zones. The top-ranking B.Sc.(Hons) or B.Sc. students of each zone were selected and offered admission. Much of the teaching was in general engineering subjects, and communication engineering subjects figured only in the final year. The utmost importance was attached to the conduct of laboratory experiments. Students had plenty of homework to do; but there were few examinations, possibly one in each subject at the end of the year. A great deal of importance was also attached to the practical training programme which occupied a substantial part of the summer vacation every year. The most common training centres, which were also the places where most students eventually found employment, were All India Radio, Overseas Communication Service, Army workshops, and later government factories like BEL, ITI, and HMT, and R&D establishments such as LRDE, CIL, and NAL. After the completion of the 3rd

phase of practical training, the students got the Diploma DIISc(ECE). Being an offshoot of the already well-established DIISc in ET, there was no difficulty with regard to its recognition. Mr. M J Viswanathan, who belongs to the 1954 batch, vividly remembers the interviews conducted on 8th April 1954 in the library tower for the post of Technical Assistant in AIR. He and most of his classmates were selected and given postings. After a distinguished career in AIR/DD, one example of a few thousand success stories of the ECE Department. Mr. Viswanathan retired as Chief Engineer in October 1989.

2.5 The outstanding feature of the DIISc course, and perhaps of all courses offered by the Institute at that time, was the relaxed atmosphere. The students must have found the absence of tension that goes with the system of frequent examinations, and the presence of an excellent library, good residential and recreational facilities, delicious food, and a salubrious climate, far more invigorating intellectually than the competitive atmosphere of today. No wonder that many students considered life at the Institute was like living in Paradise. The scholarship, enthusiasm and dedication of teachers like D.J.Badkas, H.N.Ramachandra Rao, N.B.Bhatt, K.Sreenivasan, S.K.Chatterjee, and later S.V.C.Aiya, B.S.Ramakrishna, S.Sampath, N.S.Nagaraja and N.N.Biswas made a tremendous impact on their minds. They were also enthused by the fact that the alumni of yester-years were in good positions and known to be doing creative work in several prestigious organisations. Admittedly, the students then worked less hard than their present-day counterparts, but they went out of the Institute exuding confidence that they could handle any job that might be assigned to them.

2.6 The general staffing pattern of the Institute until about the mid-sixties was one Professor one or two assistant professors, and a few lecturers in each department. The professor was, naturally, the head of the department and had complete sway over its management. Professor K.Sreenivasan, who had been in charge of the ECE section of the ET Department for 12 years, took charge as the first Head of the ECE Department in 1947, after the brief stint of Dr.N.B.Bhatt. Professor Sreenivasan was a multifaceted personality who defies categorisation in conventional terms. He was fond of saying, 'Research is an integral part of the life and work of the Department', and then he would say almost in the same breath, 'Research is your own business, but teaching is our moral responsibility'. He also never lost an opportunity to declare that he had not done any research for ages. Notwithstanding these contradictions, his phenomenal dedication to work and loyalty to the Institute are undisputed. It is known that, when his father died one morning, he performed the cremation ceremony and came to the Department to resume his work. None of his students can ever erase from their minds the image of Professor Sreenivasan, clad in a spotless white khadi suit, standing at the entrance to the ECE Department at 6.28 every morning, for he used to conduct his classes between 6.30 and 8.00 in the morning, six days a week. He was very keen on his students having a firm grasp of the fundamentals. Series and parallel resonance was one of his favourite topics, and he would insist on the students drawing the graphs with different LCR values.

2.7 Professor Sreenivasan was greatly interested in new technical developments. He had many friends among the officers of the Royal

Air Force (RAF), mostly Cambridge graduates, working in radar and communication. They would meet him in the Department frequently during the II world war, prior to the formation of the ECE Department. He was very keen that Indians should learn about radar, called 'radio location' in those days, the technology of which was still top secret in India. So he advised his students to join the Air force. Many students of the 1943 batch including N S Nagaraja, who later became a professor in the ECE Department, took his advice and joined the Radio Location branch of the RIAF. Professor Nagaraja received training in radar both in India and in Britain during the war and later served in the Civil Aviation Department of the Government before joining the faculty of the ECE Department in 1954 and working there until his retirement in 1979.

2.8 Professor Sreenivasan had an enormous interest in laboratory buildings, gardens, lawns and roads. During a short period when he was the acting Director of the Institute, he got all the Institute roads metalled and tarred. He would ride on a steam-roller to ensure that the roads were made to his satisfaction. He is said to have remarked once that the Institute, like the earth in Hindu mythology was carried on the shoulders of eight persons. The list of eight did not include any teachers or senior administrators; but, contained mainly names of service staff. One of the names on this list was that of Mr. V Ramachar, a retired engineer who was employed to look after the maintenance of roads and buildings of the Institute, and who executed the roads project to the professor's expectations. Another person on this list was Mr. R Vijayendra, a draughtsman in ECE Department who retired recently after nearly 40 years of service. Professor Ramakrishna recalls the skill with which Mr.

Vijayendra converted sketches of any type-graphs, circuit diagrams, building or machine drawings-into masterpieces of drawings fit for the most demanding printers in the world. Numerous drawings of Ph.D thesis, technical papers and design documents in the Institute archives bear testimony to his superb draughtsmanship.

2.9 A Review Committee headed by Professor Alfred Egerton visited the Institute in 1948, two years after the formation of the ECE Department. This committee recommended the closure of the 3-year DIISc (ECE) course citing the availability of such a course at other locations in India! It recommended concentration of effort in postgraduate teaching and research in the emerging areas of radio and radar. It also noted the very meagre and mostly outdated equipment and facilities as the reasons for low research intensity in the Department. Obviously, the Institute authorities decided not to act on the recommendation to close the DIISc (ECE) course, and with good reason. The next Review Committee in 1955, which was headed by Prof J C Ghosh, came out strongly in favour of continuation of the course by recommending a doubling of the intake of students to meet the growing demand in the II Plan period. This Committee noted the high reputation of the course and commended the excellent quality of training as a strong foundation for postgraduate studies. It also noted an upswing in research activity in ultrashortwave and microwave engineering, radio wave propagation, directional antennas, pulse techniques, line communication and acoustics.

2.10 The ECE Department moved into its present building in 1951. The site for the Department building was chosen with the

intention of locating it far away from the High Voltage Engineering laboratories. A Second and probably unintended benefit of this location has been the extremely quiet and unpolluted ambiance. Professor Sampath recalls an amusing incident that occurred during the ceremonial inauguration of the new building by Prime Minister Pandit Jawaharlal Nehru. The Department had set up two demonstrations for the Prime Minister's viewing during the visit: Vibration patterns of Indian musical drums, resulting from a classical piece of research by Professor B.S.Ramakrishna, and an early warning radar set, reclaimed from military equipment used during the war, that could display echoes from the Nandi Hills, located about 50 km away from Bangalore. As the Prime Minister was watching with interest the chalk patterns on the musical drum, Smt. Indira Gandhi, who had accompanied her father, picked up an attenuator pad lying on the table and asked the Director, Prof M.S.Thacker, who was standing nearby, what it was. The latter, without batting an eyelid, said 'part of a radar set'! He did not have to explain how a radar component had found its way into the Acoustics laboratory.

2.11 A significant event in the mid-1950's was the visit of Professor V.C. Rideout from the University of Wisconsin, USA, as a Visiting Professor to the ECE Department under a programme called Technical Cooperation Mission. He taught courses on servo-mechanisms and analog computers during his stay. More importantly, he introduced analog computers as a new line of work. With the help of two faculty members N.S. Nagaraja and S Sampath, he designed and built India's first analog computer PREDA (Philbrick-Rideout Electronic Differential Analyser). V. Rajaraman,

who was a research scholar at that time, obtained his M.Sc degree by research for his work on PREDA under the guidance of Professor Nagaraja.

2.12 Another distinguished visitor to the Department during this period was Professor Norbert Wiener. He paid a week long visit in December 1955 and delivered a series of six lectures on information theory. Mr. S K Lakshmana Rao, a faculty member in the Department, was assigned the task of taking full notes of the lectures. This series of lectures was the forerunner to the course on Information Theory introduced in the curriculum of the Department and also to the information theoretic study of six Indian languages carried out by Dr B S Ramakrishna and his colleagues.

2.13 A postgraduate course DIISc(PG) in Electronics Engineering/Ultrashort and Microwave Engineering/Line Communication Engineering for DIISc/B.E. degree holders in ECE was started in the Department in 1956. It was the first postgraduate course in ECE in India, and comprised advanced level courses, project work, and industry/R&D laboratory training. Soon thereafter the Institute attained the status of a deemed University and DIISc and DIISc(PG) were rechristened respectively as B.E and M.E. The introduction of the postgraduate courses brought capital grants for the purchase of equipment and additional faculty positions. By the end of the decade, the ECE Department had about 10 faculty members. From time to time, there were also visiting professors from abroad. A full-fledged Department of Mathematics also started functioning in the Institute in the mid fifties, and mathematical instruction became a regular feature of all courses in engineering.

2.14 By the close of the decade of fifties, research had taken roots in the ECE Department in the areas of electronics, acoustics, microwaves and analog computers; but it was still largely confined to the faculty. Most of the students who joined for research left as soon as they got a job or a fellowship abroad. There was no agency to sponsor academic research or even applied research, the sole exception being a grant of Rs.1 lakh (a very tidy sum in those days) by Mr. J.R.D.Tata for research promotions through publications at that time, since research and publications were not the hallmarks of distinction in engineering. The main motivation for research was curiosity and the thrill of discovery, and perhaps a conscious or subconscious desire to achieve fame and recognition. With some people, research was a passion or a way of life, providing immense internal satisfaction. How else can one explain a phenomenon like Professor S.K.Chatterjee sitting at the same table in the library for 50 years and poring over journals past the age of eighty?

2.15 Professor Sreenivasan retired in 1959 after more than 30 years of service at the Institute. After a short gap of about 1 year, he became the Director of the Madras Institute of Technology where he served for another 13 years. Physically and mentally he remained much the same until his death in 1993 at the age of 94. There is no doubt that he loved the Institute like nobody else before or after him. He bequeathed all he had to the Institute.

2.16 Professor S.V.C Aiya took over as the Head of the Department on the retirement of Professor Sreenivasan while Professor Sreenivasan made his mark during his tenure at the Institute, the reputation of Professor Aiya as

an experimental physicist in electronics and radio science, and as an inspiring teacher and educationist preceded his arrival at the ECE Department. Before coming to the Institute, Professor Aiya had planned and set up the Department of Electrical Communications at the College of Engineering in Poona, started the immensely popular B.E course in Telecommunication Engineering, and initiated research in atmospheric radio noise and its interference to radio communication. In many ways he was a strong contrast to Professor Sreenivasan. He was a colourful person, witty and controversial, who never hesitated to call a spade 'a bloody spade'. He had a zest for life, and for cigars. According to Dr N S Jayant, one of several illustrious students of Professor Aiya, the cigars left a long log-normal trail behind him, with an attenuation of a mere 1dB/km/hour. The lectures of Professor Aiya were a lively affair, interspersed with "physical explanation" and proverbs in four different languages. He was known among his students as O.M or 'Old Man', and the old man certainly taught the youngsters a trick or two. Perhaps the most celebrated of these are two rather conflicting games, viz., 'kite flying', and 'Hitting the nail on the head', as he called them. Dr Jayant has confessed that playing them has proved crucial for his survival and sanity.

2.17 One of the first concerns of Professor Aiya was that research should not remain confined to the faculty only and that training in research must form a part of the work of the Department. He had an instinct to discover talent among students long before it would flower, and he knew how to nurture it. Proof of this is the glittering array of 18 Ph.D. students whom he guided at a time when Ph.D in engineering was a rare phenomenon.

The list of his Ph.D students, comprising such well-known names as N.Seshagiri, N S Jayant, A Prabhakar, M Satyam, and B S Sonde, reads like a veritable who's who in electronics and communication and covers an amazingly wide spectrum of expertise from electronic devices and circuits to communication and information technology. Professor Aiya also encouraged other members of the faculty to take research students. There was a significant growth in the number of research students who stayed long enough to complete their Ph.D., and soon research activity began to flourish in the areas of electron devices, circuits, instrumentation, microwaves, antennas, and acoustics, in addition to atmospheric radio noise. New laboratory buildings for research in acoustics and electron devices came up, and the Department expanded from its original single building to the present complex of three buildings. When the duration of the M.E. course was increased to 2 years in 1963, a research/design oriented project became a part of the curriculum, and the research interests of the faculty began to get reflected in the project work of the M.E. students also. Professor John Brown of the Imperial College of Science and Technology, London, and President of IEE, London during 1979-80, who visited the ECE Department several times during Professor Aiya's tenure in his capacity as the first Head of EE Dept at IIT/Delhi has the following to say, 'It would have been very easy for Professor Aiya to have concentrated entirely on his own personal research, but he chose the more difficult, and ultimately the more rewarding, route of using his energies to encourage others to establish new lines of research. A measure of the success of a laboratory director is not the quality of his own work, but rather the extent to which he has motivated his staff to operate at a level to which

they would not themselves have aspired. Professor Aiya's rating on this measure must indeed be a high one'.

2.18 During the sixties there was a great demand in the country for trained Ph.D students as well as experienced faculty members from several newly established research laboratories and IIT's. The Institute was naturally the hunting ground for scientific talent. Many faculty members, particularly at the middle level, who were uncertain about the prospects of their advancement locally, began to leave the Institute. The initial reaction of the Institute management was that supplying trained teachers to the country was as much a function of the Institute as supplying trained Ph.D students. But, it was soon found that by the time the Institute decided to recruit a candidate at a certain level, he got a post at the next higher level at other institutions. The Institute authorities realized that the Institute faculty must be provided opportunities to advance their career at the Institute itself. Thus began the scheme of merit promotions which brought with it the entire paraphernalia of periodic assessment, peer review, etc. Tenure appointments gave way to 5-year contract appointments renewable upon satisfactory performance. The atmosphere in which the good and the mediocre coexisted had disappointed once and for all.

2.19 An important fact of life during Professor Aiya's time was the ECE Club. Professor Aiya encouraged the students to organise get-together and parties and participated enthusiastically in these activities. The club continued to function for a few years after Professor Aiya's departure and then gradually folded up.

2.20 The year 1969 marked the end of an

important period for ECE Department. In this year, Professor Aiya left the Department to take up the Directorship of NCERT at Delhi, and Professor S K Chatterjee retired leaving his wife Rajeswari Chatterjee and student Dr. Anand Kumar to carry on the legacy of teaching and research in electromagnetics and microwaves. Professor S K Chatterjee continued his labour of love at the library of the Institute for more than two decades thereafter, almost until his last days. His profound knowledge of and passion for his subject were reflected in the animated discussions that he often had with his students and colleagues. The intensity of his devotion to Science was marked by the warmth of his affection for students. He must have been aware of the difficulties of most students in unraveling the mysteries of an arguably difficult subject like electromagnetic theory, for he was rather generous in his evaluation of answer scripts. But this generosity led to the circulation of some amusing stories in the student community. Gullible students were often advised by some of their seniors that the number of marks awarded by Professor Chatterjee were directly proportional to the number of filled pages in the answer script. One story, which must be taken with more than a pinch of salt, was that in one examination conducted by him the highest marks were scored by a student who submitted a fat bunch of papers stapled at both ends and covered with writing only on the first and the last pages. Such are the joys of academic life!

3. A NEW ERA

3.1 Professor B S Ramakrishna succeeded Professor Aiya as the Head of the ECE Department. But soon thereafter, the position of the Head of the Department was replaced by the

Chairman of the Department. A Committee of Professors headed by the Chairman started looking after the various functions which were earlier managed more or less singly by the Head of the Department. While Professors Sreenivasan and Aiya were the architects of the ECE Department during its formative years, Professor Ramakrishna, who had been a part of the Department almost throughout this period, sustained and consolidated its growth. Professor Thomas Kailath, Visiting Professor from Stanford University and a long-standing friend of ECE Department, and Professor Ramakrishna were instrumental in procuring for the Department a large long-term research grant from the Ministry of Defence for starting a research centre called Centre for Information Processing (CIP) in 1971. The CIP, headed by Professor Ramakrishna, had a mandate to undertake research projects in the areas of acoustical and speech signal processing, optical signal processing, and surface acoustic wave devices. Another project on microwave tunable devices based on YIG single crystals was also taken up at a later stage, in collaboration with some faculty members in the Department of Inorganic and Physical Chemistry. Although the CIP ceased to exist in 1979 due to the stoppage of grants, research in the areas of signal processing and photonics had taken firm roots by then, and continued to flourish in the Department. In the meanwhile, another grant for a research project in underwater acoustics had been received from the DOE (Department of Electronics). These projects heralded the era of sponsored research. Since then, sponsored research has grown considerably in strength and has now become a major source of funding for the Department (See Table 1).

3.2 The early seventies witnessed a massive

influx of faculty members into several departments of the Institute, including ECE. Among those who came to the ECE Department on this wave were N N Biswas, T A Raju, S V Pappu, P S Naidu, D N Bose, S G Joshi, V K Bhargava, A Selvarajan, and P S Moharir. Several of them came from outside India following the visit of a search committee consisting of the Director, Professor S Dhawan and a few senior Professors of the Institute to several universities in the U.S.A, UK, and Canada. Some of the new entrants joined the regular faculty of the Department, while the others got appointed in the CIP and acted as adjunct faculty. They were a mix of engineers and physicists, in keeping with the tradition of the Department. The Department was enriched by their wide spectrum of expertise, new ideas, and varied personalities. Dr Joshi, in the traditional Indian dress of kurta and pyjama, with his ever-ready smile and his zest for Hindi, attracted the attention of one and all. He spoke chaste Sanskritised Hindi (à la the characters of the popular television serial Mahabharat), and took great pains to converse with everyone in that language. Several technical reports on SAW devices written by him in both English and Hindi are lodged in the departmental library. Ironically, after a stint of about 5 years in the ECE Department, he went back to U.S.A. Dr Bhargava regaled everyone with his witty remarks, irrelevant jokes and hearty laughter. Dr Moharir, a fresh Ph.D. from IIT Kanpur with a wide range of interests and a measure of diction, would always have the last word in any discussion. For Professor Biswas, it was a homecoming. He had already made his mark in the world of computers, and has continued to work in the same intense but quiet way after his return to Bangalore and even after his retirement. Professors Pappu and Raju, stalwarts in their

respective fields of optics and microelectronics, had contrasting personalities. While Professor Pappu could not tolerate incompetence and bureaucratic red tape, Professor Raju took everything in his stride with a shrug and a smile. Dr Bose, who is now a Professor at the Materials Science Centre at IIT Kharagpur, recalls with pleasure his association with Professors Raju and Satyam in their joint efforts to build up the electron devices laboratory, and with Dr T S Vedavathy of ECE and Professor A R Vasudeva Murthy and Dr N Kutty of the IPC Department in the YIG project. Dr Bose had the privilege of 'looking after' Professor John Bardeen, Nobel Laureate and co-inventor of the transistor, when the latter paid a 3-week visit to the Institute. One of the pleasant memories of Dr Bose is about his 'brave deed' of participating in a tour of Kodaikanal with two bus-loads of students, organised by the ECE Club. The only members of the 'early seventies' group still with the ECE Department are Professors Naidu and Selvarajan, the others have either retired or left after staying here for varying periods of time. Professor Naidu, a geophysicist, and Professor Selvarajan, a specialist in optics, came in as custodians of the two extremes of the frequency spectrum. They also came from opposite ends of the globe. While Dr Naidu flew in all the way from Canada, Dr Selvarajan, just walked across from the Department of Physics, barely half a kilometer away.

3.3 A Centre for Electronics Design Technology (CEDT) was started in the Department in 1974 under an Indo-Swiss Agreement, with the support from DOE and UGC to train engineers and technologists for the electronics industry. The CEDT offered a postgraduate Diploma Course in Electronics Design and Technology primarily for

industry-sponsored candidates, and also undertook product design for the electronics industry. Nurtured by Professor B.S.Sonde in its early years, the CEDT became a model for other similar centres started elsewhere in the country and abroad. The CEDT moved out of the ECE Department after attaining the status of an independent centre in 1985, and the postgraduate diploma course was upgraded into an M.Tech Course in 1987.

3.4 Professor Ramakrishna was the architect of a major change in curriculum organisation that occurred in the Institute in 1970. The entire teaching work of the Institute was organised on the basis of the so-called unit system according to which each course carried a certain number of Credits (usually 3, but in some cases 2 or 4) proportional to the total number of effective contact hours. Every course was open, in principle, to every student of the Institute to take and count towards his/her credit. The average course load of a student was fixed at 16 credits per semester. Each department prescribed a set of courses as core or compulsory courses for students working towards a degree in that department. The students could make up the balance of Credits required for the degree by choosing courses of their liking. This system has proved so successful that it is still being followed with only minor variations. That it offers great flexibility to the students to design the curriculum according to their interest is obvious. It also offers the teachers the freedom to float new courses in tune with their research interests or to update existing courses to keep abreast of new developments. Thus, the students get exposed to new ideas, imbibe the research atmosphere of the Department, and are equipped to take up research/design projects in areas of current

interest.

3.5 Professor Ramakrishna relinquished the Chairmanship of ECE Department in 1974. He remained in charge of the CIP till the end, and in charge of the acoustics laboratory until he left the Department in 1980 to take up the Vice-Chancellorship of the University of Hyderabad. During his tenure of more than three decades in the Department, he successfully built up a school of research in acoustics. He made pioneering contributions to architectural acoustics. One of his proudest achievements is the acoustical design of the huge Centenary auditorium of Madras University, a masterpiece which made architects and builders in India aware of the importance of acoustical design.

3.6 Following professor Ramakrishna, the position of chairperson of the Department has been held successively by Professors N S Nagaraja, N N Biswas, R Chatterjee, B S Sonde, M Satyam, A Kumar and V U Reddy roughly for a period 2-4 years each and by Professor A Selvarajan who is the current Chairman.

3.7 The post-seventies period saw the march of the Department towards democratisation. Several factors contributed to this process. The abolition of the position of the Head of the Department meant that all important decisions affecting the Department were taken by a Committee of Professors instead of by a single individual. The introduction of the unit system gave faculty members freedom, within certain broad guidelines, to introduce new courses matching their research interests. The easier availability of grants from sponsored research projects (Table 1) meant that individuals had greater freedom in planning their research

programmes and goals. These changes gave better opportunities for individual talents to flourish, though at the cost of a certain degree of cohesiveness that marked the older dispensation. Democratisation also shifted the responsibility for the growth of the Department more to the individual faculty members from the Head of the Department.

3.8 The 3-year DIISc/B.E Course of the ECE Department has been one of its biggest success stories, as evidenced by the high proportion of top positions in the ECE field in academic institutions, R&D establishments, and industry held by the ECE alumni of the Institute. Admissions to this course were highly sought after. This state of affairs began to change when the University Grants Commission reduced the duration of the B.E course in other universities from 5 years to 4, while the duration of the B.Sc course continued to be 3 years. This meant that the number of extra years that a student had to put into get a B.E degree via the B.Sc.-B.E route as compared to the direct route increased from 1 to 2. The rapid increase in the number of institutions and universities offering courses leading to a Bachelor's Degree in ECE meant that fewer good students were willing to spend 2 extra years to get a B.E degree from IISc in spite of the high reputation of its ECE Department. The Institute responded to this situation in 1983 by replacing the post B.Sc. 3-year B.E course by a unique post B.Sc. 4-year M.E course, called the integrated M.E, thus reducing the disparity in duration at the M.E level from 2 years to 1 1/2 years. But this was still not enough to attract many bright students in a rapidly changing employment scenario, in contrast to the regular 1 1/2-year M.E Course (for graduates in engineering) which continued to attract the best

students. In order to optimally utilise the talent and resources of the Department, and to meet the growing demand from the industry for specialists in the areas of tele communication, signal processing and microelectronics, it was decided this year to close down the 4 year integrated M.E programme, and from 1997-98 start 3 new 1 1/2 year M.E Programmes in telecommunication, signal processing and microelectronic systems. The first of these courses will be run exclusively by the ECE Department, while the other two will be run jointly with the EE Department and the CEDT respectively.

