Introduction

Established in 1958, IIT Bombay has attained recognition in the world community as a leading institution of technology and science. The institute continues to be rated as one of the top technical universities in the world. The academic and research programmes in Humanities and Social Sciences, in Design, and in Management are also highly regarded. IIT Bombay attracts the best students from the country for its Bachelor’s, Master’s and Doctoral programmes, and, in the 52 years of its existence, around 37,000 students have graduated from IIT Bombay. The institute is known for its strong research groups in varied areas of science and technology that are making substantial contributions to national projects. The research and academic programmes are driven by an outstanding faculty, with many of them internationally reputed for their research contributions. I am happy to note that the institute continues to attract top quality academics to its faculty. IIT Bombay is creating a niche for its innovative short-term courses through continuing education and distance education programmes. The institute continues to build links with national and international peer universities and other institutions to enhance research and educational programmes. IIT Bombay alumni have distinguished themselves through their achievements and contributions in the industry, academics, research, business, government, and social work. The institute continues to work closely with the alumni for enhancing its activities through interactions in academic and research programmes as well as mobilizing financial support.

The biggest challenges facing IIT Bombay arise from maintaining its path to excellence while simultaneously managing a rapid increase in the number of students from 5285 in 2007-08 to 8800 by 2014. Infrastructure is being expanded on an urgent basis with construction projects to the tune of Rs. 300 crores underway. Faculty recruitment is another important priority in this period of growth.

Academic Programme

IIT Bombay has taken several new initiatives in restructuring and strengthening its academic programmes at postgraduate and undergraduate levels over the past years. A new curriculum for undergraduate students was introduced in 2007, two-year M.Sc. and six-year M.Sc.-Ph.D. dual degree programmes were reviewed in 2008, and M.Tech.-Ph.D. dual degree programmes were introduced in 2009. Introduction of new programmes at the postgraduate level and a focus on research and development are the two crucial factors that have helped in the recognition of IIT Bombay as a premier institute for higher learning. IIT Bombay has been mentoring two new Indian Institutes of Technology at Gandhinagar and Indore. IIT Gandhinagar and IIT Indore started their academic session in the year 2008-09 and 2009-10, respectively. The mentoring involved extending support at all levels, which included curriculum design, setting up laboratories, recruitment of faculty and staff, and setting up academic administration system for registration and maintenance of student records. It is a matter of immense pride and satisfaction that both the new IITs have taken off smoothly.

The institute has emerged as the leading institution for technology education and research in the country. IIT Bombay continues to be the most sought-after destination for undergraduate and postgraduate studies and attracts the top performers in national examinations such as GATE, CEED, NET, JAM, and JEE. The fact that among 15 IITs in the country, 69 of the top 100 rankers in JEE 2009 joined IIT Bombay and 13 of the top 20 All-India JEE rank holders chose to join IIT Bombay is a clear indication that the institute remains the first choice for the toppers. Similar trends are observed for other examinations as well. The demography of the student population at the institute is undergoing a significant change in the recent times. The on-roll student strength in 2007-08 was 5285 of which 2196 (41.5%) were undergraduates (UG) and 3089 (58.5%) were postgraduates (PG). After the implementation of the second phase of the 27 per cent OBC reservation during 2009-10, the on-roll strength has increased to 6339 of which 2533 (40.0%) are UG
and 3806 (60.0%) are PG students. If no other new programmes are introduced in the immediate future, the UG population at the institute will attain its peak strength of 3468 (37%) in the academic year 2013-2014, while the PG population will saturate at 5882 (63%) during the year 2018-19 with a total of 9350 students in the institute. The institute has responded pragmatically to the large increase in its intake by substantially reorienting itself academically technologically and administratively and by using it as a great opportunity to retain its leadership in engineering education in the country.