3.9 In research, the areas of electron devices, circuits, communication, microwaves, antennas and acoustics have been cultivated by the Department for a long time. New areas such as signal processing, switching theory, communication networks, and photonics have been added to the list in recent years. The expansion of research activity has been helped to a great extent by several sponsored projects including major ones in hybrid microelectronics, telematics, microwaves, networking, photonics and ocean acoustics, funded by various agencies of the Government.

3.10 As one looks back at the years that have passed, one recalls vividly not only many old students and faculty members but also other members of the staff who served the Department with great devotion and loyalty. Messrs. G Selvappullai, Rangaswamy Iyengar and N Srinivasa Rao in the Office, Messrs L Abel, Namdev Rao, and U Sadananda Rao in the Workshop, the draughtsman Mr. R Vijayendra, Mr. Gopalan Nair and Mr. M Jani who operated the duplicating machine and also ran the popular

coffee club, and Mr. Hussain who was always busy with the ammonia printing machine, are known to many. They and many others like them were always ready with a smile to do that little bit of extra work whenever the need arose. For this, the Department must thank the founding fathers of the Institute who established the fine traditions that allowed all sections of the employees to thrive and give their best. The main ingredients of these traditions are academic freedom for the faculty and the students, concern for the welfare of the employees and an enlightened interpretation of rules and regulations.

3.11 While the Department has achieved a fair degree of success in its mission of training students and carrying out basic research, applied research is an area where its efforts have been sporadic and not so successful. In this context, it would not be out of place to recount an incident that occurred nearly 25 years ago. When the Indo-Pakistan war broke out in 1971, sanctions imposed by the western countries shut off the sources of supply of several vital components. A major electronics company looking for indigenisation of component manufacture approached the ECE Department for the development of quick heating cathodes required for RF pentodes used in military equipment. Professor M Satyam and his associates in the electron devices laboratory, known as the tube laboratory at that time, were asked to apply their minds to the problems and come up with a quick solution. They worked hard to understand the basic parameters controlling the heating time etc., and succeeded in designing and fabricating quick heating filaments. In the meantime the war was over and imports were freely available again. The giant electronic company quietly changed its requirement from a quick heating filament to

a quick heating pentode, which the Department was not in a position to supply. The effort of the preceding months culminated in half a dozen scientific publications (in reputed journals) on the transient characteristics of filamentary electron emitters, but the original objective of indigenous technology development remained unfulfilled due to the lack of support from the industry. Changing the attitude of indifference exemplified by this episode is a major challenge facing the Department and the scientific community in the country at large.

4. FUTURE CHALLENGES

4.1 As the Department crosses the landmark of 50 years and marches towards a new millennium, it is gearing itself up to meet a future full of new opportunities and challenges. The nation is currently in the throes of major and rather swift socio-economic changes, and the Institute cannot be immune to these. There is a greater need than ever before to make scientific research more relevant to the needs of the society. There is also a great pressure on institutions of higher education and research to generate more resources and to reduce their dependence on public funding. In other words, education and research must become more need-based and application-oriented. These demands appear at first sight, to conflict with our cherished ideal of academic freedom. But it is well to remember that every freedom is circumscribed by social responsibilities, and also that applied research does not curb the creativity of a scientist but only channelises it in a purposeful manner.

4.2 The challenge before the Department today is not only to find the directions in which its talents should be so channelised, but also find industrial

partners who are willing to enter into a mutually beneficial symbiotic relationship with it. The Department has recently taken several initiatives in the pursuit of this objective. One such initiative is the decision to start the new M.E programmes. An Industrial Associateship programme has been launched to increase interaction between the Department and industries in the area of electronics, communication, and information technology. Discussions held with some industries and other potential sponsors for taking up applied research projects have started bearing fruit. Many of these projects will call upon several individuals to pool their talents in pursuit of a common goal, and everyone concerned will have to learn the art of participation in and management of such cooperative group activities. But making pioneering contributions to education and research is not a new experience to the Department. There is every reason to believe that the latest efforts will succeed in establishing new paradigms of cooperation between academic institutions, research organisations and industry.

Compiled and prepared by Prof G V Anand
Contributions received for this chapter from
faculty members-
past and present as well as from alumni are
gratefully acknowledged
ECE Golden Jubilee Organizing Committee.

A. DOWN THE MEMORYLANE : REFLECTIONS BY PAST FACULTY & ALUMNI

1. Prof B S Ramakrishna (Chairman of Dept - 1969-74)

- I consider myself fortunate in knowing the ECE Dept for 47 out of the 50 years it has completed;
- By today's standards, the ECE Dept in the 40's and 50's was miniscule in every sense - about 15 students in each year and some 4-5 rooms which served both as labs and staff offices. Yet, this small corner in Bangalore attracted some of the choicest students from all over India - for some mysterious reason;
- When I joined the ECE Dept in 1948, Prof K Sreenivasan was the Head and Mr S K Chatterjee, Mr H C Basak and I constituted his team. Prof Sreenivasan was a multifaceted personality and defies categorization in conventional terms;
- Prof S V C Aiya who succeeded Prof Sreenivasan as Head of the Dept, was in many ways a strong contrast to Prof Sreenivasan. He had an instinct to discover talent in students long before it would flower and he knew how to nurture them;
- As IISc moved into the 1970's major changes also took place in curriculum organization, research direction, administration, funding etc. While these changes gave better opportunities for individual talents to flourish, there is no doubt that the cohesiveness of the Dept suffered; However, the Institute remains the best employer in the Country;

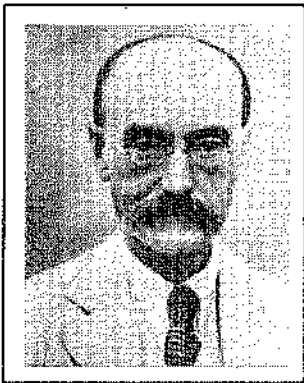
2. Prof N S Nagaraja (Chairman of Dept - 1974 - 77)

- I was a student in the ET Dept specializing in ECE during 1940-43. In those days, the Dept was located in the present physics building;
- Prof K Sreenivasan handled the main communication subjects; Dr Saroj Datta taught us measurements;
- Those were the years of World war II and there was a lot of dislocation owing to many disturbances. But, Prof Sreenivasan had many friends among the RAF officers, who used to visit the Dept. Prof Sreenivasan was greatly interested in technical developments, particularly radar, the technology of which was still secret at that time. He was therefore keen that the faculty and students should learn and master this new subject;
- When I rejoined the Dept as Lecturer in 1954, there were many changes. New lines of work were started - particularly Analog Computer under Prof V C Rideout, which group I joined. I was involved in the development of PREDA and V Rajaraman was associated with me as a research student in this project;

3. Prof S Sampath (Faculty Member 1953-61)

- I was a student of the Dept during 1945-48, the transition period from ECE Section to ECE Dept. Even in the formative years, ECE Dept had begun to be looked upon as a model and glowed with the brilliance of a lamp destined to light other lamps in the Country;
- I spent 8 happy years in the Dept as a faculty member, teaching several courses, assisting in the setting up of new laboratories and guiding students in their project work ;
- I recall with pleasure the opportunity that I had to associate with Prof V C Rideout;
- I have fond memories of the glittering array of students like M M Sodhi, B S Atal, O P Gandhi, S C Gupta, V Rajaraman, T K Ramaswamy, K S P Kumar, R P Wadhwa and N S Jayant, to name a few;

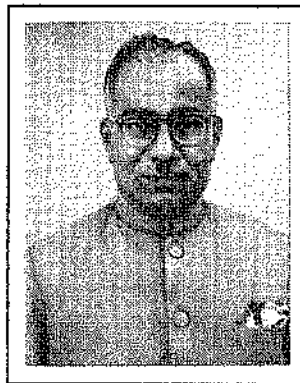
HEADS OF ET DEPT & ECE SECTION / DEPT



Alfred Hay



J K Catterson-Smith



S R Kantabet



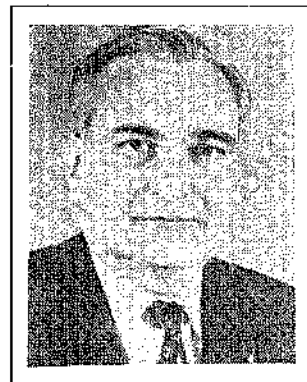
F N Mowdawalla



K Aston



S P Chakravarti



N B Bhatt

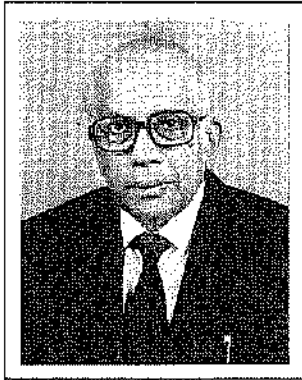


K Sreenivasan



S V C Aiya

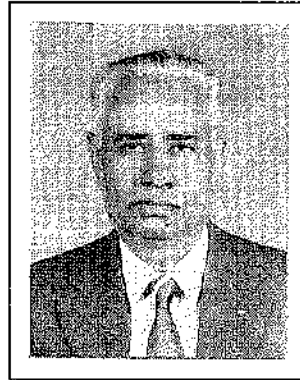
CHAIRMEN OF ECE DEPARTMENT



B S Ramakrishna



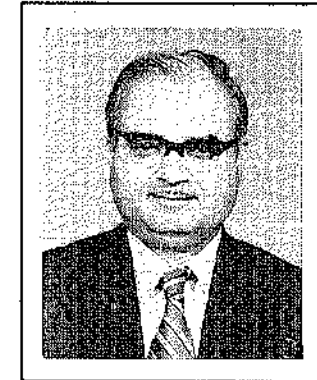
N S Nagaraja



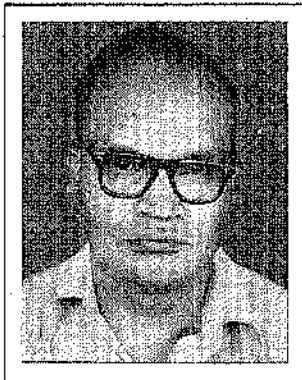
N N Biswas



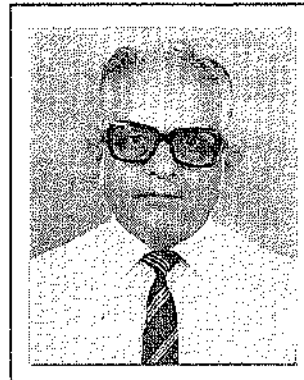
R Chatterjee



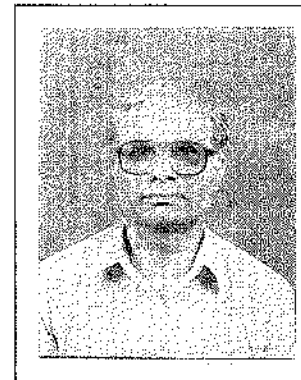
B S Sonde



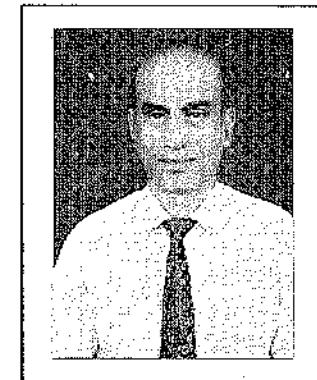
M Satyam



A Kumar

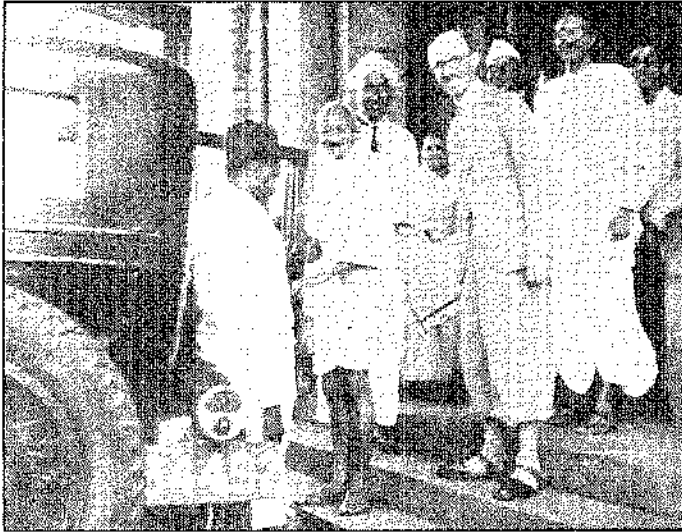


V U Reddy

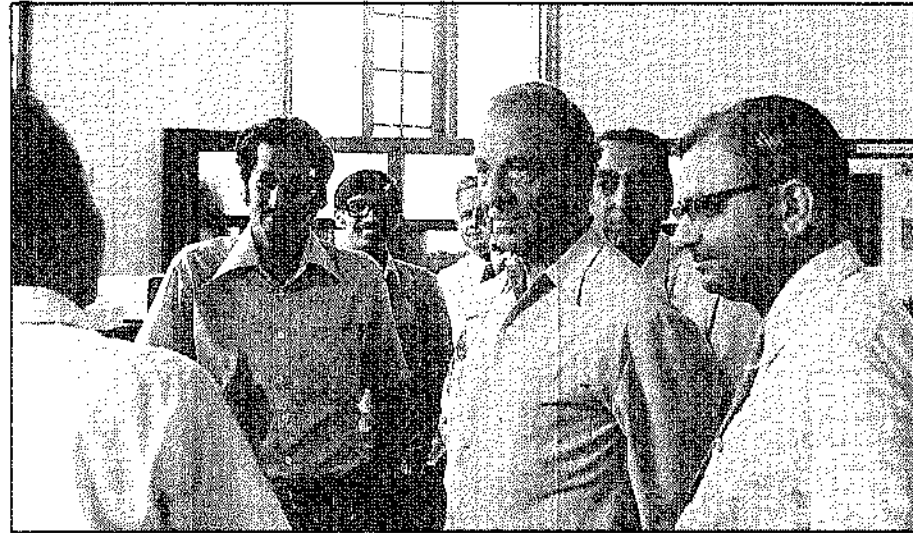


A Selvarajan

DISTINGUISHED VISITORS



Mahatma Gandhi's visit to the Department of Electrical Technology (1936) Prof. Kenneth Aston and Sir C V Raman are also seen in the picture.

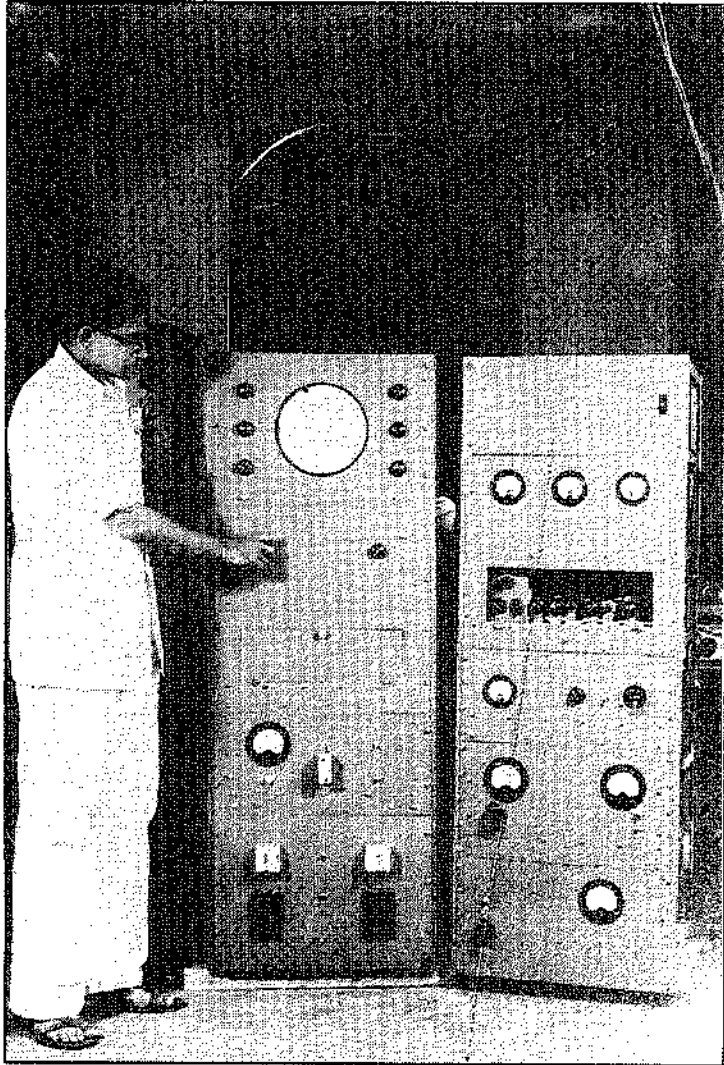


Mr J R D Tata's (President of the Court) visit to the ECE Department (1978); also seen in the picture is Mr J J Bhabha (second from right).

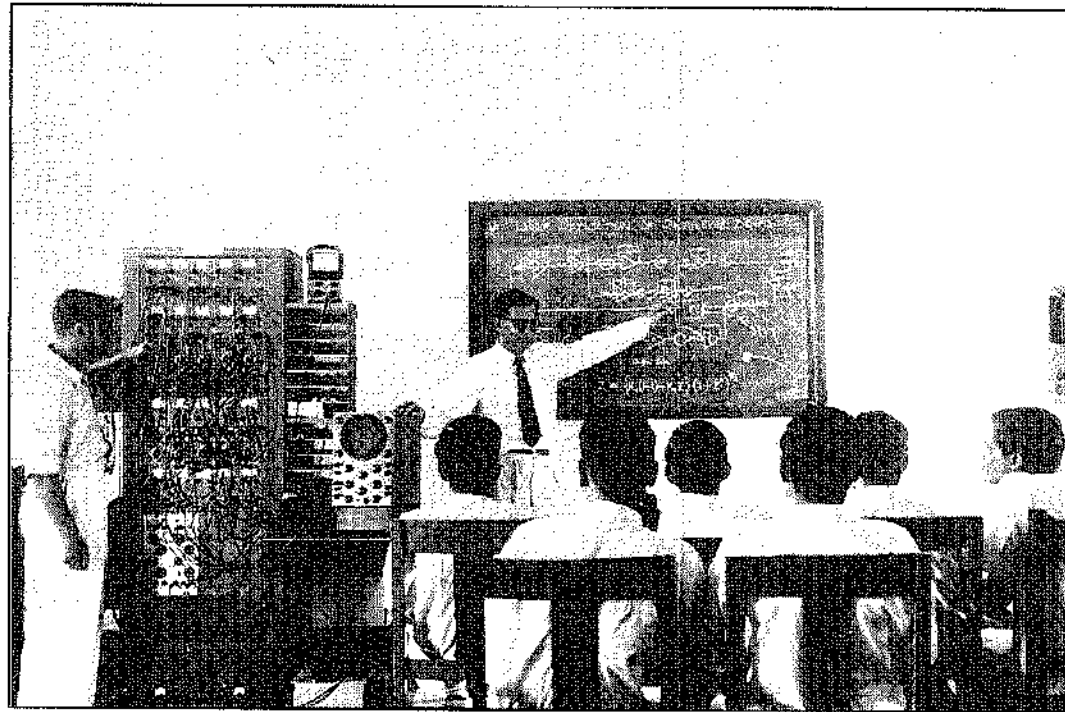


Jawaharlal Nehru's visit to the Institute (1948) for laying the foundation stone of the Department of Electrical Communication Engineering. Sir A Lakshmanaswamy Mudaliar (extreme left) and Sir V N Chandavarkar (second from left) are also seen in the picture.

ECE IN THE 1950s



Automatic Ionospheric Recorder



Electronic Differential Analyzer (PREDA)

3. ECE TODAY

1. INTRODUCTION

The Department of Electrical Communication Engineering at the Indian Institute of Science is probably the oldest and one of the best known Departments of its kind in India. Since its inception, ECE has been a centre of excellence in Electronics and Communications and has contributed immensely to the growth of Research and Teaching in these areas. Presently, Communication, Microelectronics and Signal Processing are the main areas of R&D effort in the Department. Teaching programmes are also focussed along similar lines and beginning from August 1997 the M.E. programme will be offered as three independent Masters' courses. The Department has also been an active partner with many Government and public/private sector agencies in translating research ideas into useful products and systems. Over 2000 students have graduated from this Department and have gone on to occupy key positions in academic institutions, R&D laboratories and industry in India and abroad. The Department strives to contribute to the scientific and technological goals through teaching, research and industrial interaction. It is an active participant in many technological projects of national importance and is constantly in the process of providing a vision for future technological trends in the Country. In all its endeavours, it pursues excellence in accordance with the noble traditions of the Institute.

2. LABORATORIES/FACILITIES

2.1 Research Laboratories:

Communication Networks Laboratories:

Popularly known as the ERNET lab, these laboratories have been functioning as a part of the DOE/UNDP funded Education and Research NETwork project. All laboratories of the department, the library, and the office are networked over a thick ethernet LAN that is bridged to the campus FDDI network. The ERNET laboratory houses one of the major backbone nodes of the ERNET network, through which the IISc campus is connected to the Internet. The laboratories have several workstations and PCs, and facilities for high-speed hardware development.

Photonics Laboratories:

Photonics laboratories have facilities for optical communication including optical spectrum analyzer, bit error rate measurement equipment, high speed sources and detectors, and integrated optics fabrication facilities. Experimental systems for the generation of ultra short optical pulses and their characterization have been added recently.

Microwave Laboratory:

Facilities for experimentation in microwaves, electromagnetics and antennas, such as a microwave vector network analyzer and a microwave anechoic chamber, are available.

Electronic Devices and Microelectronics Laboratories

This laboratory has facilities for building microelectronic devices, structures, transducers and sensors, and composite materials for design

of electronic devices. The hybrid circuit laboratories have complete facilities for thick and thin film hybrid circuits technology.

Digital Signal Processing Laboratory:

The Digital Signal Processing (DSP) laboratory has been setup under the Telematics project sponsored by MHRD. This laboratory is also a partner in the University Partnership Program of Analog Devices, USA. The laboratory has PCs DSP processor boards.

Some of the other associated laboratories in the area of signal processing are

- Adaptive Signal Processing Laboratory
- Digital Array Processing Laboratory
- Biomedical Signal Processing Laboratory

Acoustics and Underwater Acoustics Laboratory

These laboratories have computing facility for simulation work, water tanks for conducting under-water experiments, and acoustic anechoic and reverberation chambers for conducting acoustic experiments.

Speech and Audio Processing Laboratory

This lab comprises of several PCs with speech and audio signal input and output capability along with good microphones, headphones, audio amplifier, speaker facilities. Several speech/audio databases are maintained for experimentation. A sound treated studio has been setup for digital audio/video perception experiments.

Visual Communication Laboratory

This laboratory has image and video handling capabilities including video camera, digitizer, video recorder, video effects hardware, large multisync display, various software (some

developed in-house) for compressing/editing/ displaying image and video, and has PCs as computing resources for simulation work.

2.2 Teaching Laboratories

Digital Electronics Laboratory:

This laboratory has the facilities for digital hardware implementation and testing.

Microprocessor Application Laboratory:

These laboratories contain microprocessor- and DSP-based developmental systems, computing facilities, and GPIB based programmable instrumentation system. PC laboratory. This lab has several PCs and workstations that are networked and provides a general computing facility for the course students of the department.

2.3 Library

The computerized departmental library has over 2000 reference books, journals/proceedings and theses.

3. ACADEMIC WORK

The faculty members offer courses at the graduate level and continuously update the contents of the existing courses and introduce new courses to keep abreast of the latest developments in the fields of interest

3.1 Degree Programmes

The Department currently offers 2 research programmes and 2 course programmes, all at postgraduate level. As mentioned in the introduction, 2 new M.E. programmes, one in Signal Processing and one in Microelectronic Systems will be introduced in 1997.

Ph. D.: Research programme; admission requirement: Master's degree in Engineering; selection: through interview (twice a year); award of degree: based on the thesis only; typical duration: 4 years.

M. Sc. (Engineering): Research programme; admission requirement: Bachelor's degree in Engineering or Master's degree in Science; selection: through GATE followed by interview (twice a year); award of degree: based on the thesis only; typical duration: 2 years.

M. E. : Course programme; admission requirement: Bachelor's degree in Engineering; selection: through GATE (once a year); award of degree: based on the course credits and project; duration: 1.5 years.

The M. E. (3 semester) programme is currently under revision. It is planned that two new M.E. programmes - M. E. in Signal Processing (jointly with the Electrical Engineering Department) and M. E. in Microelectronic Systems (jointly with CEDT) will be introduced from August 1997. At the same time, the present M. E. (ECE) will be restructured and renamed as M. E. in Telecommunication.

M. E. (Integrated): course programme; admission requirement: Bachelor's degree in Science; selection: through IISc Entrance test (once a year); award of degree: based on the course credits and project; duration: 4 years.

The M. E. (Integrated) programme is being discontinued from August 1997.

3.2 Courses currently offered

E0-262	Multimedia Information Systems
EO-283	Switching Theory VLSI Design (New) Testing and Testability of Digital systems
E1-141	Signals and Systems
E2-101	Probability Theory
E2-111	Principles of Communication Systems
E2-201	Information Theory and Coding
E2-202	Random Processes
E2-204	Stochastic Processes
	Queuing Theory
E2-221	Communication Networks
E2-222	Switching Statistical Multiplexing in Telecommunication Networks
E2-223	Communication Protocols (New) Advanced Digital Communication (New) Wireless Mobile Communication (New) Modulation and Coding Theory
E3-111	Devices Analog Electronics
E3-131	Digital Electronics
E3-151	Electronic Measurements Instrumentation
E3-161	Electronic Packaging Production
E3-201	Network Theory
E3-211	Solid State Devices
E3-213	Microelectronics
E3-223	Designing with ASICs
E3-234	Digital Data Display Systems
E3-241	Communication Electronics
E3-351	Microelectronic Compatible Sensor Technology
E7-101	Optical Electronics
E7-211	Integrated Optics
E7-221	Optical Communication

E7-231 Fiber Optic Networks
 E8-101 Electromagnetic Theory Antennas
 E8-121 Microwave Techniques
 E8-211 Antenna Theory Practice
 E8-221 Microwave Devices
 E8-222 Microwave ICs
 E8-231 Microwave Communication
 E9-201 Digital Signal Processing
 E9-211 Optimum Signal Processing
 E9-212 Spectrum Analysis
 E9-221 Digital Signal Compression
 E9-231 Digital Array Processing
 E9-252 Ocean Acoustics
 E9-261 Speech Information Processing
 E9-281 Biomedical Signal Processing
 (New) Designing with DSPs
 (New) Advanced Topics in Digital
 Signal Processing

3.3 Recent Conferences, Workshops and Short Courses conducted

Conferences/Workshops

1. Workshop on Signal Processing, communication and Networking
July 23-26, 1990
2. Workshop on Recent Advances in Signal Processing and Communications
Jan 18-20, 1993
3. Conference on Signal Processing and communications
Aug 9-12, 1995
4. First DRDO-IISc workshop on Signal Processing and Communications
Aug 27-28, 1993

5. Second DRDO-IISc workshop on Signal Processing and Communications
Aug 26-27, 1994
6. Third DRDO-IISc workshop on Signal Processing and Communications
Aug 25-26, 1995
7. Conference on Emerging Optoelectronic Technologies (CEOT '91), Dec 16-21, 1991
8. Conference on Emerging Optoelectronic Technologies (CEOT '94), July 18-22, 1994

Short Courses

1. First short course (DRDO-IISc) on "Higher Order Statistical Signal Processing and Wavelet Transform"
Jan 31- Feb 5, 1994
2. Second short course (DRDO-IISc) on "Selected Topics in Signal Processing"
Feb 6-14, 1995
3. Third short course (DRDO-IISc) on "Selected Topics in Signal Processing and Communication"
Feb 26 - March 2, 1996
4. Short course on Telematics
Aug 12-20, 1991
5. Short course on Telematics : Digital Communication and Broadband Communication Networks
Aug 2-12, 1994

6. Tutorial on ATM Networking Technology ,
Nov 20-23, 1995.

4. RESEARCH WORK

The research activity in the department is currently in the following areas: Communications - Theory and Systems, Communication Networks and Protocols, Microwave Communication, Photonics and Optical Communication; Signal Processing - Ocean Acoustics, Audio Signal Processing, Biomedical Signal Processing, Image/Video Processing, Array Signal Processing; Space-Time Signal Processing for Mobile Communication, Wavelets and Multirate Signal Processing; Microelectronics and Instrumentation - Materials, Devices, Integrated Circuits, Fuzzy Logic Systems, Logic Synthesis and Intelligent Sensors and Instrumentation.

4.1 Communication Networks

In the area of task scheduling in parallel processing systems, the effect of the distribution of the number of tasks in a job, and the job partitioning granularity has been studied. Scheduling strategies in an input queuing ATM switch that offered different types of bursty traffic at its various inputs was studied and it was shown that, when output conflict occurs, there is a significant advantage to serving a cell that comes from a less bursty input. By introducing information delays into some classical formulations of stochastic control problems in queues, a complete characterization of optimal control policies was obtained. This work has been applied to the control of traffic in high-speed integrated communication networks.

Multiaccess dual slotted unidirectional bus networks were studied. A variation of the Distributed Queuing access protocol was analyzed, wherein packet access delay was partitioned into a round-trip propagation delay bounded component and waiting time in a slotted non-preemptive priority queue. The access problem for two nodes was formulated as a total expected discounted lengths. Optimal schedulers were obtained for zero and half-slot propagation delay cases. Shared medium fast packet switching was studied, wherein switch scheduling algorithms were analyzed for purposes of input buffer sizing.

4.2 Cellular Networks

Most of the research activities are in the area of channel assignment algorithms. Investigations have been carried out recently into the issues of fairness, pricing and revenue maximization in the design of channel assignment algorithms. The performance of specific algorithms, notably the Maximum Packing algorithm, has also been studied. The problem of optimal cell-site location is also being investigated.

4.3 Mobile Cellular Communications

Research in this area was focused on the problems of handover management and channel allocation in mobile cellular systems. Some new techniques invented/developed are:

1. Handover prioritization with weighting of power and its derivative
2. Most-critical-first technique for channel allocation handover calls
3. Handover call look-ahead scheme with pre-handover zones

4. Handover channel exchange technique
5. Weighted prioritization scheme with new call queuing
6. Handover management techniques for highway microcellular systems
7. Directional channel borrowing scheme without locking in cochannel cells

4.4 Microwaves

Study of propagation characteristics of microstrip transmission lines using high superconducting films.

Analysis and Synthesis of Arbitrary Antenna arrays using circular and parabolic arrays.

Study of microstrip antenna array- Microstrip ring antenna- mutual effects in an array- Stacked structures for bandwidth enhancement. Design of microstrip antenna array- with little back radiation to minimize the biological effects of the field on the user.

4.5 Photonics and Optical Communication

THEORY OF OPTICAL WAVEGUIDES: Practical applications of fiber and integrated optics requires understanding the theory of light propagation in optical waveguides. Beam Propagation Method (BPM) and Coupled Mode Theory (CMT) have been used to analyze a variety of guided wave devices. Coupled Mode Theory has been applied to solve the problem of light propagation in thin clad fiber, and a three fiber system. A combination of CMT, BPM and the electrooptic effect was used to analyze waveguide devices of an arbitrary geometry (inclined or curved).

NONLINEAR OPTICS: Soliton propagation, Raman and Bragg scattering in a Kerr medium and copropagation of two optical pulses of different frequencies in birefringent fibers are some of the key issues considered. Another area of study is second order processes in nonlinear media. Detailed theoretical and experimental studies on planar and crystal core fibers were carried out and methods of phase matching for efficient SHG were analyzed.

PHOTONIC SWITCHING : Novel photonic switching architectures such as the CNET and SSPIRAL were studied and optimal real estate utilization in switch arrays was investigated. Studies on self-routing and fault-tolerant architectures, implementation aspects, and requirements of input/output queuing for better throughput-delay performance were carried out. A novel method for tuning of a directional coupler based switch was demonstrated.

4.6 Optical Networks

Research activities are in the areas of design, architecture and performance evaluation of both broadcast and wavelength-routing optical networks. Research activities include performance analysis of media-access protocols for broadcast optical networks, routing and wavelength assignment algorithms for wavelength-routing optical networks, and virtual topology design algorithms. The design, development and fabrication of an integrated optic, acoustooptic tunable filter has been undertaken. The long term goal is to develop a prototype wavelength routing optical network.

4.7 Array Signal Processing

The research in this area is focussed in the analysis of interpolated and uniform circular

arrays with spatial smoothing, and adaptive algorithms for eigen-subspace estimation.

4.8 Space-Time Signal Processing for Mobile Communication

The research in this area is focussed in blind separation of multiple co-channel digital signals arriving at a base station antenna array in the presence of ISI and CCI, blind channel identification and equalization based on second-order statistics, beamforming for fading channels, recursive channel identification using antenna array, ML and LS methods for Ricean fading channels, improving SNR in cellular CDMA with antenna array.

4.9 Wavelets and Multirate Signal Processing

The research in this area is focussed in sub-band adaptive filtering for acoustic echo cancellation, tree-structured filter banks for signal compression, discrete wavelet multitone modulation for data communication and use of wavelet-based diversity strategy for unpredictable communication links.

4.10 Speech And Audio Processing

Speech Recognition: Keyword Spotting using "garbage" modelling; ergodic, on-line, no garbage models; noise robustness; projection distance measure new features: level-crossing intervals, TFR based approach corrective learning instead of ML learning.

Phoneme Recognition: HMM approach: new HMMs incorporating phonemic properties inhomogenous-HMM, trend-HMM, left-context-HMM, etc. better phoneme recognition accuracy on TIMIT database Neural Network approach (only classification).

Multi-plane MLP architecture: separate MLP network for each phoneme leads to better learning of the NN.

Speech Enhancement: new method of VQ based iterative Wiener filtering performs better than spectral subtraction and MAP estimation.

Speech/Audio Compression: Variable rate coding - useful in voice mail and mobile applications optimized CELP like coders for different classes of speech sounds closed loop or open loop determination of the coder type.

Perceptual audio coding: improvements to masking threshold determination transform coding of prediction residual instead of the signal Hi-fi Audio Effects: Efficient DSP algorithms for real-time processing (TMS320-C30) for quasi-stereo, surround sound, enhanced localization, 3D-sound, audio morphing, etc.

4.11 Image/Video Compression

New Algorithms: Image Vector Quantization - fast codebook search algorithms to reduce complexity, analytical methods in memory VQ to reduce excessive dependence on the training sequence, variable dimension (variable block size) VQ encoding and codebook design, heterodimensional tree structured VQ encoding and codebook design; Transform/Subband Coding — using nonuniform filter bank based transform coding that retains the advantages of both subband coding (nonuniform spectral bands) and transform coding (effortless time-varying analysis).

Lossless Image Coding — proposed switching theoretic approach to image compression using logic minimization. Work on Standards: JPEG

algorithm for image-specific and rate-specific JPEG quantizer design, implementation of fast DCT on a DSP processor.

Related Area: image presentation/printing using halftoning, an important aspect of multimedia. New halftoning algorithms such as tracking based halftoning based on noise thresholding, iterative error diffusion vector quantization based combined halftoning and compression. VIDEO COMPRESSION:- New Algorithms: motion field coding that includes efficient coding of motion vectors, motion field prediction, motion field modelling for camera motion, etc.

Work on Standards: H.261 quantizer selection strategy, MPEG-I video plus layer-III audio complete encoder-decoder implementation in software. Developmental Work: Implemented a PC-based video library service through ethernet that achieves real-time software-only decoding of full-rate color near-QCIF video; real-time low-end DSP based encoding for this system.

4.12 Microelectronics and Instrumentation

The focus of research work in this area was on new techniques for programmable nonlinear ADCs (NADCs). The following new NADCs have been developed

NADC using optimal-sized ROM; ROM-prefetch high speed NADC; High speed hybrid NADC; Piecewise linear approximation NADC; PLS-based NADC; Curve runup/rundown NADCs; Charge-balancing NADC; Improved A-law encoding NADC; Algorithmic A-law NADC; Multimicroprocessor-based NADC

These NADCs are superior to those reported earlier with respect to digital programmability, IC

realizability, hardware simplicity, and conversion speed. The operation of these NADCs have been verified by experimental implementation, computer simulation and/or analytical evaluation.

4.13 Fuzzy Logic Systems

Two new fuzzy logic processing architectures have been proposed and their performance evaluation has been carried out. They are superior to some of the reported architectures in terms of hardware requirement and processing speed.

4.14 Programmable Instrumentation

Research in this area has resulted in the development of a GPIB instrument— Analog Signal Multiplexer. A new fast functional test generation technique developed for Finite State Machines. Based on a new functional fault model, high quality test sequences can be efficiently derived from a functional description of the logic

4.15 Logic Synthesis and Testing

New algorithms for test generation and fault simulation of path delay faults in combinational logic circuits developed. A novel "line delay fault model" proposed and a two-pass test strategy outlined to obtain high quality path delay test. Image data compression formulated as a Boolean function minimization problem and efficient switching-theoretic techniques developed for lossless compression of digital image data. Compression obtained is comparable to the best existing schemes

A novel approach based on Boolean Transforms developed to drastically reduce the size of the PLA implementation of several switching functions. Currently work is in progress to extend the transform idea to the synthesis of efficient multi-level logic circuits.

Fast algorithms proposed for fault simulation of combinational as well as sequential circuits. A two-level logic minimizer which is faster than existing minimizers for many classes of functions implemented

5. CONSULTANCY WORK

The faculty members of the department are involved in various sponsored projects from several government agencies and industries in the public and private sectors within India and other countries. Following is a list of major projects and consultancies in the past few years.

Performance analysis and performance optimization of the call processing subsystem of the C-DOT Digital Switching System; funded by C-DOT; investigator: Prof. Anurag Kumar 1990.

Development of a large model version of a TCP/IP protocol software package; funded by ITI; investigator: Prof. Anurag Kumar; 1994—95.

Traffic engineering in a GSM cellular mobile network with full-rate and half-rate mobiles; funded by Philips Kommunikations Industrie AG, Nuremberg, Germany; investigators: Prof. Anurag Kumar and Dr. Sivarajan; 1994—1995.

Modelling, performance analysis and overload control design of the ITI digital switching system; funded by ITI; investigators: Prof. Anurag Kumar and Prof. Vinod Sharma (EE Dept., IISc); 1994—95.

6. COOPERATIVE PROGRAMMES

With a view to strengthen interaction with industry and to bring about practical utilization of R&D efforts of the faculty and students of the Department, a number of cooperative programmes have been taken up. Specifically, MOUs have been signed with BNR (NORTEL), Samsung Electronics, and NOKIA which provide for student scholarships, faculty exchange, consultancy and sponsored research and such other cooperative programmes.

Cooperative programmes with Universities such as Helsinki University (Finland), University of Keiserslauten (Germany), Stanford University (USA), and others have helped to establish international participation and contact between the various groups in the Department and the other universities.

7. FACULTY/STAFF/STUDENTS

7.1 Faculty

A Selvarajan, Professor and Chairman
G V Anand, Professor
Prabhakar S Naidu, Professor
V Umapathi Reddy, Professor
A P Shivaprasad, Professor
B S Sonde, Professor
Mandavilli Satyam, Honorary Professor
Anand Kumar, Emeritus Scientist
D Narayana Dutt, Associate Professor
Anurag Kumar, Associate Professor
Anamitra Makur, Associate Professor
Utpal Mukherji, Associate Professor
T V Sreenivas, Associate Professor
T S Vedavathy, Associate Professor
Pallapa Venkataram, Associate Professor

D B Ghare, Principal Research Scientist
 Dinesh K Anvekar, Assistant Professor
 K V S Hari, Assistant Professor
 James Jacob, Assistant Professor
 Kumar N Sivarajan, Assistant Professor
 Malati Hegde, Senior Scientific Officer
 M K Ravishankar, Senior Scientific Officer
 M V Srinath, Senior Scientific Officer
 Victor Anand Raj, Scientific Officer
 T Badrinarayana, Scientific Officer
 S V Gopalaiah, Scientific Officer
 K Sivasankara Reddy, Scientific Officer
 Anandi Giridharan, Technical Officer
 E S Shivaleela, Technical Officer

7.2 Staff

Office Staff

A V Leelavathi, Personal Assistant
 Susheela Nagaraj, Personal Assistant
 V. araswathi, LDC
 R Srinivasa Murthy, LDC
 S R Ramakrishna, Attender

Laboratory Staff

R Madaiah, Laboratory Assistant
 M Ramachandra, Laboratory Assistant
 G S Hegde, Laboratory Assistant

Workshop Staff

C Thiruvengadam, Mechanic 'B'
 C Subramany, Mechanic 'B'
 C Kattaiah, Mechanic 'B'
 P Arunachalam, Mechanic 'C'
 N Balasubramani, Mechanic 'C'
 R Muniraju, Laboratory Helper
 S Irudayaraj, Laboratory Helper
 K P Babu, Laboratory Helper
 G Rossaiah, Laboratory Helper
 Rupendra Raju, Laboratory Helper

Other

7.3 Students on roll (1996-97)

Ph. D.

Anantha Kumar Majhi
 Abraham Santosh Paul
 Anirban Roy
 Badrinarayana T
 Bipul Chandra Paul
 Nataraj, C.R.
 Abhilash G
 Gagan Bihari Rath
 Joshi George
 Kavitha V.
 Lakshmipathi S
 M.N.Shanmukha Swamy
 Maheswara Reddy K
 Manish Gupta
 Natarajan S.R.
 Prem Kumar Gadaey
 Prodip Mandal
 Rajeev Shorey
 Rajesh M.K.
 Rmabrahman, R
 Sai Shankar N
 Saswati Sarkar
 Sethu Selvi
 Shaibal Mitra
 Siva Sankara Reddy K.
 Sreenivasa Rao
 Sridharan, M.K.
 Sriram S

M.Sc.(Engg.)

Abhijit Chakrabarti
 Aniruddha Diwan
 Anupama Toshniwal
 Debashis Ghosh
 Gupta AVT

Indu Shekhar Das
 Muthuvel A
 Nayak J
 Prabhu T
 Rajanish
 Ram Kumar M
 Renu M.R.
 Sarala S
 Shanthi S
 Shishir KL
 Shivaleela ES
 Shreekanth Lakshmeshwar
 Swaminathan KS
 Tushar Tripathi
 Vijay Kumar G
 Vinod Menzes
 Viswanath G.

M.E.

I Year

Amit Vishvambhar Mate
 Anand Santhana Krishnan
 Archana Somashekara
 Arindam Raychaudhuri
 Basker P
 Deepak Mahajan
 Joby Joseph
 Korada Ramkishor
 Krishnan TN
 Madhukar BR
 Mallikarjun B.Marg
 Mohammad Ather Khan
 Nagaraj B
 Narayana Raju KS
 Navaneethakrishnan R
 Navin Kumar Agrawal
 Potbhare Rajabhau Mahadev
 Rahul Agrawal
 Rajesh Khanna
 Sabu Emmanuel

Sanjay SG
Santosh
Shine M Thomas
Sreelatha J
Subhasis Das
Sunil Alias Balwantrao
Tapan Kumar Nayak
Tushar Kanti Adhikary
Vadapalli VVJ Raghu
Visweswaran I
Vyasaraaj S

II Year

Abil Ali
Alok Kumar Singh
Anantha Ramu B.K.
Anshuman Gupta
Arvind Pundlik Mandpe (SC)
Ashish Vaishya
Ashish Verma
Ashutosh Kulshreshtha
Atul Suresh Joshi
Chacko Thomas
Debashish Pramanik
Ganesh K Koppiseti
Gopi Krishna C
Hemant S Borale
Jagadish N. Grandhi
Jayaram
Pala Srinivasa Rao
Pramit A Chavda
Sachin S Deo
Sadafule Rahul Dinkar
Samvid S Shah
Sathyanarayana DV
Soumya Jana
Sudip Ghosal
Yoganand R

M.E(Int.)

I Year:

Amit Agarwal
Dinesh Kumar
Kaushik Dutta Manujdar
Natesan B
Nihar Ranjan Saha
Satyaki Datta
Sethuraman G

II Year

Anand A
Arindam Roy
Dipetendu Mitra
Jitendra Kumar Singh
Padmagowri P
Patnaik Sanjay Kumar
Pradeep PP
Rajan Srivastava
Rileen Sinha
Saran Sajesh Kumar
Shobanjali R
Shrikumar Sharma B
Sriram S
Suman Mukherjee

III Year

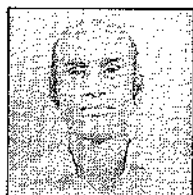
Abhijit Sinha
Anirban Sarkar
Bharat B
Daniel D Ezekiel
Devika R
Gautam Saha
Girish G
Jitendra Singh Yadav
Mainak Chatterji
Natwar Modani
Radhakrishnan N
Raghu Raman

Shailendra Sinha
Singaraju Gouri Sankar
Sividya N
Vikram S

IV Year

Aparna B
Chandresh Tiwari
Kaushik Das
Madhavi kumari GVNS
Madhumitha Ghar
Mrinalini L
Rajesh Kumar Jha
Sachin Purushotam Desai
Sankar Kumar Singha
Sathish kumar R
Shashi Bhushan Tripathi
Tatagato Mukhopadhyay
Vidyacharan B
Visweswaran B

8. FACULTY PROFILE



A Selvarajan
Professor and Chairman

Ph: 334 0563, 309 2278, 309 2283
email: rajan@ece.iisc.ernet.in

Received Master of Science degree in 1964 from Annamalai University and Ph.D. from Indian Institute of Science in 1969. Joined the Electrical Communication Engineering Department of IISc in Jan 1972 as lecturer. Has been a visiting Scientist at Uppsala University Sweden (1969-70), University of Arizona (1977-78), Technical University of Denmark (May-July 1986), University College, London (May-July 1987) and International Centre for Theoretical Physics, Trieste (May-June 1991). Fellow of IETE (India) Fellow of Optical Society of India. J C Bose memorial award 1992 from IETE and IETE Students' Journal paper award.

Currently working on linear and nonlinear optical waveguide theory, integrated optics, photonic switching, optical communication and fiber optic sensors.

G V Anand
Professor
Ph: 309 2277 email: anandgv@ece.iisc.ernet.in

Received B.Sc. and M.Sc degrees in Physics from Osmania University in 1962 and 1964 respectively, and Ph.D in Electrical

Communication Engineering from Indian Institute of science in 1971. Joined the faculty of ECE Department, IISc in 1969. Commonwealth Academic Staff Fellow, University College London (1978-79). Fellow, IETE Fellow, Acoustical Society of India.

Currently working on ocean acoustics, with particular reference to propagation, scattering, array processing, underwater acoustic imaging, and tomography. Nonlinear propagation of acoustic and optical waves. Chaotic signals and systems.

Prabhakar S Naidu
Professor
Ph: 309 2442 email: psn@ece.iisc.ernet.in

Received B.Sc.(Hon) and M.Tech. from IIT, Kharagpur; Ph.D., UBC, Canada, 1965). Humboldt Fellow (1979-80) (at Philips Forschungslaboratorium, Hamburg, Germany) National Research Council (USA) Senior Research Associate (1988-1989), Naval Postgraduate School, USA

Currently working on underwater signal processing; tomographic 3D imaging; geophysical signal processing.