The new undergraduate curriculum for engineering and science education was implemented with effect from the academic year 2007-08. It introduced a new rigour and methodology in undergraduate teaching, laying emphasis on developing analytical skills and challenging the students intellectually. Its flexibility, which gives students a range of degrees to choose from – B. Tech. or B. Tech. with Honors or B. Tech with one Minor or B. Tech. with Honors and Minor or Dual Degree and one Minor – has raised their level of enthusiasm for academics. The opportunity for Minor has been used heavily by all the three batches of students in the new curriculum, and around 80 per cent of the eligible students have signed up consistently every semester ever since the Minor option came in force (Autumn 2008). The new initiatives at the PG level, approved by the Senate in 2009-10, include the formation of an interdisciplinary programme in Educational Technology and the start of a Ph.D. programme in this area, introduction of M.Sc.-Ph.D. dual degree programme in Environmental Science and Engineering, M.Sc.-Ph.D. dual degree programmes in Applied Geology and Applied Geophysics in the Department of Earth Sciences, and M.Des. degree in Mobility and Vehicle Design. The special M.Tech. programme in Mechanical Engineering offered to officers from the Indian Navy in coordination with INS Shivaji has been restructured and replaced by a M.Tech. programme in Thermal and Fluids Engineering. The trans-disciplinary M.Tech. programme in Manufacturing, Materials and Modelling was started in 2009.

The Institute Student Mentor Programme has been operating successfully for several years. It provides a support structure for the undergraduates, targeted largely to the first and second year students, which is essentially managed by the senior students under the supervision of a faculty coordinator. This programme has recently been extended to mentor-needy senior students at the department level. The PG students have initiated a student companion programme this year, which is similar in spirit to the mentorship programme for undergraduates, to address the needs of PG students. For undergraduates, whose academic performance does not meet the requirements for continuation in their programmes, a final chance for continuation in the form of Academic Rehabilitation Programme (ARP) has been in effect since 2008-09. A special Senate-appointed committee prescribes a customised academic load for an ARP student, provides necessary support with the help of student mentors, and carefully monitors behaviour and performance for a semester. An ARP student is rehabilitated into her/his programme on successful completion. Academic probation, a feature similar to ARP, gives postgraduates a second chance to survive and continue in the programme. Encouraged by enthusiastic and effective participation of students in various aspects of academic administration, mechanisms to channelise and structure the energy of the students in creative and constructive activities are being devised. Setting up of student academic task force, UG teaching assistants, internship cells are but a few instances of the efforts in this direction.

Review of academic programmes is a continuous activity at the institute. Two important reviews are scheduled to be completed during 2010-11. The first is a comprehensive review of the Ph.D. programme initiated in 2009. It is envisaged that the outcome will have a great impact on the research culture of the institute, in general, and the doctoral programme, in particular, in the years to come. The other review of the B.Tech.- M.Tech. dual degree programme is also on target. The Ph.D. student strength has steadily been increased and we are on course to achieve our target of 2775 Ph.D. students (approx. 30%) on roll among 9350 students in the academic year 2018-19. While we had 771 Ph. D. students on roll in the academic year 2001-02, in the academic year 2009-10 the number has risen to 1681, an increase of over 100 per cent in a span of just eight years. On the Ph.D. output, as compared to 73 Ph.D. degrees awarded in 2001, the numbers of Ph.D. degrees awarded were 105, 152, 200 and 179 in the years 2005-06, 2006-07, 2008-09 and 2009-10, respectively. An interesting aspect of our Ph.D. output, observed in the recent years, is the fact that around 65 per cent of the Ph.D.s are in the engineering disciplines. All the students involved in research in the institute are given the opportunity to interact with research community at the national and international levels by providing funds to attend international conferences. While the research scholars are the primary beneficiary of this scheme, a small number of other PG students (including dual degree) and UG students have also benefited. The annual funding has been enhanced from Rs. 50 lakhs last year to Rs. 75 lakhs this year. With effect from January 2010, the funding for international conference participation has been enhanced to Rs. 60,000/- for North and South America; Rs. 45,000/- for Europe; and Rs. 30,000/- for Asia. In addition, the students are also reimbursed conference registration fees up to a maximum of Rs. 20,000/-.