V Umapathi Reddy
Professor

Ph: 309 2280 e-mail: vur@ece.iisc.ernet.in

Received B.E. (Tele-communication

Engineering) from Osmania University, Hyderabad, 1962; M.Tech (Electronics and Electrical Communication Engineering), Indian Institute of Technology, Kharagpur, 1963; Ph.D. (Electrical Engineering), University of Missouri, 1971. Assistant Professor, IIT, Madras (1972 - 1976); Professor, IIT, Kharagpur (1976 - 1979); Visiting Professor, Stanford University (1979 - 1982); Project Director, Research & Training Unit for Navigational Electronics, Osmania University (1982 - 1988); Visiting Professor, Stanford University (1986 - 1987); Professor, IISc (1988-); Visiting Professor, University of Iowa (June-July 1991), Stanford University (March-June 1994), Visiting Scientist, RCI, Hyderabad (Sept. 1995-Feb. 1996), Visiting Professor, Stanford University (March-Sept. 1996); Fellow of the Indian National Science Academy, Fellow of the Indian National Academy of Engineering Fellow of the Indian Academy of Science Fellow of the IETE (India) S. K. Mitra Memorial Award 1989 from IETE.

Currently working on adaptive algorithms, antenna arrays, array processing for mobile communication wavelet transform and multirate signal processing.



A P Shivaprasad
Professor

Ph: 309 2656 email: aps@ece.iisc.ernet.in

Received B.E., M.E., and Ph.D. in Electrical Communication Engineering from I.I.Sc. in 1965, 1967 and 1972 respectively.

Currently working on multimedia communication systems, application of neural computation to instrumentation, and microprocessor based systems.



B S Sonde
Professor

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Received BE (Telecom) from Poona University, 1958; M.Sc(Engg.) (Advanced Electronics), Poona University, 1959; Ph.D (Faculty of Engg.), Indian Institute of Science, Bangalore, 1963. Member, Academic Staff of the Department of Electrical Communication Engineering since 1964, where he is Professor from 1973. Short visits abroad on academic/scientific assignments: Tohoku University, Japan(1964), Stanford University, USA (1966), Swiss Federal Institute of Technology, Zurich Lausanne, Switzerland (1976, 79), Chulalongkorn University, Bangkok, Thailand (1984, 88, 89, 90). Ramlal Wadhwa Gold Medal, IETE (1978) Jaya Jayant Award for Teaching Excellence, IISc (1992) Distinguished Fellow, IETE (1982) Member, Electronics Commission, Government of India (1986-89) Chairman, ISHM-India Chapter (1985-93) President, IETE (India) (1992-94).

Currently working on microelectronics, integrated circuits, instrumentation, digital communication.

Mandavilli Satyam
Honorary Professor

Ph: 309 2279 email: msece@ece.iisc.ernet.in

Received B.E (Telecommunication) from Madras University (1958); M.E (Electronics), Indian Institute of Science, Bangalore (1960); Ph.D, Indian Institute of Science, Bangalore (1963). Joined the Institute in 1962.

Currently working in the area of microelectronics with functional approach as the main goal.



A Kumar
Emeritus Scientist

Received M.E (Microwave) from IISc. (1960); Ph.D (Antennas) from IISc. (1966).

Currently working in the area of Microstrip Patch Antennas.



D Narayana Dutt
Associate Professor

Ph: 309 2742 email: dndutt@ece.iisc.ernet.in

Received B.E. from Bangalore University in 1967; M.E. (Distinction) and Ph.D. from IISc in 1969 and 1974. Worked earlier as Senior Research Assistant, Scientific Officer, Senior Scientific

Officer and Assistant Professor in the Department. Visited AlFateh University, Tripoli, Libya as Professor during 1985-87.

Currently working on digital processing of EEG(brain) signals with emphasis on spectral estimation, noise minimization and real time processing; EEG data compression and display; nonlinear dynamics and chaos; acoustics and speech signal processing.

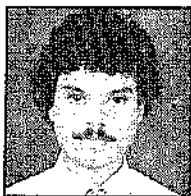


Anurag Kumar
Associate Professor

Ph: 334 0855, 309 2387
email: anurag@ece.iisc.ernet.in

Received B.Tech (EE) from I.I.T. Kanpur, 1977; Ph.D. from Cornell University, 1981. Member Technical Staff, Performance Analysis Department, ATT Bell Labs, Holmdel, N.J., 1981-1988; Faculty, ECE Department, Indian Institute of Science, Bangalore, 1988-. Senior Member IEEE Fellow IETE IETE's CDIL Award for a paper in Journal of IETE, 1993

Currently working on communication networking; in particular, modelling, analysis, optimisation, scheduling, and control problems, arising in communication networks and distributed systems.



Anamitra Makur
Associate Professor

Ph: 309 2745 email: amakur@ece.iisc.ernet.in
Received B.Tech.(Hons.) in Electronics and Electrical Comm. Engg. from I.I.T., Kharagpur, in 1985; M.S. and Ph.D. in Electrical Engg. from California Inst. of Tech., Pasadena, in 1986 and 1990. Joined this department as Asst. Professor in 1990.

Currently working on source coding (image, video, and data compression), image/video processing (halftoning, multidimensional filter design, television video processing, adaptive filtering), and channel coding (design of channel codes, decoding algorithms).

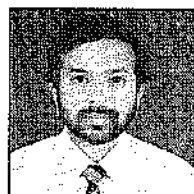


Utpal Mukherji
Associate Professor

Ph: 309 2387 email: utpal@ece.iisc.ernet.in

Received B.Tech. degree in Electrical Engg. from IIT, Bombay, in 1980, and S.M., E.E., and Sc.D. degrees in electrical Engg. and computer sc. from Massachusetts Institute of Technology in 1982, 1984, and 1986, respectively. Member of Technical Staff at ATT Bell Laboratories, Murray Hill, from 1986 to 1989.

Currently working on communication networks modelling and analysis. Activities include design of an experimental fiber-optic multi-access network.



T V Sreenivas
Associate Professor

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Received Ph.D. from Tata Institute of Fundamental Research, Bombay, 1981; M.E. (Distinction), Indian Institute of Science, 1975; B.E., Bangalore University, 1973. Scientist-C, Electronics Radar Development Establishment, Bangalore, 1982-85; Research Scientist, Norwegian Institute of Technology, Trondheim, Norway, 1986-87; Visiting Assistant Professor, Marquette University, Milwaukee, USA, 1988-90. Republic day award, Electronics Radar Development Establishment, 1984 Fellow, IETE, India, Senior Member, IEEE Signal Processing Society, USA, Member, Audio Engineering Society, USA.

Currently working on speech signal processing, auditory modelling, spectral estimation, speech/ audio compression for bandwidth reduction, speech perception, hidden Markov models and neural networks for speech recognition, speech enhancement in noise, hi-fi audio systems, DSP architectures.



T S Vedavathy
Associate Professor

Ph: 309 2281 email: veda@ece.iisc.ernet.in
Received Ph.D from IISc, Bangalore in Microwave Antennas, M.Sc (Physics) from Bangalore University.

Currently working on high Tc superconducting thin films for microwave applications, microstrip antennas, radiation pattern synthesis for various applications, RF problems associated with cellular mobile communication, like mathematical modeling under multi scatterer environment and antennas suitable for mobiles.



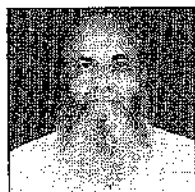
Pallapa Venkataram
Associate Professor

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Obtained Ph.D in Information Sciences from The University of Sheffield, UK. Worked for two years as a Deputy Manager (computers) at Hindustan Aeronautics Ltd. Has been a visiting scientist at University of Maryland, USA (April-May 1992), University of Montreal, Canada (June-July 1992), and University of Twente, The Netherlands (September-October 1995). IEEE Globecom'91 paper award, Received a diploma of distinguished visitor from UPAO, Trujillo,

PERU. Fellow IETE IETE CDIL'94 paper Award
Member IEEE.

Currently working on protocol engineering by formal methods, AI applications in network management, wireless networks, multimedia systems.

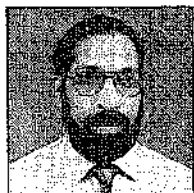


D B Ghare
Principal Research Scientist

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Received Ph.D. (1967) from Pune University. Principal Research Scientist, 1985 - till date, IISc; Senior Scientific Officer, 1970-1985, IISc; Research Associate, 1968-1970, IISc; Asst Engr, 1967-1968, Semiconductors Ltd. Pune; Senior Research Fellow, 1967, N.C.L. Pune; Junior Research Fellow, 1963-1967, N.C.L. Pune. Best Paper Award and Gold Medal for the paper "Increasing Creepage Distance of High Voltage Insulators by Composite Designing" by Central Board of Irrigation and Power, 1977

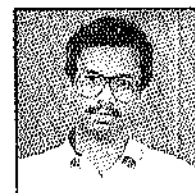
Currently working on hybrid microelectronics compatible transducers technology, Microelectronic miniature sensors, Smart / intelligent sensors, Sensor signal processing conditioning circuits, MPPHT (Microprocessor Programmed Periodic Pulsed Heating Technique) based sensor technology, Thick / thin film hybrid microelectronics materials, technology and devices, Composite materials for design of electronic devices.



Dinesh K Anvekar
Assistant Professor

Ph: 309 2746 email: dka@ece.iisc.ernet.in
Received B.E in Electronics Engineering with State Award and Gold Medal from Bangalore University, in 1979; M.E. in Automation with Distinction, in 1981; and Ph.D. in Microelectronics with Best Thesis Award, in 1990, both from the Indian Institute of Science. Has been a member of faculty of Electrical Communication Engineering, IISc, since 1982. Fellow of IETE; Senior Member of IEEE; IEEE Region 10 Paper Award, 1982; Visiting Scientist at State University of New York, 1986; Indo-US Fellowship 1993-94 for research at AT&T Bell Laboratories and IBM Watson Research Center, USA KAAS Young Scientist Award in 1994; Two US International Patents for New Handover Techniques, 1995, 1996; First author of Tata McGraw Hill book on Electronic Data Converters.

Currently working in the areas of digital communication, microelectronics, and intelligent instrumentation. Some of the recent activities include development of new techniques for nonlinear ADCs, multimicroprocessor system design and implementation, handover and channel assignment techniques in mobile cellular communication systems, and fuzzy logic architectures.



K V S Hari
Assistant Professor

Ph: 309 2745 email: hari@ece.iisc.ernet.in

Received Ph.D from University of California, San Diego (1990); M.Tech, I.I.T. Delhi (1985); B.E., Osmania University, Hyderabad (1983); Scientist, Defence Electronics Research Laboratory, Hyderabad (1985-87); Scientist, Osmania University, Hyderabad (1991-92); Faculty, Department of ECE, Indian Institute of Science (1992-); Visiting Faculty, Department of Signals, Sensors Systems, Royal Institute of Technology, Stockholm (Jul-Sep 1995)

Currently working on application of signal processing techniques to mobile communication, higher-order spectrum analysis, time-frequency representations, active sound control.



James Jacob
Assistant Professor

Ph: 309 2282 email: james@ece.iisc.ernet.in

Received B.E. and Ph.D degrees in Electronics and Communications from IISc in 1983 and 1988 respectively. Joined the faculty of ECE Department in May 1988.

Currently working on the development of efficient algorithms for logic synthesis, test generation and fault simulation of large digital circuits. Work is also in progress on developing switching theory based techniques for digital data compression.



Kumar N Sivarajan
Assistant Professor

Ph: 309 2658 email: kumar@ece.iisc.ernet.in

Received Ph.D. from California Institute of Technology (1990); M.S., California Institute of Technology (1988); B.Tech., I.I.T. Madras (1987). Assistant Professor, IISc (1994—); Research/Scientific Staff Member/Postdoctoral Fellow, IBM T.J. Watson Research Center, Yorktown Heights, NY (1990—1994).

Currently working on communication networks: all-optical, mobile/cellular and ATM (high-speed packet-switched) networks with emphasis on performance analysis, network architecture and design, and network algorithms.

Malati Hegde
Senior Scientific Officer

Ph: 334 0855, 309 2387
email: malati@ece.iisc.ernet.in

Received Ph.D from the Indian Inst. of Technology, Kanpur

Currently working on computer networks.

M K Ravishankar
Senior Scientific Officer

Ph: 309 2743

Received M.Sc (Engg.) from Indian Institute of Science.

Currently working on devices.



M V Srinath
Senior Scientific Officer

Ph: 309 2743

Received B.E. and M.E. from IISc.

Currently working on electronic circuits and television field.



Victor Anand Raj
Scientific Officer

Ph: 309 2745 email: victor@ece.iisc.ernet.in

Received M.E. Degree (ECE) from Indian Institute of Science, Bangalore.

Currently working in the area of multimedia.



T Badrinarayana
Scientific Officer

Ph: 309 2279 email: badri@ece.iisc.ernet.in

Received M.Sc from Sri Venkateswara University, M.Sc (Engg.) from Indian Institute of Science, Bangalore.

Currently working on electronic devices, superconducting devices, optoelectronics.



S V Gopalaiah
Scientific Officer

Ph: 309 274 email: svg@ece.iisc.ernet.in

Received M.Sc.(Physics), Bangalore University, 1981; M.Sc. (Engg.), Indian Institute of Science, 1995. Worked as Scientific Assistant and Technical Officer since 1981.

Currently working on voice/data integration, dynamic channel allocation, microcontrollers, GPIB interfacing, PALs.

K Sivashankara Reddy
Scientific Officer

Ph: 309 2279 email: kssreddy@ece.iisc.ernet.in

Received M. Tech from Indian Institute of

Technology, Kharagpur.

Currently working on devices.



Anandi Giridharan
Technical Officer

Ph: 309 2282 email: anandi@ece.iisc.ernet.in

Received B.E. Degree in Electrical Engineering
from Bangalore University in 1988.

Currently working in the area of communication
networks, security management.

E S Shivaleela

Technical Officer

Ph. 309 2283 email: lila@ece.iisc.ernet.in

Received B.E. Degree in ECE in 1987 from
Mysore University.

Currently working in the areas of optical
communication and integrated optics .

ECE LABORATORIES



Acoustics



Devices



Bust of Heinrich Hertz in ECE Foyer

ECE STAFF & STUDENTS AT WORK



Devices Laboratory



Microwave Laboratory



Visual Communication Laboratory

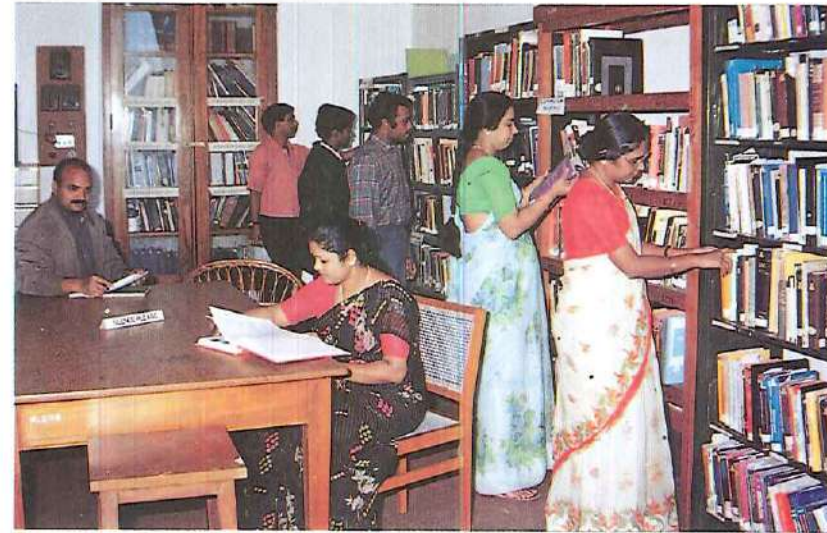


Acoustics Laboratory

ECE STUDENTS & STAFF AT WORK



Microprocessor Laboratory



Library

SWEET MEMORIES



Silver Jubilee Reunion of BE (ECE/ET) 1964 Batch



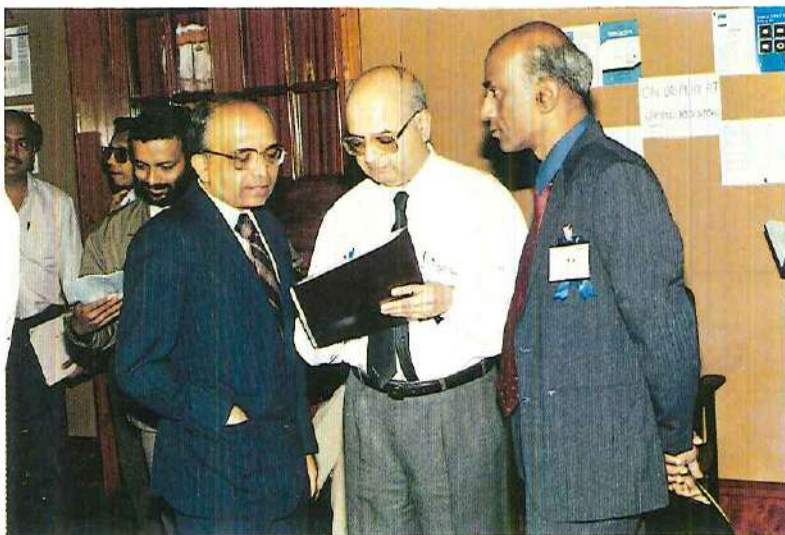
CONFERENCE MEMORIES - CEOT '94



Inaugural address by Prof. U R Rao, Chairman, ISRO



Valedictory address by Prof. C N R Rao, Director



Faculty with Delegates



Attentive Audience

4. ECE : VISION 2000

1. INTRODUCTION

Visualizing the technology map of the future is a difficult task with rapid changes in technology taking place almost every year. New directions in ECE technology in the next millenium and the challenges ahead have been proposed by an EEE Experts Committee (Box A) recently. This can form the basis for a future vision for the Department. Following this, an attempt is made to look into the future and contemplate on the role of our Department in the next few years.

2. FUTURE TRENDS

Communication between humans-machines-humans will be the prime objective of society. To realize this, Personal Mobile Communication will be the major thrust of research activity all over the world. Information Technology will result in the home computer becoming an 'infotainment' device. Broadcast communication of Radio and TV will go digital with better quality. It will not be long before one can observe all the multimedia enter the communication arena in the future microcellular environment. We can foresee the interconnected computer networks replaced by such wireless communication networks which will enable not only the advancement of the cellular phones, but also linking of all the multimedia. Advances in microelectronic and optical device technology will yield high performance computing power which will enable sophisticated signal processing systems to be designed for the real world. Digital Signal Processing (DSP) technology will become omnipresent. Philosophically, disciplines will become more and more inter-dependent.

3. TECHNOLOGY FOR COMMUNICATIONS

3.1 The major thrusts in 'wired' communication will be the use of Optical fibre, use of existing wired local loop for digital local loop, use of existing Cable TV (CATV) cable for bidirectional digital transmission. Wireless communication for personal communication will include the use of new signal processing techniques for efficient use of the available meagre bandwidth. Switching systems to realize this will include Fast Ethernet for shared medium, ATM cell switching for local to wide area networks. Asynchronous Transfer Mode (ATM) based Broadband Integrated Services Digital Networks (B-ISDN) and Internet type networks will be the most widely used. In the area of antennas for mobile communications, the chief interest of research will be on the synthesis of microwave antenna arrays for mobile communications. The demands here are to achieve a specified radiation pattern with high gain and high efficiency transmit-receive antennas at the base station to provide channel allocation to the mobile phones on one hand, and on the other, to fabricate compact, conformal, highly sensitive transmit-receive antennas to be placed inside the mobile phones, which will be the future trend in the next five years.

3.2 One of the RF problems in the area of cellular telephony seems to be a rigorous analysis and estimation of scattered signals in multipath environments. Diversity reception not only at the base station but also at the mobile handset may be expected to be the solution for the above problem. For instance, the pagers and cellular phones of the recent days used for mobile communications mostly utilize the wire (dipole)

antennas and loop antennas, which in future are expected to be replaced by the low-profile, thin and compact microstrip antennas. These will employ stacked structures of microstrip patches, especially microstrip ring antennas with optional combination with patches of other structures. More in-depth and very precise design and analysis accounting for the radiation patterns, the directivity and the other important antenna characteristics will be evolved. Another area of prime interest will be bandwidth enhancement maintaining higher gains by using newer orientation of microstrip elements in different array configurations.

3.3 A major requirement for the near future seems to be the evolution of CAD software packages to realize the required specifications, particularly in the area of cellular mobile communications. Moreover, we can foresee the exploitation of the higher ends of microwave frequencies which will greatly reduce the size of the antennas required. The frontier regions of the microwaves under research, especially the millimeter range of frequencies will be utilized and no longer will they continue to remain the frontier regions. The high power sources that are required for generation of millimeter range signals may be expected to be a goal for achievement in the next few years. In addition to the above, a newer dielectric substrate which has very high breakdown voltage may be evolved which would enable the microstrip antennas to effectively act as a transmitter also, besides its present use for receiving the microwaves. These two achievements put together may lead to a stage wherein the huge parabolic dishes will be replaced by small compact microstrip patch antennas and their arrays, since the millimeter wave frequencies may be expected to be

deployed for all space and satellite communications in the future.

3.4 Digital Signal Processing (DSP) technology is centered around DSP processors. Hardware and software DSP tools will play a prominent role in the implementation of any complex system dealing with sampled signals. As advances in DSP hardware take place, more efficient software tools to assist the developer will be developed reducing the cycle time for developing a DSP product.

3.5 The Microelectronics Devices Laboratory of the ECE Department evolved from simple facilities for vacuum tube fabrication to the present stage which has basic facilities to carry out basic research work to conceive new electronic devices and verify their performance based on vacuum, gas filled liquid state and the various disciplines of solid state. A vision of the Laboratory is to build up its facilities to such a level wherein any type of device, new or old, can be synthesized and fabricated with teams of academic staff and scores of students working with the goal of conceiving, developing new devices and technologies which are simple, elegant and provide direct solutions to the multitude of old and new problems of communication systems.

3.6 Some major application areas that are envisaged to receive primary attention include personal communication services over wireless medium; multimedia services over wireless networks; High Quality broadcast systems like Digital Audio Broadcasting, High Definition TV and Direct Broadcasting Satellite Systems. As the density of the global WEB is expected to increase tremendously, applications around the world wide web (WWW) will become a major

focus of activity.

4. WHAT SHOULD ECE DO?

4.1 The prime objective of the Department is to maintain excellence in research and advanced level instruction/training. The goal of ECE should be to stay relevant to the needs of the electronics and telecom industry in India while pursuing excellence in research and academic work. We need to balance these goals but that should not be difficult since the former (staying relevant) only provides direction to the scope of research and academic programme and does not necessarily impact the latter (excellence).

4.2 Over the next five years, this means that we pursue research and academic work in the areas of personal mobile telecommunications and networking. What do we do using the Internet which is now connected to almost every computer in the world, how do we do it well, what are the problems we face, how do we solve them, what are the special problems, if any, in the Indian context? Such questions can help us in identifying directions for our future activity. Over the next ten years, we do not know what new areas/technologies will emerge as the important ones; but the onus will be on us to identify these areas (considering technology directions/challenges such as those in Box A) early on and understand them well enough before the new technologies are ripe for implementation.

4.3 We have to reevaluate what we are training our students for. Should the training of the students be driven by faculty research interests or what the outside world needs and their own career goals? Except for a few students who will end up in advanced theoretical research, the

research should be driven from strong practical considerations but carried out with the best of analytical and experimental tools.

4.4 Due to a gradual but firm change in the central Government funding scenario, the Institute will have to earn most of its finances soon. Some engineering departments including ECE have the potential to take the lead in this respect. Therefore, a welcome trend for ECE is to have increased emphasis on industry-oriented activities. This would mean teaching would be strengthened again, and it would be specifically tuned to the needs of the industry (which is likely to include more laboratory training and wider coverage including theory and implementation). This would also mean research would be directed towards present-day problems rather than mere publication-oriented fundamental research. These directions of teaching and research are but welcome changes, since they effectively serve the society more than what is being done at present. Further, the tremendous advancement and globalization of Indian industry during the past decade has also reduced the gap between what academia does and what industry does. Fall-outs of this industry-oriented trend would be sacrificing part of individual freedom by the faculty, staff and students of the Department towards a larger goal, and strengthening of group rather than individualistic activities. The launching of the Industrial Associateship Programme in 1996 to bring industry closer to the Department is indeed a welcome first major step in this connection.

4.5 The faculty and students of ECE as well as sister entities often feel the need to work together. Proof of this trend is seen in one current joint teaching programme and in two more future joint

A. NEW DIRECTIONS IN ECE TECHNOLOGY - MAJOR CHALLENGES

- To be reachable at any time, anywhere through worldwide personal communication systems (PCS) and wireless/fiberless communications;
- To have instant access to all information through databases, high speed links, flat-panel displays and interfaces;
- To be present at any time, anywhere through virtual presence and reality;
- To enjoy abundant, clean, safe and affordable energy;
- To travel faster and more safely over intelligent highways;
- To work in paperless offices;
- To not carry any cash and use electronic purse or wallet.

Reference : IEEE Spectrum,
vol.30, no.1, Jan.1993, pg.81

ECE Golden Jubilee Organizing
Committee.

teaching programmes, as well as in other joint activities including sponsored research, seminars, and conferences proposed. It is expected that ECE would, in the future decade, work more closely with the Departments of Electrical Engineering and Computer Science & Automation, and with the Centres like CEDT and SERC. Further, the merging of apparently different fields would be seen within the Department itself, with groups that now possess separate identity merging. Consequently, the training provided by the Department would be wider in technical aspects. You won't hear phrases like "I work on theory, he's an experimentalist." Everyone would be a theorist and would conduct experiments, too. You won't distinguish a hardware engineer from a software engineer. Rather, the individual distinctions would be based on the area of specialization.

5. THRUST AREAS FOR RESEARCH & ACADEMIC WORK:

The following thrust areas for research and academic work are now proposed following box A and the above line of thinking.

Communications:

Broadband and Wireless Networks - Performance analysis, network planning.

Mobile Cellular Communication - Channel Assignment, Handover Management.

Microelectronics:

ASIC based communication hardware development, Intelligent Instrumentation, CAD of microelectronic circuits and systems.

Signal Processing:

Speech, audio, video and data compression with applications to multimedia and mobile cellular communication. Space-Time communication systems with emphasis on Antenna array signal processing for mobile cellular communication.

Compiled and edited by:

Dr. D K Anvekar and K V S Hari

The assistance received from faculty,
colleagues and students is greatly
acknowledged.

ECE Golden Jubilee Organizing Committee

5. ECE STRENGTH

1. PREAMBLE

1.1 For any academic institution, the students and alumni together with the faculty members constitute the main strength. This is no exception for the Department of Electrical Communication Engineering which has a record of student training of nearly 65 years, first as a section in the Department of Electrical Technology (1929 - 30 to 1945 - 46) and then as an independent Department (from 1946-47 onwards). The conferments from the Department include PhD, MSc(Engg) (earlier AllSc), ME (earlier DIISc (PG)), BE (earlier DIISc/Cert. of Prof.) and PG Diploma. The names of all the students who received their Degree/Diploma conferments from the Department, as extracted from the records at the Institute, are given below programme wise and in a chronological order. It is interesting to note that this list indeed presents "who is who" in electronics and communication engineering in India and also includes a number of foreign students. For making the list more interesting, the thesis titles (including names of supervisors) are also given in the case of research conferments (viz., PhD and MSc (Engg)). A gradual, but clear shift in the research areas and emphasis can be seen here, almost in line with the global trends in ECE.

a) ECE RESEARCH CONFERMENTS
Ph.D DEGREE AWARDS

Sl No.	Year of Award	Name of Student	Thesis Title	Res. Supervisor
01	1962	B S Sonde	A Portable Transistorized Radiation Field Actuated Lightning Flash Counter	S V C Aiya
02	1962	M Satyam	Some Aspects of Atmospheric Noise Interference	S V C Aiya
03	1964	N Seshagiri	Some Analytical Techniques for Bounded Media Problems in Field Theory	S V C Aiya
04	1964	V Ramachandran	Some Studies on Exponential Transmission Lines	B S Ramakrishna
05	1964	P J Joglekar	-----	S V C Aiya
06	1965	S V Dobadghao	An Automatic Pulse Repetition Frequency Multiplication Techniques	S V C Aiya
07	1966	Anand Kumar	Tapered Dielectric Rod Aerials	R Chatterjee
08	1968	S N Gupta	Effect of Receiver Bandwidth on Atmospheric Radio Noise Bursts	S V C Aiya
09	1966	K P Zacharia	Surface Wave Resonator	S K Chatterjee
10	1967	A Prabhakar	Generalized Topological Formulas for Linear Network Functions	S V C Aiya
11	1967	V Subramanian	-----	S K Chatterjee
12	1970	N S Jayanti	Data Communication in the presence of Atmospheric Noise Bursts	S V C Aiya
13	1970	M S Ramachandraiah	A Study of Diffraction and Backscattering of Electromagnetic Waves by Circular Dielectric discs at Xband	S K Chatterjee
14	1970	S J Bhat	Atmospherics at VHF	S V C Aiya
15	1970	K Ramaswamy	An Atmospheric Noise Burst Generator	S V C Aiya
16	1970	G Bhanumurthy	-----	S V C Aiya

Sl No.	Year of Award	Name of Student	Thesis Title	Res. Supervisor
17	1971	H M Girija	Metal Disc-loaded Summer field Surface wave length	S K Chatterjee
18	1971	G V Anand	Nonlinear Vibrations of Stretched Strings	B S Ramakrishna
19	1971	M J S Rangachar	Some characteristics of Atmospheric Radio Noise at 30 & 60 Kilohertz at Bangalore	S V C Aiya
20	1972	K N Shankar	Some Investigations on Circular Cylindrical Corrugated Dielectric Rods	S K Chatterjee
21	1972	B V Rajeswari	Analysis of Fields in Parallel Plate Dielectric Waveguide	S K Chatterjee
22	1973	V S V Mani	A Transistor Operational Amplifier an associated studies in Low Frequency Noise	N S Nagaraja
23	1973	A P Shivaprasad	Some Pulse Characteristic of Atmospheric Radio Noise Bursts at 3 Mhz	S V C Aiya
24	1973	A Ramakrishna Sastry	Atmospheric Radio Noise Bursts as sources of Interference	S V C Aiya
25	1973	R Srinivasan	Auditory Signal Detection Studies	N S Nagaraja
26	1973	M J Zarabi	Studies on Some Electrothermal Phenomena in Semiconductors and Semiconductor Interfaces	M Satyam
27	1973	T Chandrakaladhara Rao	Surfacaewave and Radiation Characteristics of a Circular Cylindrical dielectric Coated Metal Rod	R Chatterjee
28	1973	T S Vedavathy	Dielectric Coated Spherically tipped Metalcane Aerials Excited in the Susymmetric Hybrid Mode	R Chatterjee
29	1974	K S Srinivas	A Study on the Impedence Characteristics of Gas Discharge gaps	M Satyam
30	1974	D Narayana Dutt	Control of Vibration Pattern in Stretched Strings	B S Ramakrishna
31	1974	B Yegnanarayana	Non exponential Decay of Sound in Rooms	B S Ramakrishna

Sl No.	Year of Award	Name of Student	Thesis Title	Res. Supervisor
32	1975	P Krishnamurthy	Synthesis of Antenna Arrays	A Kumar
33	1975	A K Bhattacharyya	Some Investigations on the Model & Radiation Characteristics of Dielectric Spheres excited in the Symmetric transverse magnetic mode in X Band	R Chatterjee
34	1975	P V Ananda Mohan	Negative resistance in Bipolar Transistors and Some Studies & Applications	B S Sonde
35	1975	K V Viswanatha	Studies on Some Junction Field Effect Structures through Computer Aided Analysis	M Satyam
36	1976	Glory John	A Theoretical Study of Surface Wave Characteristics of a Circular Cylindrical Conductor Coated with two Graded Dielectric Layers embedded in Isotropic & Anisotropic Media	R Chatterjee
37	1976	P A Govindacharyulu	Ionic Conductivity Photo Conductivity and drifts mobility in Single Crystal B-AgI	D N Bose
38	1976	S K Srivastava	Map Synthesis of Single Gate and Multigate Threshold Network	N N Biswas
39	1977	Jayanthi Dilli	Surface Wave and Radiation Characteristics of Overmodel Circular Cylindrical Dielectric Rods	R Chatterjee
40	1977	George Thomas	Linear Block Sources Coding for Binary Memory Less Sources	B S Ramakrishna
41	1978	T K Sen	Surface Wave and Radiation Characteristics of Rectangular Dielectric Rods at X band	R Chatterjee
42	1978	T N Rajashekhar	Low Power Logic Circuits	B S Sonde
43	1978	Ashish Ganguli	Laser Plasma Interactions	R Chatterjee
44	1978	T V Ananthapadmanabha	Epoch Extracation and its Application to Voiced Speech Analysis	B Yegnanarayana

SI No.	Year of Award	Name of Student	Thesis Title	Res. Supervisor
45	1978	N V Srinivasa Rao	Nonlinear D/A and A/D Converters Some new Techniques & Applications	B S Sonde
46	1978	S G Nethaji Sundar Ganesan	Microstrip Antennas at X-Band	R Chatterjee
47	1978	P Radhakrishna Chetty	Space Craft Powersystem Some New Techniques for Improvement	B S Sonde
48	1979	S Vijaya Kumar Sastry	Conformal Antennas	A Kumar
49	1979	K K Srivastava	A Study of Microwave Line Source Antenna for High Speed Scanning	R Chatterjee
50	1979	C R Raghunandan	Subharmonic Superharmonic and Internal Resonance on Strings	G V Anand
51	1979	C R Chakravarthy	Video Signal Processor for AirTraffic Cntrol Radar Beacon Systems (ATACRBS)	B S Ramakrishna
52	1979	Parveen Fatima Wahid	Theoretical & Experimental Investigations on the Dielectric Coated Conducting Sphere Excited in the Symmetric Transverse Magnetomode at Microwave frequencies	R Chatterjee
53	1979	C Rajagopal	Studies on the Electrical Properties of Conductor-Insulator Composites	M Satyam
54	1979	T S Rukmini	Propagation of Microwave in Cosinusoidally Space-Modulated Circular Cylindrical Metallic Corrugated Structures	R Chatterjee
55	1980	K Richard	Nonlinear Random Vibrations of a Continuous System	G V Anand
56	1980	Henry Marx Dante	Multistage Pattern Recognition Schemes for Automatic Speaker Identification & Verification	V SV Sarma
57	1980	K Ram Kumar	Electrical Breakdown in Bipolar Transistorsq	M Satyam
58	1980	R Sivaswamy	Signal Design for Pulse Compression	N S Nagaraja

SI No.	Year of Award	Name of Student	Thesis Title	Res. Supervisor
59	1980	Y Venkataramayya	Acquisition Time Improvement of PLL's Using Aiding Functions - A Study	B S Sonde
60	1980	M Anandan	Coplanar Gaseous Plasma Display	M Satyam
61	1980	N Kalyanasundar	Nonlinear Propagation of Surface Acoustic Waves	G V Anand
62	1980	M Jayaram	Linguistic Analysis of Stuttering Pattern among monlinguals and bilinguals	B S Ramakrishna
63	1981	T G Chandravadivelu	Relative Efficiencies of Devangari & Tamliscripts for Reading and Information Theoretical Study	B S Ramakrishna
64	1981	A Mathialagan	On the Optimization of Control memory and Data paths in the Design Microprogrammed Computers and Microprocessors.	N N Biswas
65	1981	S Ananda Rao	Studies on Wavefront information Storage and Retrieval with Emphasis on Holographic Optical Elements	S V Pappu
66	1981	S Saratchandra Babu	Studies on Some Aspects of Design Development of Neodymium Solid State Lasers & Laserinduced damage in thin films	S V Pappu
67	1981	Satish Chandra Rao Philar	An Algebraic Method for the analysis and Synthesis of Fanout Free Functions	N N Biswas
68	1982	T G Palanivelu	Adaptive Antenna Arrays	A Kumar
69	1982	A Pedar	Reliability Modelling & Architecture Optimization of Aerospace Computing System	V V S Sarma
70	1982	S Venkatagiri Rao	Studies on Some Aspects of Colour Centres of Information Storage in Pure and doped pottasium Chloride Crystals	S V Pappu
71	1982	Sajal Kumar Paulit	Radiation Charactaeristics of the Tapered Rectangular Dielectric Rod Antennas at Microwave Frequencies	R Chatterjee

SI No.	Year of Award	Name of Student	Thesis Title	Res. Supervisor
72	1982	N G Kurahatti	Monolithic Saw Resonator Oscillator	T A Raju
73	1983	H S Shivaram	Some New ADC & DAC Architectures for Realizations of Nonlinear Transfer Functions & their Applications	A P Shivaprasad
74	1983	Arun Kumar Sinha	Study of Microwave Propagation Over Multiple Ridges Using GTD Techniques	A Kumar
75	1984	D V Paradeshi Rao	Studies on Methods of Reducing some cost Parameters in Microprogrammed Digital Computers and distributing Processing Systems	N N Biswas
76	1984	R D Tarey	Thin Films of Indium Oxide Tin oxide and Cold electron Emitting and ultraviolet sensitive devices from them	T A Raju
77	1984	M Venkata Ramana Yogi	A Study of the offset Voltage and its compensation in Operational Amplifiers	M Satyam
78	1984	S R Krishna Murthy	Cylindrically Tipped Cor Reflector Antenna	A Kumar
79	1984	D Lakshminarayana	Ooty Synthesis Radio Telescope	A Kumar
80	1984	V Venkaeswarlu	Conception & Realization of a two Terminal Multilevel Voltage Regulator	T A Raju/M Satyam
81	1984	D K Ravindra	A Digital Correlation Receiver for the Gauribidanur Decametre Wave Radio Telescope	A Kumar
82	1984	H V Anand	Studies on the Effect of Field Plates in Bipolar Transistors	M Satyam
83	1984	Hiroshi Hashida	Subsurface very low Frequency Electromagnetic Wave Propagation	A Kumar
84	1984	I V Ramana	membership Algorithms for dependencies in Relational Databases	N N Biswas

SI No.	Year of Award	Name of Student	Thesis Title	Res. Supervisor
85	1984	S S Murthy	A Four Quadrant MOS Analog Multiplier : Some Studies	B S Sonde
86	1984	K G Narayana	Radiation Characteristics of Rectangular Dielectric Horn Antennas	A Kumar
87	1985	Mohd E M Nasr	Hybrid Adaptive Quantization	A P Shivaprasad
88	1985	H N Shivashankar	Development of Ternary Combinational Circuits using MOS/CMOS Ternary Multiplexers as Building Blocks	A P Shivaprasad
89	1985	S D Mehta	Studies on Improvement of Acoustics Bragg Imaging	A Selvarajan
90	1985	O M Salem	Companding DACs for PCM Telephones CODECS A New Realization	B S Sonde
91	1985	Radhe Shyam Arora	Solid State Local Oscillator Systems for Millimetre Wave Radio Astronomy Receivers	A Kumar
92	1985	Surendra Pal	Spherical Dielectric Antennas	A P Shivaprasad
93	1985	S K Bhattacharyya	Development and Implementation of Computer Based Algorithms for Natural Language Processing	N N Biswas
94	1985	B S Dasannacharya	A Study of Load Dependent Attenuation of saw by Viscoclastic Materials and its Applications	T A Raju
95	1985	C Govardhana Reddy	Curvilinear Antenna Arrays	A Kumar
96	1986	Harjinder Singh	Description-Aided Recognition of handprinted Characteristics	D Narayana Dutt
97	1986	H S Jamadagni	DPSK Modems and Synchronisers - Some new Realization	B S Sonde
98	1986	K Lal Kishore	Studies in the Realization of Varistors with Positive Voltage Coefficient of Resistance Based on Composites	M Satyam
99	1986	L V A R Sarma	Studies in Diffraction Imaging with Emphasis on side-band Fresnel Holograms & their Applications	S V Pappu

Sl No.	Year of Award	Name of Student	Thesis Title	Res. Supervisor
100	1986	M Subbarayudu	Performance of the Eigenvector (EV) Method in the Presence of the Coloured Noise	P S Naidu
101	1986	M D Rajnarayan	Study of Dielectric Resonator Stabilised Gunn Oscillator	T A Raju
102	1986	L Kameshwara Rao	Studies on laser induced Optical & Morphological changes in Obliquely deposited Ge, and PbTe - Films	A Selvarajan
103	1986	V V Krishna Reddy	Quantization Problems in Detourphase Digital Holograms	P S Naidu
104	1986	R Padma	Studies on Thermally Grown titanium Oxide Overlayers on Titanium for Electronic Components	M Satyam
105	1986	Y Venkatarami Reddy	Sea Surface Spectrum from Aerial Photographs Model Studies using Microprocessor Controlled Optical Scanning	P S Naidu
106	1986	S R Bhat	Photovoltaic Pump Optimization Techniques : Some Studies and Results	B S Sonde
107	1987	T Arivoli	Studies on the Realization of Magnetoresistors Based on Composite Materials	M Satyam/ K Ramkumar
108	1988	A T K Shalaby	Unilateral Finlines on Anisotropic Substrates	A Kumar
109	1988	B Gurunath	Logic Minimization Algorithms for VLSI Applications	N N Biswas
110	1988	James Jacob	Design for Testability and Fault Analysis in PLAs & General Combinations Ccts	N N Biswas
111	1988	V D Mytri	Hybrid Technique for Adaptive Delta Modulators	A P Shivaprasad
114	1988	P G Krishna Mohan	Source Location by Signal Subspace Approach and Ambient Noise Modelling in Shallow Water	P S Naidu
115	1988	S V Narasimhan	Parametric Spectral Modelling of Electroencephalograph (EEG)	N N Biswas/ D Narayana Dutt

Sl No.	Year of Award	Name of Student	Thesis Title	Res. Supervisor
116	1988	T N Ruckmoganathan	Some New Addressing Techniques for RMS Responding Matrix LCDs	B S Sonde
117	1988	R Sundaresh Shenoy	Holographic Methods for the Display of Spectrum Image of an Object in a Single Plane & Applications	S V Pappu
118	1988	D K Varughese	Microstrip Elliptical Ring Antenna	A Kumar / T S Vedavathy
119	1989	K Natarajan	Studies on Cast Polycrystalline Silicon and Polysilicon Junctions	M Satyam / K Ramkumar
120	1989	Uma Raychaudhuri	Studies on the Degradation of Tin oxide/Silicon interfaces	M Satyam/ K Ramkumar/ D B Ghare
121	1989	V K Govindan	Computer Recognition of Hand Printed Characters. An Automated Approach to the Design of Recognizers	A P Shivaprasad
122	1989	G Krishnan	Development of Quaternary Ccts Using CMOs Quaternary Multiplexers as Building Blocks	A P Shivaprasad
123	1989	S Srinivas	Dynamically Reconfigurable Architectures for Supercomputing Systems	N N Biswas
124	1990	Chitrasena Bhat	On the Design of Maximum Folded Programmable Logic Arrays for VLSI Systems	N N Biswas/ A P Shivaprasad
125	1990	K S Gurumurthy	Behaviour of Electrically Communication Stressed Thin Silicon Dioxide Engg (SiO ₂) Films	M Satyam
126	1990	Harish M Chauhan	Normal Mode Decomposition Communication & its Applications in Engg. Ocean Acoustics	G V Anand
127	1990	Kuldip Singh	Digital Beam Forming Arrays	A Kumar

Sl No.	Year of Award	Name of Student	Thesis Title	Res. Supervisor
128	1990	K R Kamath	Low-cost Micro-Displacement Measurement Using Opto-Electronic Encoders : Some Studies & Results	B S Sonde
129	1990	Dinesh K Anvekar	Programmable Nonlinear ADCs - Some New Techniques	B S Sonde
130	1991	Mathews K George	Normal Mode Acoustic Propagation in Isovelocity an Ocean with a Rough Surface	G V Anand
131	1991	S Chitrlekha	Studies on the Role of Spatial Coherence in the Lau Phenomenon	S V Pappu
132	1991	S Ramamohana Rao	Study of some Thermal Design Problems in High Density SMT/Hybrid Micro-circuit Assemblies	M Satyam
133	1992	Subrat Kar	Self-Routing in Some Novel Photonic Switching Architectures	A Selvarajan
134	1992	L S Biradar	SVD - Based Criteria for Detection of the Number of Damped/ Undamped Sinusoids in Noise and Their Parameter Estimation	V U Reddy
135	1992	M V Satyanarayana	Analysis of Electrooptic Waveguide Modulators using Finite Difference Feromulations	A Selvarajan
136	1992	C Guruprasad	Some Studies on Negative Resistance Behaviour Associated with MOSPLT	M Satyam
137	1992	P R Suresh	Some Electrical Characteristics of Grain Boundaries in Cast Polysilicon	M Satyam
138	1993	T Srinivas	Applications of Coupled Mode theory to Fiber and Integrated Opric Waveguide Structures	A Selvarajan
139	1993	R A K Rashid	Analysis & Synthesisof Curvilinear Antenna Arrays	A Kumar
140	1993	M V S Lakshmi	Some Investigations on the Development of Electronic Components Based on Superconducting Films	M Satyam

Sl No.	Year of Award	Name of Student	Thesis Title	Res. Supervisor
141	1993	Lilly Kutty Jacob	Performance Analysis of Scheduling Strategies in Switching and Multiplexing of Multiclass Variable Bit Rate Traffic in an ATM Network	Anurag Kumar
142	1993	A Chockalingam	Design and Performance Study of a Media Access Control Protocol for Wireless LANs	P Venkataram
143	1993	K C Indu Kumar	Analysis of Some Smoothing Techniques with Applications to Narrowband/Broadband Beamforming and DOA Estimator	V U Reddy
144	1993	R Radha Krishna Pillai	Performance of Multiaccess Dual Slotted Unidirectional Bus Network	Utpal Mukherji
145	1994	G M Rather	New Clock Synchronization Techniques for Digital Telecommunication Networks	B S Sonde
146	1994	George Mathew	Development and Analysis of Algorithms for Eigen Subspace Estimation	V U Reddy
147	1994	H R Udaya Shankar	Broadband Source Localization in a Wedge shaped Shallow Sea	P S Naidu/ T S Vedavathy
148	1994	Riadh W Y Habash	Non-Invasive Microwave Hyperthermia	A Kumar
149	1995	R Balasubramanian	Studies on Second Order Non-Linear Effects in Optical Guided Wave Structures	A Selvarajan
150	1995	B Prabhakara Rao	Performance Analysis of Multi Image Subspace Algorithm for Source Localization in Shallow Water	P S Naidu
151	1995	P K Sadasivan	Signal Processing Algorithms for Minimization of Artefacts in Electroencephalogram	D Narayana Dutt
152	1995	Shiva Kumar	Propagation and Interaction Studies on Optical Waves in a Cubically Non-Linear Medium	A Selvarajan

Sl No.	Year of Award	Name of Student	Thesis Title	Res. Supervisor
153	1995	N S Shashidhar	A Study of the Inverse Problem of Ocean Acoustic Tomography Using Regularization Techniques	G V Anand
154	1995	Joy Kuri	Optimal Control Problems in Communication Networks with Information Delays and Quality of Service Constraints	Anurag Kumar
155	1995	S R Nagesh	Synthesis of Arbitrary Antenna Arrays	T S Vedavathy
156	1996	Manju Sarkar	lambda Bipolar Transistor (LBT) in Shatic Random Access Memory Cell	M Satyam
157	1996	U K Revanakar	Three Layer Electromagnetically, Coupled Circular Microstrip Antennas	A Kumar
158	1996	V Udaya Shankar	DSP Techniques for Performance Enhancement of Digital Hearing Aid	A P Shivaprasad