During the academic year 2009-10, 115 students were granted financial assistance for attending international conferences as against 120 for the previous year.
A new era of education and research in science and technology has been ushered in by IIT Bombay. Augmentation of our academic infrastructure, instructional and laboratory facilities and human resource has been planned carefully to meet the challenges ahead. With its forward looking academic plans and programmes, IIT Bombay is poised to actively participate as an important national resource to enhance India’s science and technology capabilities in the changing global scenario.

Research and Development Activities

Research and development remains an important activity of IIT Bombay. It received an amount of Rs. 102 crores as grants towards sponsored and consultancy research projects, which is an increase of 40 per cent over last year’s grants of Rs. 73 crores.

Funding for Sponsored Research Projects

Nearly 210 new sponsored projects were initiated during the year 2009-10 with a sanctioned outlay of about Rs. 160 crores, whereas in the last year (2008-09), 190 new projects with an outlay of Rs.72 crores were sanctioned. These included projects in all areas of science and engineering supported by government and industries, both national and international.

Funds of about Rs. 86 crores were received for various new projects initiated during the year and for the ongoing projects of previous years. A list of some of the funding agencies is given below:

National government agencies

- Aeronautical Development Agency
- Aeronautical Research & Development Board
- All India Council For Technical Education
- Bhabha Atomic Research Centre
- Board of Research in Nuclear Sciences
- Council of Scientific & Industrial Research
- Defence Research & Development Organisation
- Department of Biotechnology
- Department of Electronics
- Department of Information Technology
- Department of Science & Technology
- Government of Goa
- Indian Council of Agricultural Research
- Indian Space Research Organisation
- Ministry of Earth Sciences
- Ministry of Food Processing Industries
- Ministry of Human Resource Development
- Ministry of New and Renewable Energy
- National Board for Higher Mathematics
- Naval Materials Research Laboratory
- Naval Research Board
- Oil & Natural Gas Commission
- Technology Information, Forecasting and Assessment Council, DST

Indian Industry

- Commtel Networks Pvt. Ltd
- HP Labs.
- International Business Machines Corporation
- Johnson & Johnson
- Micron Technology
- Microsoft Research Lab India Pvt. Ltd.
- National Thermal Power Corporation Ltd.
- Nicholas Piramal India Ltd.
- Renesas Technology Corporation
- Tata Consultancy Services Ltd.
- Tata Consulting Engineers Ltd.
- Tata Steel Ltd.
- Tata Teleservices Ltd.
- Yahoo Software Development India Pvt. Ltd.

International Agencies and Industry

- Alexander Von Humboldt Foundation Germany
- Applied Materials Inc., USA
- ArcelorMittal, Belgium
- Corning Inc. USA
- European Commission, Belgium
- IBM Corporation, New York
- Indo US Science & Technology Forum, New Delhi
- Infineon Technologies AG, Germany
- McDonnell Academy, St. Louis, USA
- Monash University, Australia
- Pratt & Whitney Co. Canada
- Procter & Gamble Technology (Beijing) Co. Ltd., China
- SAP Research, Brisbane, Australia
- Semiconductor Research Corporation, USA
- The UK India Education & Research Initiative (UKIERI), UK
- Washington University, St. Louis, USA
- The World Bank, USA

In addition to the external funding, the institute internally funded a number of research projects with a total outlay of Rs. 5.4 crores to new faculty and the faculty who received the best research paper/review paper/young investigator awards for initiating and
nurturing their research and also for assisting in the setting up or upgradation of national facilities.