(b) ECE RESEARCH CONFERMENTS

AIISc / M.Sc. (Engg.) DEGREE AWARDS

Sl No.	Year of Award	Name of Student	Thesis Title	Res. Supervisor
01	1954	N N Biswas	Electrical Tele Typewriter Transmitter	H C Basak/K K Nair
02	1957	V Rajaraman	Function Generatorions for an Electronic Differential Analyses	N S Nagaraja
03	1961	H R Ramanujam	Some Investigations on Dielectric Rod Aerials	R Chatterjee
04	1962	T K Ramaswamy	A New Technique for Obtaining Sound Spectrograms	B S Ramakrishna
05	1971	H M Girija	Metal Disc-loaded Sommerfeld Surface wave length	S K Chatterjee
06	1973	Soumitri Swamy	Identification & Realization of Totally Sequential Machines	S V Rangaswamy
07	1974	Swarnagowri Virupaksha	Some investigations on dielectric coated spherically tipped perfectly conducting conicalaerials excited on symmetrical T M Mode	R Chatterjee
08	1974	Narendra Mohan Dube	Surface elastic wave delay lines using interdigital transducers	T A Raju
09	1976	H R Manjunath	Some studies with hololens optical spatial frequency processing systems	S V Pappu
10	1977	M G Sriram	Some information theoretic and signal detection problems in the context of nearly gaussian densities	J. Krishnamurthy
11	1982	T Arivoli	Characteristics of junction field effect transistors (JIETs) under electrical breakdown	M Satyam
12	1983	K Sree Kumari	Studies of SCR's (to determine the suitability of two transistors model for represently SCRs).	M Satyam
13	1983	Syed Asadulla Bokhari	Microstrip and wire antenna arrays"	A Kumar
14	1983	B Selvan	Design of fiber opticlink for local area communication network	A Selvarajan
15	1984	Paul Pravin	Techniques for improving computational speed of fastwalsh & fast hear transforms using	A P Shivaprasad

SI No.	Year of Award	Name of Student	Thesis Title	Res. Supervisor
16	1985	V Nagarajan	Some issues in computer communication A simulations study	A Selvarajan
17	1985	A K Subramanian	Openended rectangular waveguidd radiations	A Kumar
18	1985	K Soumyanath	Dsign and performance studies on bus-based multi-micro computer systems	A P Shivaprasad
19	1985	Nemichandramma	Dielectric-coated corner reflector	A Kumar
20	1985	Paul Anthony	Studies on acoustic absorption in partialate composites	A Kumar
21	1985	A Senthil Kumar	Coherent optical image deblurring with computer generated fourier plane filters	A Selvarajan
22	1986	M K Ravishankar	-----	S V Pappu
23	1986	C Karthikeyan	Studies on sound transmission in shallow sea	G V Anand
24	1986	K Kalpagam	Micro-computer controlled automatic image focusing system	P S Naidu
25	1986	S Narasimha Prasad	Analytical study of some aspects of cross talk in wave length division multiplexing based fiber optic systems	S V Pappu
26	1986	Nidrita Mitra	A simplified approach for word length reduction of control memory of microprogrammed processers	N N Biswas
27	1986	V Mushtaq Ali	A Token ring local area network for small systems application	A Selvarajan
28	1987	C Guruprasad	A feasibility study on the synthesis of the acoustic absorbers based on layered composites	M Satyam
29	1988	D S Babu	Some studies on automatic repeat request error-control shemes	T S Vedavathy
30	1988	M V S Lakshmi	Studies on metal-oxide semiconductor structures on polycrystalline silicon	M Satyam

SI No.	Year of Award	Name of Student	Thesis Title	Res. Supervisor
31	1988	N G Vijaya Vittala	Random jumps of a duffing oscillator under narrow-band random excitation	G V Anand
32	1988	C Rameshu	Study & development of four commonly used temperature indicators for indl.temperature instrumentation	A P Shivaprasad
33	1989	Trishala Dharanendra	A Fault-tolerant centrally controlled omega network for SIMD systems	N N Biswas
34	1989	S Ravishankar	Waveform mapped multiplexing an alternative methodology for multiplexing plesiochronous channels	A Selvarajan
35	1989	K Anil Kumar	Passive localisation of sound source in shallow waters-simulation studies	P S Naidu/ T S Vedavathy
36	1989	A R Mathews	A framework for service characterization & link management in ON	T Viswanathan
37	1989	George Mathew	Application of exponential power estimator for speech coding	A P Shivaprasad
38	1990	Aravind Mathur	Holoconnector for single-mode optical fibres: Theoretical analysis and design	S V Pappu
39	1990	R Sujatha	Log-periodic array of circular microstrip patches	T S Vedavathy
40	1990	V Sundara Vadivel	Normal mode wave propagation in an ocean with a wavy surface	G V Anand
41	1990	Saugata Pramanik	A hybrid knowledge-based system for process plant fault diagnosis	P Venkataram
42	1990	C N S Ganesh Murthy	A Study on bandpassed speech from the point of intelligibility	M Satyam
43	1990	K J Raghunath	Performance analysis of MVDR beamformer in finite data with and without spatial smoothing	V U Reddy

SI No.	Year of Award	Name of Student	Thesis Title	Res. Supervisor
44	1990	Satish M Kulkarni	DPLLS for network synchronization A new approach	B S Sonde
45	1990	Shiva Kumar	Transform techniques for optical wave guides	A Selvarajan
46	1991	Rajeev Shorey	Performance analysis and scheduling of stochastic form jim jobs in a multicomputing system	Anurag Kumar
47	1991	T Badrinarayana	Downward trimming of thick film resistors	M Satyam
48	1991	Gummad Sreenivas	Simulation of surface profiles due to vapour deposition in straight lines	M Satyam
49	1991	N Jayaprakash	A PC-based interferometer for radio anstronomy	B S Sonde
50	1991	R Subrayan	Effects of impulse noise on digital UHF LOS links and countermeasures	T S Vedavathy
50	1991	T V J Ganesh Babu	Analysis of the end-to-end performance of integrated services networks	Anurag Kumar
51	1991	H R Ramanujam	Modulo-PCM codec implementation using single TMS 32010 digital signal processor	A P Shivaprasad
52	1992	B K Jayaram	Analysis of buffering for a shared medium fast packet switch	Utpal Mukherji
53	1992	Srikrishna Kurapatti	Scheduling a processor executing a layered communication protocol	Anurag Kumar
54	1992	K R Srinivas	Finite data performance of the music and minimum norm methods with sensor gain and phase errors	V U Reddy
55	1993	A Ramakrishna	A Novel instrumentation and communication system for GMRT	B S Sonde
56	1993	S Mathiarasan	Subspace splitting algorithm for wave packet generation and its application in channel modelling	V U Reddy

SI No.	Year of Award	Name of Student	Thesis Title	Res. Supervisor
57	1993	Mahadev Gurunath Lad	Laser patterning and automated loss measurements for integrated optics	A Selvarajan
58	1993	P V Nagesha	Ocean acoustic tomography using the normal mode approach	G V Anand
59	1993	P Annachelvi	Guided wave acoustooptic interactions in LiNbO ₃	A Selvarajan
60	1993	R Mahendra Prabhu	Evanescent coupling between fiber and planar waveguides	A Selvarajan
61	1993	Niraj Sachdeva	Bandwidth of linear antenna arrays	T S Vedavathy
62	1993	P Venkatesh Rao	Nulling multiple jammers using phase only techniques	A Kumar
63	1993	Sreenath Settur	A Method of Fault Diagnosis in a Wave Soldering System	----
64	1993	V L Narayana Murthy	Design of some two dimensional filters through transformation for image processing	Anamitra Makur
65	1993	A S Prabhavathy	Robust frequency estimation using auditory representations	T V Sreenivas
66	1993	C R Sreenivasan	Task scheduling techniques for distributed/parallel processing systems	P Venkataram
67	1994	Sampath Napoleon	Analysis of transmission lines with non linear source and loads	M Satyam
68	1994	T Ganesan	A new algorithm for source localization in shallowwater	P S Naidu
69	1994	Suryan Stalin	Optimized neural network dichotomizer for speech recognition	T V Sreenivas
70	1994	Alok Tripathi	Propagation characteristics of planar superconducting microwave transmission lines	T S Vedavathy
71	1994	D S Sivaraj	Optical fiber communication system for the GMRT	A Selvarajan
72	1994	L Srinivas	FIR system identification using higher order cumulants - A generalized approach	K V S Hari

Sl No.	Year of Award	Name of Student	Thesis Title	Res. Supervisor
73	1995	Janardhana Swamy VC	Electronic Access Control Systems:A New Approach	B S Sonde/ D K Anvekar
74	1995	Binoy Joseph	Clustering For Designing Error Correcting Codes	A.Makur
75	1995	Rajarshi Roy	Optimal control for queue length fairness in dual bus networks	Utpal Mukherji
76	1995	Ajit S Bopardikar	Speech encryption using wavelet packets	V U Reddy
77	1995	Kang Jin Ho	Studies on Amorphous Silicon thin films doped with aluminium	M Satyam
78	1995	Yogish K Lavanis	Signal analysis using time frequency representations	K V S Hari
79	1995	A Vasuki	Diffraction tomographic imaging with a circular array	P S Naidu
80	1995	Joy Kuri	Optimal control problems in communication networks with information delays and quality of service constraints	Anurag Kumar
81	1995	S V Gopalaiah	Dynamic channel allocation for integrated voice/data communication A TDM approach	A P Shivaprasad/ P Venkataram
82	1995	Vadde Venkatesh	Phase sensitive estimation of fluorescence lifetime for fiber optic biosensors	Vivek Srinivas/ A Selvarajan
83	1995	Vijay Gautam	Performance analysis of a variation of the distributed queueing access protocol	Utpal Mukherji
84	1996	K Anand	Methods for blind separation of co-channel BPSK signals arriving at an antenna array and their performance analysis	V U Reddy
85	1996	Mala A Shivaprasad	Dynamic Delay Compensation and Synchronization Services for continuous Media Streams	P Venkatram
86	1996	B Subashini	Ray Chaos in Underwater Acoustics	G V Anand
87	1996	C S Aparna	Studies on the Effects of Raman Scattering on the Propagation of Solitons in Optical Fibers	A Selvarajan
88	1996	A Buvaneswari	Estimation of Object Shape From Scattered Field	P S Naidu

(c) UG DEGREE (ECE) CONFERMENTS

Cert of Prof ET(ECE)

1929-30

0001 T K Garudachar
0002 G C Mukerjee
0003 V V Sathe

1930-31

0004 M L Venkataramiah

1931-32

0005 C K Anantharamiah
0006 C M Braganza
0007 N S Krishna Prasad
0008 I S Thiruvengkatachar

1933-34

0009 M S Chandrashekar
0010 P Venkata Rao

1934-35

0011 B V Baliga
0012 T D Chatterjee
0013 T Krishnaswami Rao
0014 S N Mukerji
0015 S Raghunath Rao
0016 T V Ramamurti

1935-36

0017 V Balasubramanyan
0018 J N Kaul
0019 M A Madagavkar
0020 S Pattabhiraman
0021 S Vetrivel

1936-37

0022 S S Aiyar
0023 S R Bhashyam
0024 R K Cowsik
0025 B Y Nerurkar

0026 I L Patel
0027 M Rajeswara Rao
0028 S Tiruvengkatachari

1937-38

0029 N V Gadadhar
0030 K R Karve
0031 T Rajamanikam
0032 K Venkataraman
0033 Y Venkataramiah

1938-39

0034 Gurucharan Das Sethi
0035 V Natarajan
0036 P S Nagarkar
0037 N V Sundara Raja Iyengar
0038 S V Venkataramaswami
0039 A Venkateswaran

1939-40

0040 Y N Gururaja Rao
0041 Harischandra
0042 C Ramachandra Rao
0043 S N Sen
0044 S Visweswaraiya
0045 G Ramanathan
0046 K N Ghosh
0047 Manjit Lal
0048 K Ramaswamy

1940-41

0049 D C Bhattacharji
0050 K C Chabra
0051 M J Gandhi
0052 P Jayapal
0053 H L Khosla
0054 C R Krishnamurthy
0055 C G Nagaraj
0056 C J N Nazarath
0057 N C Ray

0058 K R Srinivasan
0059 G Seshadri
0060 G Prabhakar Rao Nayudu

1941-42

0061 C D Ayyar
0062 S Banerjee
0063 V Ganesan
0064 K N Gopalakrishnan
0065 C R Krishnasarma
0066 M R Seshadri Iyengar
0067 C R Tirumalai
0068 K Venkitaraman

1942-43

0069 S K Ganguly
0070 Joginder Singh
0071 A A Khan
0072 S M Nabar
0073 A K Nabi
0074 N S Nagaraja
0075 G Pattabhiraman
0076 N S Satyanarayanan
0077 S N Visveswaraya
0078 T R Jayaraman

1943-44

0079 A K Ghosh
0080 G S Malhan
0081 S T Kagali
0082 Mohd. Mokleswar Rahman
0083 M G Samant
0084 M V S Ramamurthy

1944-45

0085 P V Balakrishnan
0086 Jayantilal Gulabchand
Shah
0087 Sachindra Mohan Sen
0088 S M Kapur

0089 Om Prakash Nayyar
0090 G Subramanyan
0091 K N Abraham Muthalaly
0092 Saifuddin
0093 Sudarshan Lal

1945-46

0094 D C Kar
0095 K M Kotadia
0096 M S Krishna Murthy
0097 N D Mishra
0098 C W Masand
0099 R Natarajan
0100 R Parthasarathy
0101 N J Joshi
0102 M Raja Rao
0103 K M Roy
0104 V Ramakrishna Rao
0105 P S Sethuram
0106 S Sreenivasachar
0107 Jishnu Rao

1946-47

0108 S M Varadarajan
0109 M V Krishnaswamy
0110 M S Nagarajan
0111 Ramakrishna Natarajan
0112 V Balasubrahmaniam
0113 K V Rama Murthy
0114 S Ramabadran
0115 Ramaswamy
0116 V Ramasubrahmaniam
0117 K Narayana Swamy
0118 H R Jagasia
0119 P K Palit
0120 H S Visweswariah
0121 P S Srinivasa Modaliar
0122 V R Chander

DIISc (ECE)**1947-48**

0123 M Harnath
 0124 R Parthasarathy
 0125 R Radhakrishna Rao
 0126 K Ramachandra Rao
 0127 R Ramakrishnan
 0128 V Sahasrabudhe
 0129 S Sampath
 0130 Rabindranath Ghosh
 0131 G R Narasimhan
 0132 T V Srirangam
 0133 R Subrahmanyam

1948-49

0134 H V Badrinath
 0135 H R Bapuseetharam
 0136 I S Bhatnagar
 0137 J N Bhandari
 0138 J N Bisaria
 0139 H D Krishna Prasad
 0140 R Nagaraja Rao
 0141 K S Prabhu
 0142 K V Seshadri
 0143 S Seshu
 0144 V P Narula
 0145 M H Venkatachalamurthy
 0146 M M Fotedar

1949-50

0146 C L Agarwal
 0147 K L Bhatnagar
 0148 L Fegredo
 0149 V Chandrasekharan
 0150 S Krishnamurthy
 0151 D M Lam
 0152 T K G Menon
 0153 N Mohanty

0154 P V V Sastry
 0155 V Srinivasa Rao
 0156 B S Srivathsan
 0157 T S Venkoba Rao
 0158 K Krishna Nair

1950-51

0159 Aditya Kumar Kamal
 0160 J P Bhargava
 0161 A P Chowdhury
 0162 P V Indiresan
 0163 B V Jaya Rao
 0164 G B Meemamsi
 0165 Nirmal Kumar
 0166 B H Shanta
 0167 C P Sharma
 0168 B Siva Rao
 0169 K C Sondhi
 0170 V Srinivasachary
 0171 K N Tiwari
 0172 K Vittal Nayak

1951-52

0173 S Ramakrishna Aiyar
 0174 P K Balakrishnan
 0175 M S Barnela
 0176 N N Biswas
 0177 Subhash Chandra
 0178 S C Chaudhuri
 0179 B N Jayaram
 0180 A K Joshi
 0181 Kutubuddin Khan
 0182 V N Mathur
 0183 U D Nagaraja Rao
 0184 P Nayak
 0185 P K Pai
 0186 K T Sastry
 0187 B S Gopakrishna Setty
 0188 C R Venkata Rao
 0189 N Venkateswarlu

1952-53

0190 G N Chaturvedi
 0191 V N Chiplunkar
 0192 G V Desai
 0193 V Krishnan
 0194 Ish Kumar
 0195 R B Lall
 0196 S C Mathur
 1097 S C Mishra
 1098 C Rama Bai
 0199 Satyapal
 0200 S R Seshadri
 0201 P Ramadas Shenoy
 0202 Man Mohan Sondhi
 0203 K S Sree Prakash
 0204 H G Sutradhar
 0205 B S Venugopalan

1953-54

0206 S Acharya
 0207 B Bhargava
 0208 K B Borker
 0209 S C Dubish
 0210 K R Jaya
 0211 P C Khare
 0212 Y N Keshavamurthy
 0213 C M Khorana
 0214 S Krishnaswami
 0215 H C Mathur
 0216 P S Sampath Kumaran
 0217 M P Singh
 0218 R Somasundaram
 0211 B Vasudeva Rao
 0212 C Satyanarayana
 0213 R P Subrahmanyam
 0214 V Nagendra
 0215 M J Viswanath

1954-55

0216 B S Atal

0217 S N Contractor
 0218 O P Gandhi
 0219 S C Gupta
 0220 B V Keshavan
 0221 P B Krishnaswamy
 0222 L S Manavalan
 0223 M N Mathur
 0224 T R Narasimha Rao
 0225 S R Pavanamurthy
 0226 N S Ramachandra Murthy
 0227 V Rajaraman
 0228 T V Satyanarayana
 0229 A P Singh
 0230 C S Upadhyay
 0231 K Venkataraman
 0232 R P Wadhwa

1955-56

0233 M N Amritalingam
 0234 V Balasubramanian
 0235 K R Banerjee
 0236 Bharat Kumar Choudhury
 0237 S K Ghosh
 0238 M P Gupta
 0239 Kailash Chandra
 0240 K A Krishnan
 0241 K K Mathur
 0242 Raghu Nath
 0243 V Ramakrishna
 0244 C V Ramachandran
 0235 V Ramachandran
 0236 D P Rastogi
 0237 D K Sachdev
 0238 S K Suri
 0239 Y Nayudu
 0240 G T Narayan

1956-57

0241 B T Baliga
 0242 M P Bhandari

0243 B K Chopra
 0244 P P Gupta
 0245 C Krishna Murthy
 0246 S C Padhi
 0247 M D Pai
 0248 J Ranganath
 0249 S P Sachdev
 0250 M N Srikantaswamy
 0251 A Srinivasa Murthy
 0252 R Subramanyan
 0253 R Aswathanarayana Rao

1957-58

0254 N G Anantha
 0255 K C Chhabra
 0256 R P Gupta
 0257 P Kameswara Rao
 0258 D Kuppa Swamy
 0259 N C Mathur
 0260 E S Narayana Murthi
 0261 H N Mahabala
 0262 K S Prasanna Kumar
 0266 H R Ramanujam
 0267 V V Rampal
 0268 N Sivambaramanian
 0269 K Venkata Reddy
 0270 K Venkatasubramanyan
 0271 A Sridhara Murthy
 0272 R Balasubrahmanyam

1958-59

0273 G K Aggarwal
 0274 Anand Kumar
 0275 R K Arora
 0276 N H Godhwani
 0277 B N Prasanna
 0278 D V Ramachandran
 0279 T K Ramaswamy
 0280 S S Sanssguri
 0281 G S Srinivasa Murthy

0282 R C Vatsa
 0283 T R Viswanathan
 0284 H V Anantharamaiah
 0285 P Ramakrishna Rao
 0286 P S Mullick
 0287 D N Upadhyay

B E (ECE)

1959-60

0288 C R Chakravarti
 0289 R Chandrasekaran
 0290 R S Goda
 0291 D C Gupta
 0292 J G Kale
 0293 N K Kumaraswamy
 0294 N V Nayak
 0295 M S Nalini
 0296 M D Rajanarayana
 0297 Ramakant Gupta
 0298 C M Ramakrishna
 0299 R N Sharma
 0300 C R Sridhar
 0301 B Srinivasa Murthy
 0302 B K Sen Gupta

1960-61

0303 S N Gupta
 0304 P Ramaraya Kini
 0305 J N Tripathi
 0306 V Krishna Murthy
 0307 P Kotiveeraiah
 0308 A A Shamim
 0309 Y C Kesava Reddy
 0310 Kamalini Dash
 0311 H Kasturi Bhavani
 0312 V K Prabhu
 0313 B K Andal
 0314 M Narayana Swamy
 0315 K S Meghashyam

0316 R Narayanan
 0317 H S Chandramouli
 0318 K C Gupta
 0319 M V Srinath
 0320 A Prabhakar
 0321 L Sudhakara Rao
 0322 V Shanmugasundaram

1961-62

0323 R Aghoran
 0324 Brij Bhushan Goel
 0325 N Balagopala Sarma
 0326 D A Gopalakrishna
 0327 G Gopalakrishna
 0328 R Hariharan
 0329 J S Sharma
 0330 D Madhavan
 0331 K V Namjoshi
 0332 Nilamani Mohanty
 0333 G Nagaraja Rao
 0334 K Natarajan
 0335 P K Verma
 0336 C R Ramachandran Nair
 0337 S B Ramachandra Rao
 0338 H N Ramamurthy
 0339 M P Subramanian
 0340 Satish Puri
 0341 S N Shabde
 0342 Trilochan Padhi
 0343 Vijay Dayal
 0344 K Varadarajan
 0345 S Yegna Narayan
 0346 Y P Singh

1962-63

0347 A K Agrawal
 0348 A K Setty
 0349 M Bharathi
 0350 U Bharati
 0351 G Dorairajulu

0352 H D Sharma
 0353 H M Joshi
 0354 C K Kalevar
 0355 V G Krishna Murthy
 0356 G Krishna Rao
 0357 T Lakshmi Dwaraknath
 0358 V S U Mani
 0359 C V Natarajan
 0360 G Prabhavati
 0361 R Rajagopalan
 0362 M Ravi Sankar
 0363 N Suresh
 0364 K Sankar
 0365 A K Shrivastav
 0366 C Satyanarayana
 0367 K R Shantha
 0368 R Viswanathan
 0369 S Vasantha
 0370 Pradeep Murthy
 0371 K Vijaya Raghavan
 0372 Madan Kumar Shrestha
 0373 K U Ahmed
 0374 B V Venkatesh

1963-1964

0375 R Ananda Rao
 0376 S R Bhat
 0377 S Bhargava
 0378 S Chandrashekar
 0379 M Chaturvedi
 0380 R L Dass
 0381 G Gopalakrishnan
 0382 Kranti Kumar
 0383 C M Kudsia
 0384 V Mitter
 0385 S B Pai
 0386 A Prathima
 0387 H Ramakrishna
 0388 A Ramakrishna Sastry
 0389 S C Sharma

0390 K R Srinivasan
 0391 P S M Sundaram
 0392 K V Venkatachary
 0393 B Yeganarayana
 0394 R Lakshmipathi
 0395 P S Adilakshminarayana
 0396 A K Sinha
 0397 K Ramakrishna
 0398 M V Lele
 0399 M S Vasudeva
 0400 S Krishna Murthy

1964-65

0401 Ashok Kumar Bhatt
 0402 K V Bhat
 0403 S B Bapat
 0404 A Gulatii
 0405 N S Jayant
 0406 T S Jayashankar
 0407 Lalitha Dareshwar
 0408 S S Madan
 0409 R Nagaraja
 0410 Prem Chandra Agarwal
 0411 Manjula Bhushan
 0412 C V Ramanarayana Babu
 0413 K Ragunathan
 0414 R V Ramakrishna Sastry
 0415 P M Ramachandra
 0416 K Ramakrishna Hegde
 0417 S Raman
 0418 Raghuvir Rai
 0419 Ram Manohar
 0420 A P Shivaprasad
 0421 S V Simhadri
 0422 K S Srinivas
 0423 P Vasantha
 0424 S Vijayakumar Sastry
 0425 T B Lakshmana Rao
 0426 M Hari Sankar