**Funding from Government Agencies**

As the major funding agency, the Department of Science and Technology sanctioned 72 new projects and a number of workshops with a sanctioned funding outlay of nearly Rs. 34.8 crores. For the current year, funds to the tune of Rs.20 crores were received for about 120 new and ongoing projects. The projects funded were in the wide-ranging areas of science and technology including biochemical, bioengineering, chemical engineering, chemistry, civil engineering, computer science and engineering, corrosion science and engineering, earth sciences, electrical engineering, environmental science and engineering, magnetic nanoparticles, manufacturing process, materials science, mechanical engineering, micro-scale materials, nano-crystals syntheses, physics, polymer synthesis, remote sensing, resources engineering semiconductor, social sciences, and systems and control engineering.

The Department of Science and Technology sanctioned a project, “India-UK Advance Technology Centre (IU-ATC) of Excellence in Next Generation Networks Systems and Services” under the themes of Pervasive Sensor Environments, Converged Networks, QoS Frameworks, Cognitive Radio, and Self-organized Cellular Multihop Networks. These are multi-institute projects between IITs and the UK universities with an outlay of Rs. 2.9 crores over a period of three years.

Grants were also received for the implementation of projects under the programmes/schemes of Better Opportunities for Young Scientists in Chosen Areas of Science and Technology (BOYSCAST) Fellowship, Fast Track scheme for Young Scientists, FIST, ILTP Fellowship Scheme, Indo-Mexican Joint Research Project, Indo-South African Joint Research Project, Indo-Swiss Joint Research Project, NRDMS, and Women Scientist Scheme.

The Ministry of New and Renewable Energy funded about 10.5 crores towards five new and ongoing projects.

The Ministry of Human Resource Development sponsored 19 new projects with a sanctioned funding outlay of nearly 19.9 crores. The projects sanctioned were in the areas of Chemical Engineering, Computer Science and Engineering, E-learning, Digital-learning Environment, and under the schemes of National Mission on Education through Information and Technology (NME-ICT) and National Program for Technology Enhanced Learning (NPTEL) – Phase-II. It funded Rs. 6.8 crores towards 17 new and ongoing projects.

The Ministry of Communications and Information Technology sanctioned six new projects with an outlay of nearly Rs. 5.7 crores in the areas of Civil Engineering, Computer Science and Engineering, and Humanities and Social Sciences. It has funded about Rs. 7.9 crores towards 17 new and ongoing projects during the current year.

The Board of Research in Nuclear Sciences sanctioned 13 new projects with an outlay of nearly Rs. 3.1 crores and funded Rs. 2.95 crores towards 36 new and ongoing projects.

Indian Space Research Organisation sanctioned 12 new projects with a sanctioned funding outlay of nearly Rs. 40 crores. For the current year, total funds of about Rs.16 crores were received for the 11 new projects initiated during the year and the ongoing projects initiated in the previous years. The projects sanctioned were in the wide-ranging areas of science and technology including aerospace engineering, control systems, electrical engineering, materials and device applications, and mechanical engineering.

Defence establishments sanctioned about 15 new projects with an outlay Rs. 2.5 crores in the areas of science and engineering, such as aerospace engineering, computer science and engineering, electrical engineering, fuel cells, liquid fuel-based combustor, MEMS devices, modelling of electromagnetic wave absorbers and welding process. They funded more than 33 ongoing projects with about Rs. 3.6 crores during this year.

Other major governmental funding agencies include the Department of Biotechnology (Rs. 1.24 crores), the Bhabha Atomic Research Centre (Rs. 1.72 crores), and the Council of Scientific & Industrial Research (89 lakhs).

**Funding from Industry**

Interaction with industry through sponsored and contract research was excellent. An amount of Rs.5.7 crores was received during this year towards 45 new and ongoing projects.

About Rs.5.5 crores were received from various international organisations such as Alexander Von Humboldt Foundation, Germany; Applied Materials Inc., USA; ArcelorMittal, Belgium; European Commission, Belgium; Infineon Technologies AG, Germany; Mcdonnell Academy, St. Louis, USA; Monash University, Australia; Pratt & Whitney Co., Canada; SAP Research, Brisbane, Australia; and Semiconductor Research Corporation, USA.
Major Sponsored Projects

- Development of a Megawatt-scale Solar Thermal Power Testing, Simulation and Research Facility was sponsored by the Ministry of New and Renewable Energy with an outlay of Rs. 41.2 crores over a period of five years.