1965-66

0427 K B Arya
 0428 C A Athavale
 0429 T Chandrakaladhana Rao
 0430 S Iyaswamy
 0431 Jayanth Manjeswar
 0432 J R Joshi
 0433 N Kowsalya
 0434 M M Lele
 0435 H R Parthasarathy
 0436 R Ramaprasan
 0437 H N Saraswathi
 0438 G Satyanarayana Raju
 0439 K Sivaraman
 0440 B L Sopori
 0441 Sita S Nagarkar
 0442 Thirunarayana Iyengar
 0443 S N Upasam
 0444 R L Verma
 0445 V Venkateswarlu

1966-67

0446 A Gopalakrishnan
 0447 D V Giri
 0448 Harijinder Singh
 0449 C A Jayanti
 0450 R P Jayashree
 0451 R Janardhanan
 0452 S C Khanna
 0453 S N Kukreja
 0454 P N Mehra
 0455 S L Mittal
 0456 A D Mundra
 0457 N Narasimha Sastry
 0458 S L Narasimha Murthy
 0459 A K Narasimha Prasad
 0460 L Parthasarathi
 0461 N Parthasarathy
 0462 K P R Prabhu
 0463 A J Prakash Kumar

0464 N Ranganathan
 0465 B N Sathya
 0466 A K Saxena
 0467 T B Sarma
 0468 K V Shenoy
 0469 S Subramanian
 0470 Surinder Kumar
 0471 B S Venkata Raman

1967-68

0472 Amitabhu Sahu
 0473 S S Chandran
 0474 A R Das Gupta
 0475 S B Navathe
 0476 D V Sarwate
 0477 R K Aggarwal
 0478 Amarjit Nayyar
 0479 K R Augustine
 0480 D K Mehra
 0481 S Gita
 0482 K P Lakshmanan
 0483 H S Nagaraja
 0484 R C Narang
 0485 M C Padakannaya
 0486 S Ramadorai
 0487 R S Singh
 0488 P Ramesh Nayak
 0489 M V Raja
 0490 V Ramaiah
 0491 E S Rama Das
 0492 A N Shastri
 0493 N Sitaram
 0494 V Surya Kanthi
 0495 K U Limaye
 0496 K V Viswanatha
 0497 Y P Sehgal

1968-69

0498 S Raghu Kumar
 0499 Subash N Tadani

0500 S Govind
 0501 T L Keshava Murthy
 0502 H V Rajeevalochanam
 0503 K Usha
 0504 K Nagaraj
 0505 G S Ramakrishna
 0506 M S Geetha
 0507 Disa Salvedev
 0508 G K Seenivasa Gopalan
 0509 P Sundara Murthy
 0510 Sumana S Das Gupta
 0511 Anil Mahanta
 0512 Arun N Kshirsagar
 0513 Bharat Kumar Bhargava
 0514 Gourishankar Mishra
 0515 Ashok Kumar Gupta
 0516 D B Padma
 0517 Pradeep Bhargava
 0518 S K Parikh

1969-70

0519 S P Mehra
 0520 A Haridas Udupa
 0521 Shyam Sundar Arora
 0522 N Tandom
 0523 G Venugopal
 0524 Vimal Kishore Dubey
 0525 N Lalitha
 0526 C V Chakravarthy
 0527 R Nagendran
 0528 H S Sathyanarayana
 0529 P L Agnihotri
 0530 S N Srihari
 0531 M K Anantha Swamy
 0532 Malathi Sankara Raman
 0533 G R Maganti
 0534 H S Raina
 0535 K Ramachandra Kini
 0536 B G Satyanarayana
 0537 Bharat Kumar S Shah

0538 B S Sridhara
 0539 B R Ramamani
 0540 V Ashok Kumar
 0541 S K Puri
 0542 R L Raina
 0543 V K Mishra
 0544 S K Singal
 0545 A P Bhargava
 0546 L Shama Sundar

1970-71

0547 Chandrashekar Murthy
 0548 R Shrivastava
 0549 M C Mittal
 0550 T V Ananthapadmanaba
 0551 S V Joshi
 0552 V H Patel
 0553 P Varadarajan
 0554 Harish Kumar
 0555 B Damodar Baliga
 0556 S Jayasimha Prasad
 0557 D A Mohan
 0558 A K Pujari
 0559 M Srinivas Bhat
 0560 V Anantha Ramaiah
 0561 S Uma
 0562 K Subramanian
 0563 M R Ramachandran
 0564 Satish T Pingat
 0565 V K Mandlekar
 0566 Jai Krishan Hakha
 0567 P N Bhat
 0568 T N Kundra
 0569 A K Bhutani
 0570 V K Garg
 0571 S K Mithal
 0572 V K Saini
 0573 S Hariharan
 0574 M S Ramasubramanya

1971-72

0575 P Vadiraja Acharya
 0576 C N Ajit
 0577 Annie Thomas
 0578 Kasturirangan
 0579 S R Nagaraj
 0580 V S Nagaraj
 0581 Patanjali Chowdhary
 0582 H V Prahlad
 0583 K S Ranganathan
 0584 V Sai Deep Chand Rathnam
 0585 Surendra Pal Singh
 0586 Birpal Singh
 0587 G M Patel
 0588 Anil Kumar Pandey
 0589 A Pampathy
 0590 Ravi Venkataraman
 0591 S D Shamasundara
 0592 K T Tukol
 0593 Vrateesh Prakash Mithal
 0594 K Viswanathan
 0595 H N Shamasundara
 0596 N Kalyana Sundaram
 0597 N Subramanian
 0598 K Parvathy
 0599 M R Stracey
 0600 P Vasumathi
 0601 S V Narasimhan

1972-73

0602 Raj Varadhan
 0603 H R Chandra Shekara Rao
 0604 M B Muralidhar
 0605 B R Suresh
 0606 R V Bindumadhavan
 0607 M V Mohan
 0608 Sushil Chand Jain
 0609 Kaushal Kumar Dhar
 0610 V V Rangasen

0611 Rakesh Kumar Agarwal
 0612 K Chandra Sekhar
 0613 H R Manjunath
 0614 P Krishnamurthy
 0615 K B Sundaram
 0616 Ramesh Chandra Gard
 0617 Ashok Kumar Bhattacharya
 0618 E S Dattatreya
 0619 V Ranganathan
 0620 Uday S Shukla
 0621 Md Takiur Rehman
 0622 K A Balasubramanian
 0623 N Venkateswaran
 0624 K R Gopinath
 0625 Ajit Singh

1973-74

0626 Umeshwar Dayal
 0627 Abhijit Majumdar
 0628 Mukul Ranjan Verma
 0629 Sudhir Saxena
 0630 P Jayapalan
 0631 Satish Chandra Mishra
 0632 Pritam Singh
 0633 K S Muralidhara
 0634 K S G Shankar
 0635 Niranjana Kumar Kamani
 0636 Jainendra Kumar
 0637 Kuran Tirumula Narayana
 0638 R Kannan
 0639 K R Lakshmi Kumar
 0640 Trilok Nath Ahuja
 0641 V Nagaraj
 0642 Vinodchandra Bhailalbai Suthar
 0643 S K Shivakumar
 0644 P Rashmikant Shah
 0645 N Bhaskaran
 0646 P Bala Subramanyam

0647 Roop Krishan Pandit
 0648 S V Venkatesh
 0649 K Seetharam Shastri
 0650 V Ebenezer
 0651 D Venugopal
 0652 Vimal Singh Begwani

1974-75

0653 S P Gandhi
 0654 P K Jain
 0655 Chandan Sen
 0656 Ashok V Nadkarni
 0657 Anil Bhushan
 0658 C M Narayanan
 0659 B N Ranganatha
 0660 J Mohanthy
 0661 Y Raja Rao
 0662 V Sampangi Ramaiah
 0663 C Srihari Kumar
 0664 K P Dhaky
 0665 C R Shashidhar
 0666 S S Ukhalkar
 0667 A R Gururaj
 0668 R G Amoor
 0669 Mukesh Kapoor
 0670 A K Sharma
 0671 Shashank Garg
 0672 N Mohan
 0673 S Pushpa
 0674 P Ravi
 0675 M Seetharam Bhat
 0676 K V Gurumurthy
 0677 U R Kamoji
 0678 K Kalyana Rao
 0679 C Ganapathy
 0680 P N Sridhar
 0681 K Seetharama Prasad
 0682 Subrata Sanyal
 0683 Ashok Kumar Pathak
 0684 Rohit N Patel

1975-76

0680 Renuka Prasad Jindal
 0681 Rajiv Kumar Gupta
 0682 A Padma
 0683 Hrushikesh Praharaj
 0684 Krushna Chandra Sahov
 0685 K Suresh Kumar
 0686 Sibratan Agarwala
 0687 Pinaki Mazumdar
 0688 T K Chandra Shekhar
 0689 C S Raghavendra
 0690 Reynold N Welmore
 0691 A V Koundinyan
 0692 K Ravindran
 0693 P S Sathyanarayanan
 0694 Surajit Sen
 0695 K S Ramachandra
 0696 Maddipatla Naga Divakar
 0697 Yadunath Rachandra
 Deshpande
 0698 G K Visweswaran
 0699 Alok Das
 0700 Maleraj Bajantri
 0701 R Mukunda
 0702 Pawarn Kumar Pant
 0703 P Raghavan
 0704 S Vaidyanathan
 0705 R V Prasad
 0706 Hubert P Castelino
 0707 A L Sathyaprakash
 0708 T G Venkateshan
 0709 G Bharat Sastri
 0710 Pradeep Kumar Paliwal
 0711 K V Prahlada Rao

1976-77

0712 Vijaya Ramachandra
 0713 S S Ravi
 0714 Bimal Kishore Prasad
 Saha

0715 Ashok Kumar
 0716 Balakavi Narayana Rao
 0717 R Jayaraman
 0718 Shubhendu Ghosh
 0719 Rosario Mark
 0720 P P Katakai
 0721 N K Vasantharaja
 0722 Pradeep Sharma
 0723 Challapalli Jogeshwar
 0724 Ramood Shridhar
 0725 Byas Ram Sahu
 0726 M Venkata Rayudu
 0727 S Ranganathan
 0728 Bobby Philips
 0729 V S Samara Narayana
 0730 R Venkatesh
 0731 K Muralitharan
 0732 Ghantasala Gangli
 0733 Ravi Kumar Manchanda
 0734 V Narayan
 0735 John Poonnen
 0736 Biswajit Kunurga
 0737 G R Dharmji
 0738 Novellina Razan
 0739 G Marshall Raj

1978-79

0740 G Vijayan
 0741 D Surya Rao
 0742 Pat Reev
 0743 P Srinivasa Raghava
 0744 D Rajagopal
 0745 K Baljit Chander
 0746 R Nagarjuna
 0747 G Ramesh
 0748 Vinod Kumar Goyal
 0749 T N Ananthakrishnan
 0750 Naresh Kumar
 0751 V Venkata Krishna
 0752 Pradeep Vellodi

0753 N Venkatesh
 0754 S K Bhattacharjee
 0755 P Sridhar
 0756 K S Sridharan
 0757 Ashok Kumar Dev
 0758 N Hari
 0759 Manoj Kumar Jain
 0760 S Santhana Krishnan
 0761 S Nagendranath
 0762 Ajaya Kumar Saha
 0763 P S Raghavan
 0764 S E Sridharan
 0765 Ramesh R Bhandarkar
 0766 R Pannerchelvan

1979-80

0767 Prafulla Kumar Nayak
 0768 Satchidananda Naik
 0769 Waheed Ahmed Khan
 0770 K V Pratap
 0771 Subhasish Chakraborty
 0772 Nagaraja Rao
 0773 S Ravichandra
 0774 P Ramesh
 0775 Manas Ranjan Panda
 0776 S Venugopala
 0777 S Sekhar
 0778 P K Chaudhari
 0779 R Sundar
 0780 S Vinayak
 0781 D S Vijayalakshmi
 0782 Santosh Kumar Murthy
 0783 Praveen Sen
 0784 M Mukuntha
 0785 Raja Borgohar
 0786 Lakshmikanth Gupta
 0787 S Narayan
 0788 N Padmanabha
 0789 H S Venkata Shekar
 0790 Jacob Koshy

0791 C Kumaragurupan
 0792 Manoj Verma
 0793 N Rajeeva
 0794 P K Chakraborty

1977-80

0795 P S Gopala Krishna
 0796 Erramilli Ashok Chelam
 0797 Anil Bhatnagar
 0798 J Kumar
 0799 M V Srinivasan
 0800 Sanjee M Katti
 0801 S Shrivaguru
 0802 C Subramanian
 0803 B Muralidharan
 0804 Umanath Nayak
 0805 M Raghupathi
 0806 Vivek Dhawa
 0807 M G Vedayar
 0808 H R Srinivas
 0809 Sridhar Narasimha
 0810 Ajit Kumar Jaan
 0811 H S Ramakrishnan
 0812 C S Hanni
 0813 R Muthukrishna
 0814 V Kannan
 0815 S V R K Prabhakar
 0816 Ramachandra Hansdah
 0817 S K Nandy
 0818 Deepak Narayan Dixit
 0819 S Muralidhar
 0820 K K Pareek
 0821 Indrajit Dutt
 0822 R Kasturi Rangan
 0823 R K Garg
 0824 Deep Tej Singh
 0825 S C Purohit

1980-81

0826 S Prabhakar

0827 V Rangarajan
 0828 P Subbayya Sastry
 0829 K Vijayashankar
 0830 S Chandrasekar
 0831 S Venkataram
 0832 Upaindra Dixit
 0833 K Ram Kumar
 0834 Praveen Kumar
 0835 Anil Kumar Nair
 0836 P T Joseph
 0837 N Gandhara Raj
 0838 Prafulla Kumar Mundra
 0839 M Vancheernam
 0840 S Ramakrishna
 0841 K Viswanath Iyer
 0842 K G Kumar
 0843 K Anantha Narayana Jain
 0844 Charudatta
 0845 N Chandramouleswara
 0846 S Ramesh
 0847 Nirmal Kumar Joshi
 0848 K Padmanabha
 0849 Amit Banerjee
 0850 Aswathnarayan
 0851 B Ravikumar
 0852 A C Sundar
 0853 O M Vasudevan
 0854 B Venugopal Reddy
 0855 Nair Vijay

1981-82

0856 M G Balakrishna Rao
 0857 K Balasubramanian
 0858 Aditya Prasad Pathi
 0859 Sri Bhagwan Bhanu
 0860 Y Narahari
 0861 Santosh Kumar
 0862 Ajay Gupta
 0863 Nina Kiran Srinath
 0864 M Gopi Krishnan

0865 G V Kumar
 0866 M Gopalakrishnan
 0867 G Suresh
 0868 B Sudhakar
 0869 Dilip Kumar Thakur
 0870 A Vasudevan
 0871 Rajeev Tyagi
 0872 N Sridhar
 0873 Gautam Sastri
 0874 A Madana Kumar
 0875 K Ramasubramaniam
 0876 K S Chandra Murti
 0877 S K Ghoshal
 0878 Ajay Bhargava
 0879 T Balasubramanian
 0880 N S Badrinarayana
 0881 K Pramodan
 0882 Ashwani Agarwal
 0883 D Muralidhar
 0884 Johnson Peekiar
 0885 R Sundaraja
 0886 K Sridhar

1982-83

0887 P V Lakshminarayan
 0888 D Raghu Ram
 0889 B Balakrishna Bhat
 0890 A Sudha
 0891 V K Varshney
 0892 Ashok Waran
 0893 Priyadarshan Patra
 0894 G Gopal
 0895 Arul Siromoney
 0896 A Benjamin
 0897 T Mahalinga Bhat
 0898 S Manivannan
 0899 V Neelakantan
 0900 Rajib Mall
 0901 James Jacob
 0902 J K Ramachandran

0903 P V Subramanian
 0904 S Mohan
 0905 V Lakshmi Narasimhan
 0906 D S Shreekanth
 0907 R Venkata Krishnan
 0908 Navin Kumar
 0909 M S Raman
 0910 Ajai Kumar Daniel
 0911 M S Padmnabhan
 0912 K Ramachandran

1983-84

0913 V Ramasubramanian
 0914 S Anantharaman
 0915 R Kanda Swamy
 0916 T K Bhattacharya
 0917 Jayashri Das
 0918 V Raju
 0919 Sanjeev Baskiyar
 0920 Jayashree Seshadri
 0921 Akshaya Kumar Mishra
 0922 Seethuraman
 Panchanatha
 0923 K L Mohan
 0924 P A Joseph
 0925 V Ganesh
 0926 Samuel Philip John
 0927 R Govindarajan
 0928 M Mani
 0929 N Usha Rani
 0930 M G Ranade
 0931 S Jayalakshmi
 0932 M Rajesh
 0933 M Sunil Kumar
 0934 M Kandara
 0935 Daniel Antony Arunkumar
 0936 David Kumar Charlu
 0937 C B Srivatsan
 0938 R Srinivasan
 0939 K Satisha Bhat

0940 N Subramanian
 0941 K Venkataramani
 0942 K S Nagaraja Upadhya

1984-85

0943 Atul Kumar Batra
 0944 Dinesh Verma
 0945 M Jayashree
 0946 R Ganesh
 0947 R Padmanabhan
 0948 Sujatha Subramanian
 0949 M A Sriram
 0950 A R Mathews
 0951 Vinod Nagarajan
 0952 Arvind Kumar
 0953 Bharat Bhushan Ahuja
 0954 M Prakash
 0955 A Ramesh
 0956 Ahmed Fatehally
 0957 R Arvind
 0958 C Subramanyam
 0959 M A Ibadullah Khan
 0960 Davendra Kumar Sharma
 0961 V Ganeshan
 0962 A Narasimha Rao
 0963 V Jayaprakash
 0964 K Srivatsan
 0965 A Sreekantha Pai
 0966 R Radhakrishnan
 0967 C V Balakrishnan
 0968 D Rangan
 0969 A V Paramasivam

1985-86

0970 Y Venkateshwara Prasad
 0971 Marathe Laxman
 Chandrakant
 0972 K C Rana
 0973 Kalpana Padhi
 0974 Paul C Kattukaran

0975 Sonali Ganguly	1988-89
0976 K V L Vasanthi	1006 Rishi Mohindra
0977 D V Marathe	1007 N B Balachander
0978 P Vijayakumar	1008 Sandhya Khanna
Venkateshwar	1009 S Srilakshmi
0979 L Anandavalli	1010 Desouza Maria Merlyne
0980 V Sundarajan	1011 Sanjaykar
0981 Narender Venugopal	1012 R Ravi
0982 Sankar Raman	1013 R Sundararaghavan
0983 N Ramachandran	1014 M R Krishnan
0984 Vinod Ramchand	1015 R Sethuraman
Mirchandani	1016 N Alagappan
0985 G Ravishankar	1017 V Nirupama
0986 V Radhakrishnan	1018 Namrata B Desai
0987 C Sriram	1019 B P Vinaya Kumar
	1020 Sukrishna Dutta
	1021 C Sunder
	1022 S Swarnynathan
1986-87	
0988 Deva Kanta Borahe	
0989 G Gnanasivam	
0990 D S Joe Selvaraj	1989-90
0991 Swati Ray	1023 Uma Kalyanasundaram
0992 Sridhar Subramaniam	
0993 Mendes Edward	
0994 Amitava Chakraborty	
0995 K Nageshwara Rao	
0996 Sukhveer Kaur Ahluwalia	
0997 Rabindranath Basak	
0998 Sanjay Sood	
0999 Mantha Srinivas	
Sitaramaswamy	
1000 V Ganesh	
1001 S V R Anand	
1002 S Srinivasan	
1003 K S R Mohana Rao	
1004 Yogendra Kumar Tyagi	
1005 Venkatesh Kumar	
Varadarajan	

(d) P G DEGREE (ECE) CONFERMENTS

DIISc (PG) (ECE)

1956-57

001 V Ramachandran
002 Kailash Chandra

1957-58

003 M D Pai
004 V Subrahmanyam
005 K P Zacharia

ME(ECE)

1958-59

006 R Balasubrahmanyam
007 K C Chhabra
008 B M Ponnappa
009 M Satyam
010 A L Abdul Sattar
011 P Ramakrishna Rao
012 B Sarkar
013 R O Obilisunder

1959-60

014 R B Edwards
015 S K Ghosh
016 B N Prasanna
017 D V Ramachandran
018 P Ramakrishna Rao
019 Anand Kumar
020 H V Anantharamiah
021 M Madhusudhana Rao
022 V Sivaji Rao
023 R C Vatsa
024 T M Srinivasan
025 B S Chawla
026 S Bhaskaran

1960-1961

027 K Venkataramanan

028 B Srinivasa Murthy
029 C M Ramakrishna
030 S Basavaiah
031 R N Sharma
032 M D Rajanarayan
033 Ramakant Gupta
034 S Sree Ramachandra
Murthy
035 M P Mathur
036 U R R Narendra
037 M V Ramana Reddy
038 R Chandra Sekaran
039 J G Kale
040 M V Kharche

1961-1962

041 Alokanda Mitra
042 Ali Akbar Shamim
043 H S Chandramouli
044 C Dattatreya
045 K C Gupta
046 S N Gupta
047 V Krishnamurthy
048 P N Kekatpure
049 Kamalini Dash
050 D K Paul
051 P Ramaraya Kini
052 A Prabhakar
053 J N Tripathi
054 D S Venkateswarulu

1962-63

055 K Appa Rao
056 H C Gulati
057 G Gopalakrishna
058 D A Gopalakrishna
059 J P Gaur
060 S G Joshi
061 K Natarajan
062 K V Namjoshi

063 H N Ramamurthy
064 Shiromani Agrawal
065 Sudhakara Reddy
066 M V Srinath
067 Dipti Dass
068 D Madhavan
069 Nilamam Mohanty

1964-65

070 A Badrinath
071 M Bharathi
072 V Bharati
073 T Lakshmi Dwarakanath
074 V S V Mani
075 Y V L Narasimha Rao
076 G Prabhavathi
077 K Ramaswamy
078 R Srinivasan
079 A K Seth
080 Samir A Halim
081 Ibrahim Hashem Salim
082 Ahmed Reda

1965-66

083 Anthony Reddy
084 S Chandrasekharan
085 Kranti Kumar
086 V Milter
087 H Ramakrishna
088 A Ramakrishna Sastry
089 A B Tole
090 K V Venkatachary
091 A B Wadia
092 V D Agrawal
093 V Krishnabrahmam
094 S L Maskara
095 S P Pai
096 M S Vasudeva
097 B Yegannarayana

1966-67

098 Biswanath Prasad Baha
099 M P Nair
100 S K Paranjpe
101 Ram Manohar
102 A P Shivaprasad
103 K S Srinivas
104 P Gurunadha Rao
105 K M Narayana Swamy
106 A Prathima
107 S V Simhadri
108 P Vasantha
109 T Venkateswara Babhu
110 P Venkataratnam

1967-68

111 N Kowsalya
112 B L Sapon
113 V Venkateswarlu
114 S K S Kirpeka
115 R M Onkar
116 G Srinivasa Varadan
117 O P S Verma
118 R L Sharma
119 V Balasubramanian
120 T Chandrakaladhara Rao
121 P S Neelakantaswamy
122 D Sundara Rajan
123 H K Kaushal

1968-69

124 P N Mehra
125 A K Ambardar
126 S N Venkreja
127 Harjinder Singh
128 Raghu Nath
129 N Ranganathan
130 A K Goyal
131 M Hari Shankar
132 Mann Ji Zarabi

133 N Krishnan
134 K B Vohra
135 S L Narasimha Murthy
136 R Janardhanan
137 P Narayana Rao
138 D V Giri
139 Lakhmira Singh

1969-70

140 Amitabha Sahu
141 P Govindarajan
142 A R Das Gupta
143 K V Viswanatha
144 T V M S Murthy
145 T R Jayadevan
146 Naresh Kumar Agarwal
147 Daljit Kumar Mehra
148 K J Hegde
149 D M Mittal
150 K P Lakshmanan
151 Y C Keshava Reddy
152 S S Bedi
153 B Venkatesh
154 Narendra Kumar

1970-71

155 Yashwant Kumar Jain
156 Ramdatta W Vyas
157 K S Gopalakrishna
158 K Nagaraj
159 V R Katti
160 Sumana Das Gupta
161 Keshava Murthy
162 R M Wadhvani
163 Gyan Chand Jain
164 V Ramamurthy
165 D A Reddy
166 S Govind
167 V G Krishna
168 V S Sharma

169 H S Nagaraja
170 T B Sarma
1971-72
171 Vimal Kishore Dubey
172 D A Divekar
173 G K Deb
174 H S Jamadagni
175 R C Verma
176 N Janaki Raman
177 S Krishnan
178 S P Mehra
179 K A Narayanan
180 Rajaram Bhat
181 Srinivasa Krishan Srivatsa
182 M K Anantha Swamy
183 H V Ananda
184 C V Chakravarthy
185 A Haridas Udupa
186 M S Niranjani
187 G Thomas

1972-73

188 G M Aple
189 K B Lakshman
190 M S Chandrasekhar
191 K Appuswamy
192 S Purushotham
193 R Shrivastava
194 R Krishna Murthy
195 K Subramanian
196 B Raghupathi Gandhi
197 Ashoka Kumar Chelani
198 O P Aurora
199 P J Anantha Krishnan
200 Vilas Keshav Mandlekov
201 S R Bhat

1973-74

202 Narendra Kumar Ahuja

203 T V Anantha Padmanabha
204 Y N Bhushan
205 Vishwas Nealkanth
Kaduskar
206 Henry Mark Dante
207 K Nagaraj
208 S Paul Pandian
209 Makampalli Sambhu
Prasad
210 G Ramamurthy
211 K Ramesh Babu
212 Trilokinath Shreevastawa
213 Avadhesh Kumar
Shrivastava

214 P Vadiraja Acharya
215 S Varadarajan
216 S Vijaya Kumar Shastry
217 N Kalyanasundaram
218 K Lakshminarayana
219 Udayshankar
Kashinathrao Revankar
220 K T Tukol
221 S V Ramachandran
(P.G.Dip)
222 Subhash Chander
Joyotipunj (P.G.Dip)
223 V Narayana Murthy
(P.G.Dip)
224 Prem Kumar Sareen
(P.G.Dip)

1974-75

225 N L Sriram
226 T Sridhar
227 V S Nagaraja
228 M K Haldar
229 Y N Arun Kumar
230 B L Gupta
231 V R Patwardhan
232 S Sriram

233 S M Jatar
234 J Suresh Babu
235 G M Muddesihal
236 V V Rangasai
237 T V Sreenivas
238 K S Darg
239 M V Ramamurthy
240 Parthasarathi Biswas
241 K Venkatachalam
242 Rajendra Prasad Kapur
243 H K Chandra Shekar
244 Sushil Chand Jain
245 Ali Autha Khan

1975-76

246 K R Lakshmi Kumar
247 P L Kashyap
248 Pradeep R Padukone
249 Raj Varadhan
250 M Sasi Kumar
251 R Kannan
252 R Ramachandran
253 Abdullah Al Mahmud
254 Aswinder Singh Bajwa
255 M Sada Siva Rao
256 Kuran Tirumala Narayan
257 G L Pradeep
258 Appanna Laxman Kotri
259 Keshav Ramchandra
Botkar
260 B M Shivashankar
261 M B Khanapur
262 R M Sayam
263 P Balasubramayam
264 R P Goyal

1977-78

265 H N Ramakrishna
266 Subhashish Mazumdar
267 K Viswanathan

268 Ramalingam Chellappa
 269 G R Dattatreya
 270 Krish Kant
 271 C R Shashidhar
 272 Surendra Ranganath
 273 Atma Singh
 274 Shruti Prakash Sharma
 275 K Kalyana Rao
 276 B Chandrashekar
 277 C Nageswar Rao
 278 Surjit Krishna Sharma
 279 Suresh Chandra Sharma
 280 P Venkatramanan
 281 H G Dattatreya

1978-79

282 A Padma
 283 C S Raghavendra
 284 Ravi Shankar Jain
 285 K Chandrasekar
 286 T K Chandrasekhar
 287 E Vasanth
 288 G Krishnan
 289 N Srinivasa Hegde
 290 N Suresh Hakim
 291 Ramachandra Kishor
 292 Jacob T Chacko
 293 Chitrasena Bhat
 294 T N Ruckmongathan
 295 K S Ramachandra

1979-80

296 B Lakshminarayana Rao
 297 P S Cheema
 298 R Panduranga Raju
 299 B Jayaraman
 300 R Ramaprasad
 301 S Anbarsa
 302 Swalantra Kur
 303 John Kuri

304 Mark Rosario
 305 S Narayanan
 306 B R Sahu
 307 G Jayashankar
 308 H Shivanna
 309 Sateesh S Awade
 310 Ajay Kumar Gupta

1980-81

311 S Sundaram
 312 Biswaraja Mitra
 313 S Ravichandran
 314 Jaswant Singh
 315 Darshan Singh Ghotra
 316 R Phanindra Reddy
 317 Amarjit Nayya
 318 Kamalini Bose Dawson
 319 Phula Shaitendra
 320 P Sridhar
 321 Vallabha D Kulkarni
 322 Rohit Kumar Nayudu
 323 P V Krishna Prasad
 324 Daulat Singh Rathore
 325 Prasanta Kumar Bose
 326 Sadalgi Parappa Balappa
 327 G L Narsimha
 328 M A Prabhakar
 329 N S Anantha Ram
 330 Jamshid Yazahmiadi

1981-82

331 M M Trivedi
 332 Debi Prasad Gupta
 333 Salim Ullah Choudhary
 334 Vidula Gupta
 335 K V Pratap
 336 Mohinder Pal Jaggi
 337 M R Raghuvier
 338 K Anand Mohan
 339 G Nagendra Rao

340 R Suresh
 341 G S S Durga Prasad
 342 S Chakraborty
 343 T K Varaghese
 344 S R Subramanyan

1982-83

345 L Ramakrishnan
 346 M V Srinivasan
 347 Bipin Anant Gadkani
 348 M Raghupathi
 349 Ajit Kumar Jana
 350 V Subramony
 351 Thakkar Hemant Kumar
 352 Y S S Mohan Prasad
 353 K M Prasad
 354 Julka Gurvinderpal Singh
 355 Sashi Mohan Tholar
 356 Shiv Kumar Raichand
 357 K Rajagopalan
 358 Hariharan Singh Dhillon
 359 N Seshagiri Rao
 360 N Ravi Sankar
 361 S G Sachidanandan
 362 B Nanda Kishore

1983-84

363 Vijay Dhanraj Chattur
 364 A Raghu Ram
 365 K Vasumathi
 366 V Lakshminarayanan
 367 Ravi Malhotra
 368 S Gopalakrishna Iyer
 369 M Divakar
 370 K Anantha Narayana Joisa
 371 R P Saha
 372 B C Mittal
 373 Bhimsen Narang
 374 B Somanath Nair
 375 T Ramakrishna

376 Garuba Biswas

1984-85

377 M G Balakrishna
 378 Sudhir Diwan
 379 S K Ghoushal
 380 G Suresh
 381 K Babu Rao
 382 A K Ravindra
 383 R Gowri
 384 S Sundara
 385 K S Subrahmanyam
 386 B G Mirza Salim
 387 S Ananthanarayana
 388 Madhura Nadig
 389 M Usha Ammal
 390 P C John Panikar
 391 P P Katarki
 392 K V Prahlada Rao
 393 D D Srinivasa Murthy
 394 Ganesh Nagesh Rao
 395 Y L Somayajulu

1985-86

396 D K Panda
 397 Bakshi Ramesh
 398 S Rhama
 399 M S Sunder
 400 S Srikanta
 401 P K Balasubramanian
 402 K K Kuriakose
 403 K Subbakrishna
 404 Meka Venkata Ramana
 Murthy
 405 V N Narayana
 406 M K Srinivas
 407 P Sudarshan Rao
 408 K Viswanathan
 409 C R Venugopal
 410 S Madivannan

411 B Suresh Kumar
412 M Aswatha Kumar
413 C S Ajit

1986-87

414 G S Bhanu Prakash
415 Santanu Sinha
416 V Sunil
417 S Paramasivan Pillai
418 Ranjit Abhyankar
419 Asjit Kumar Mallick
420 V Mahadevan
421 N M Vaishnavi
422 S Veluswamy
423 N M Sebastian
424 S R S Mani
425 Y B Limbu
426 Raghu V Hudli
427 S N Jagadeesha
428 J Prakash Dixit
429 G Yoganarasimha
430 A T Baby
431 G Narendra Kumar

1987-88

432 V R Sudershan
433 Akella Venkatesh
434 S Rajagopalan
435 Jayashree Swaminathan
436 Kalpesh D Mehta
437 N Venkata Raghava Rao
438 M L Nagaraja
439 S V Krishna Prasad
440 K Vijaya Kumar
441 Tilak Raj
442 T K Venkateswaran
443 Anand Hardi
444 Gh.Mohd Rather
445 K Balasubramanian
446 Ch.Nagesh Babu

447 N Ramanathan
448 V S Rama Mohan Rao
449 S Gurudeva
450 V Udayshankar
451 R Rama Moorthy
452 Shyam Sunder Jagini
453 A Somanathan
454 T Venkatachalapathi Rao
455 D Thyagaraj
456 A Upagupta

1988-89

457 B Narasimha Bhat
458 Alok Nath De
459 Bollapragada Srinivas
460 A Murali
461 R Radhakrishna Pillai
462 B Jeyendran
463 B Poornima
464 N P Muralidharan
465 Pronob Das
466 Pushkal Yadav
467 Susan Abe
468 N Premalatha
469 Chemmakurthi
Sudhamadhuri
470 R Madhusudhan
471 J N Hemantha Kumar
472 Anil Kumar Nayyar
473 Anandanarayanan
474 Jayanthi V S Srinivasu
475 O P Malik
476 T P Raveendran
477 P M Sounderajan
478 Rajindra Kumar
479 Jos Xavier Aranjó
480 J S Jayananda

1989-90

481 Hari Adisesu

482 Manjari Asawa
483 Phadnis Amit Suryakant
484 G Abhilash
485 G Chitra
486 T S Gangadharan
487 B Hareesh Kumar
488 Joy Kuri
489 Prakash G Kamath
490 K S Prakash Murthy
491 N Ramesh
492 Sanjay Sharma
493 Samir Kanjilal
494 Dharanikota Sudeer
495 V Srinivasa Rao
496 K B Venkataraman
497 B R Sujatha
498 H Srinath

1990-91

499 Bijit Halder
500 Kotecha Lalit Ratilal
501 B Madhavi
502 Pullela Satya Murthy
503 Abhay Suresh Gandhi
504 A Paresb Basu
505 Jethva Sanat Babubhai
506 Manchenella
Chandra Sekhar
507 T V Murali Krishna Murthy
508 N Rama Kowsalya
509 K T Oomen Tharan
510 Pradip Mandal
511 Rajamma Mathew
512 R K Sabherwal
513 Soumitra Sen
514 C Usha Padmini
515 Bheem Rao
516 Kamalakar B Zade
517 Smitha Dighe

1991-92

518 Anindya Datta
519 Ashutosh Tripathi
520 Deva Kanta Borah
521 Gaurav Sharma
522 K V Harinarayanan
523 C S Muralidharan
524 Shamik Sural
525 V Sundarajan
526 Adarsh Kumar Chugh
527 Ashutosh Anant Pendse
528 Joshy George
529 Prasad Kukkamalla
530 R V S S Ramanjaneyalu
531 Sanjay Chaubey
532 Srinivas Sista
533 K Usha Rani
534 A Venkata Srikumar
535 Virinder Kumar Singla
536 G H Asha
537 Dinesh Somasekhar

1992-93

538 Abhijit Giri
539 Arun Hiregange
540 Raghavan Subramanian
541 Soman Manoj Shridhar
542 Ashutosh Gupta
543 Bankimbhai Arvindbhai Patel
544 B U Chandrashekar
545 Chauhan Prashant Shantilal
546 Gagan Bihari Rath
547 K Radhakrishnan
548 Mohan Lal Rathore
549 Rajesh Dixit
550 K C Ravindranathan
551 Revathi Kadekar
552 K Damodharan

553 Eluri Srinivasa Rao
554 Arun Kumar D Naik

1993-94

555 Sebastian Domic Gracias
556 B Ajit Prasad
557 Patil Deepak Shashikant
558 B V Ramakrishnan
559 N Gurudeva
560 Iyer Ganesh V.
Swaminathan
561 Malathi Limaye
562 V Mohan Doss
563 K V Nagalakshmi
564 Peddinti Bhasker
565 Phegade Vinay Gopalrao
566 Pradeep Hiranman
Kiranpore
567 Rajesh Ramesh
Patwardhan
568 P Satish
569 Vaibhav Vaman Natu
570 T P Byjubai
571 Anand Swaroop

1994-95

572 Chaskar Hemant
Madhusudhan
573 Kulkarni Umesh
Balchandra
574 Udar Mittal
575 Amit Ghosh
576 Vyas Nitesh Kumar
Natwarlal
577 Sameer Subhash
Sawarkar
578 A V Narasimhan
579 K Srikantha Reddy
580 Nandita Pramod Deo
581 S R Pawamana

582 M K Kiran
583 Sandeep Kumar
584 R Sridhar
585 Ashis Sarkar
586 V Madan Mohan
587 Tanuja Vijay Kumar
588 Velicheti Nanda Kishore
589 S K Jha
590 Damodare Rajesh
Prabhakar
591 Baddela Sesidhar
592 M Neelavathy
593 V Rajaraman
594 R Narasimha Swamy

1995-96

595 Saswati Sarkar
596 Suprio Palit
597 S Sandeep Pradhan
598 Anindya Saha
599 R Patel Tejaskumar
600 R N Diwakar
601 Akhil Kumar
602 Dave Harit Pradeepbhai
603 Raman Kumar
604 Ajay Sood
605 B V Vijay Chandra
606 B S Sheela
607 Mukul Jain
608 Anil Kumar Chaudhury
609 A Vairamuthu
610 V Balakrishnan
611 Rajendra Prasad Joshi
612 Arun Singh
613 Shankar Dashrathi
Nagrare
614 Anitha Florenc Sugantham
615 K Venkatesh Shenoy
616 Ravi G Kurudagi
617 S Jagadish Patil

618 N Suresh Kumar
619 P Victor Anand Raj

ME (Int) (ECE)

1986-87

001 Anant Kumar Jain
002 R Jagannath
003 V Chandramouli
004 Ravindra M Rao
005 S Manohar
006 V Sivaramakrishnan
007 T V Radhakrishna
008 A V Ajoy Kumar
009 T Srinivas
010 G Santharam

1987-88

011 Monteiro Anand
Christopher
012 Pinaki Poddar
013 S Raghunandan
014 D Sundar
015 Krishna Kumar
016 Meenakshi Kaul
017 Raj Kannan
018 Moushumi Sen
019 R Sivaraman

1988-89

020 K Vishwa Kumara
021 Girish Chandran
022 Hema R K Murthi
023 Lalwaney Poornima
Assudo
024 K Giridhar
025 R Balaji
026 Vivek Kumar Sharma
027 K Dilipan

1989-90

028 S Aravindan
029 N Guruprasad
030 Jayant Mittal
031 Jobe Ranjit George
032 Kamal Kumar Jain
033 R Kumar
034 Pawan Kumar Fangaria
035 S Radha
036 N Ramachandran
037 V Sachidanand
038 N Raja
039 Sneha Kumar Kasera
040 S Balakumar
041 Megha Syam Dora
042 R Sundar Raj
043 R Vasantharaghavan
044 G Vidya Murthy
045 S R Prakash

1990-91

046 N Ramanath
047 P Appan
048 K Balaraman
049 Panda Tapas Surendra
Prasad
050 Pramod Kumar Pandey
051 Rajeshwari Krishnan
052 Sajid Zia
053 Sandeep Chhabra
054 V S Unnikrishnan
055 V Bharadwaj
056 Jerald Frank Lobo
057 A P Karthikeyan
058 K Mohan Rangan
059 P Sai Sudha
060 Sandip Biswas
061 Tanay Krishna
062 K Sridhar

1991-92

063 Vivek Pachaury
 064 H C Annapurna
 065 Amitabh Baksy
 066 L Anand
 067 Arnab Basak
 068 P Harindranath
 069 R Jayaram
 070 N Kumar
 071 Naren Naik
 072 Nibedita Mohanty
 073 S Ramanathan
 074 S Balasubramanian
 075 R Dasarathy
 076 Gopal Srinivasan
 077 R Mukundan
 078 Subhasis Ghosh
 079 N Sundher
 080 R Vasudevan

1992-93

081 Gurumeet Singh
 082 V K Anuradha
 083 Sambit Sahu
 084 L Pere Prabhu
 085 Sudhir Krishnan
 086 Pawan Kumar Sharma
 087 Kiran Vaya
 088 V Laxminarayana
 089 K Ganesh
 090 Raman Srinivasan
 091 R M Raj Kumar
 092 V Raman
 093 V Srinivasan
 094 N Ganesh

1993-94

095 S Chandrasekar
 096 Rajul Vaya
 097 K P Subbalakshmi

098 K Govindarajan
 099 Nagaraj Kannaiah
 100 C P Chandrasekar
 101 K Ramanathan
 102 R Chandramouli
 103 V V V Sitaram
 104 M S Sateesh Kumar
 105 Abijit M Lele

1994-95

106 Parvatha Vardhini
 107 S Badrinath
 108 C Srikanth
 109 M Murali Babu
 110 C S Raghu
 111 S Subramanian
 112 V Seshadri
 113 Vinod Kumar
 114 A M Narayanan
 115 S Raghunath
 116 R Srinivasan
 117 L S Suresh Babu
 118 K Raghavendra Prasad
 119 R V Anand
 120 N Arvind Kumar
 121 S Amarnath

1995-96

122 K Maheshwari
 123 Hina Arora
 124 Dani Ravindra Ramesh
 125 Rajeev Kumar
 126 P S Sivakumar
 127 T A Ranganathan
 128 R Srinath
 129 D Rajakumar Ebenezer
 130 N Maheshwaran
 131 V S Govindarajan
 132 Raghunathan

PG (DIP) CIP**1973-74**

01 S V Ramachandran
 02 Subhash Chander
 Joyotipury
 03 V Narayana Murthy
 04 Prem Kumar Sareen

1974-75

05 P R Modi
 06 V K Atri
 07 G N Sahay
 08 G Chandrasekaran
 09 L M Srivatsa
 10 Ramachandra Murthy
 11 Nirmal Kumar Sen

1975-76

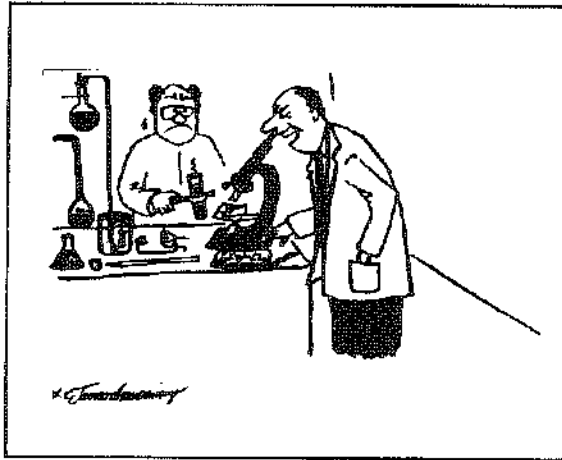
12 M Gangi Reddy
 13 Tirumalai S Raghavan
 14 S Raghavendra Rao
 15 D Jayaram

1976-77

16 Sham Sunder
 17 D R Mohan Rao

Compiled and prepared by Prof. T S Vedavathy and Dr. D K Anvekar; Assistance received from students and office staff is gratefully acknowledged. While every effort has been made to make the listing complete, errors, omissions, if any are sincerely regretted.

ON THE LIGHTER SIDE - FROM THE PEN OF ECE CARTOONIST



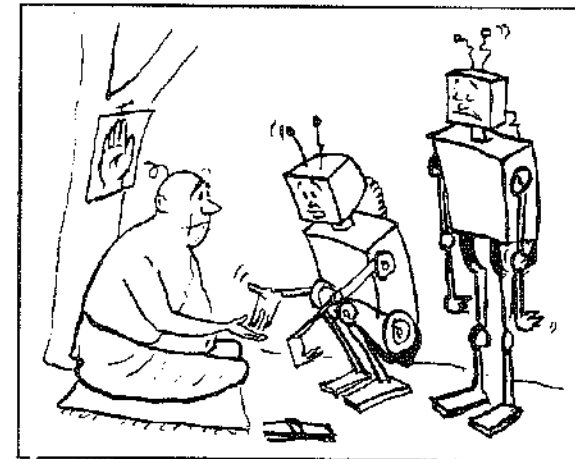
Yes. These must be a computer virus. They are in the form of only ONEs and ZEROS.

Courtesy: Information Technology

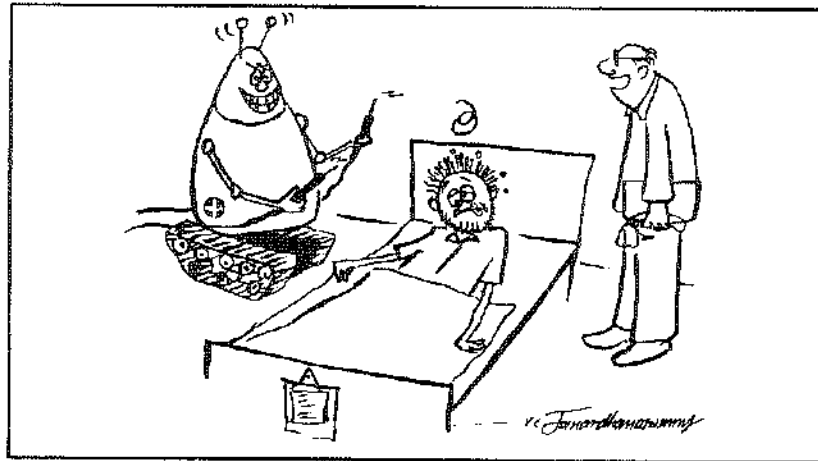


Listen. 'RAM' means not 'Shri Ram' as we know, it is 'Random Access Memory'.

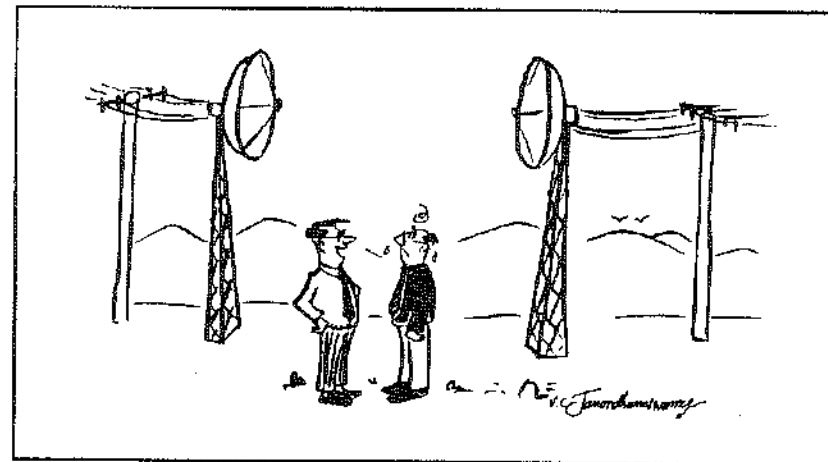
Courtesy: Information Technology



"We just wanted to change our batteries, Sir!"



"If you do not have any work to do, Henry, please go outside, and play. But don't give him electric shock again and again..."



Yes Sir, we had to install a microwave link here; there was a shortage of telephone cable for a twenty meters!