- The Ministry of Human Resource Development sponsored a few projects under the schemes of National Mission on Education through Information and Technology (NME-ICT) with an outlay of 17 crores in the area of empowerment of students and teachers through synchronous and asynchronous instruction, assimilation of open source software in science and engineering education, Open Source Course-ware animation repository for higher education and E-Yantra: Robot-enhanced teaching of subjects in engineering colleges, Virtual Laboratory activities at IIT Bombay.

- The Department of Science and Technology sanctioned a project under the NRDMS programme on “Advanced Research Lab for Geospatial Information Science and Engineering” with an outlay of Rs. 11.8 crores over a period of five years.

- The Ministry of Human Resource Development sponsored a project, “National Programme for Technology Enhanced Learning–Phase II (NPTEL-II)” with an outlay of Rs. 1.31 crores over a period of three years.

- The Department of Information Technology sponsored GCC Resource Centre with an outlay of about Rs. 1 crore over a period of three years.

- M/s. Johnson & Johnson Limited sponsored a project, “Research Observation Study Programme for Access and Acceptance of IT Solutions for Healthcare Intervention Tool among HIV Patients” with an outlay of about Rs. 1.2 crores over a period of two years.

- The Department of Science and Technology and M/s. Embio Limited, a Mumbai-based industry, jointly sponsored a project, “Optimization of a Recombinant R-Phenylacetyl Carbinol (R-PAC) Production Process under the scheme of Drugs and Pharmaceuticals Research Programme (DPRP)” with an outlay of nearly 1.25 crores, over a period of two years. The DST component is Rs. 20.43 lakhs and the industry component is Rs. 1.05 crores.

- Sir Navajbhai Ratan Tata Trust sponsored a project, “Creative Learning Materials for Children” with an outlay of nearly 55 lakhs over a period of two years.

Major Consultancy Projects

- Efficiency Analysis of Concurrency Control and Recovery
- Load Forecasting for Tata Power
- Refrigerator Study
- Solar Plastic Air Heater
- Solid Waste Management
- Structural Assessment of Majestic MLA Hostel
- Sustainable Transport Strategy for Pune

Research Projects Completed

About 100 sponsored research projects in all areas of science and engineering were completed during this financial year.

Consultancy Activities

The consultancy continues to be an important activity, which received projects with an outlay of nearly Rs. 16 crores from the industry and the government. Different types of consultancy were provided such as expert advice, product process/software development, analysis, evaluation, proof-checking, product design, web-based course design, and limited testing and opinion. Consultancy was taken up for industries and other organisations from India and abroad and also for the government. Some representative projects include:

- Adhesion Test and Prepare Test Panels
- Advice for E Governance, Health Care System, System Security, Processing Correctness
- Advice on Steam Engines
Technology Transfers for Commercialization

Several technologies developed at IIT Bombay were transferred to industry for commercialization. These include:

- Hindi word net software package was transferred to an international internet company
- Process for diamond polishing was transferred to an Indian company
- Software for use of corrosion simulation was transferred to a CFD company
- Technology on soil bio-technology was transferred to an Indian company
- Board Games design
- A Lower Rim Dipyridylamide Derivative of calix[4]arene, as a Dual Chemical Sensor of Zinc and Nickel by Fluorescence Switch-on and Switch-off respectively
- Implantable Alginate Microsphere Glucose Biosensor System Couples with an Anti-inflammatory Module
- Cuvette-based Analytical Flow Cell Device for Optical Biosensing: Estimation of Urea in Spent Dialysate
- Minimally Invasive Lactate Biosensor for Continuous Health Monitoring

Patents

Twenty one new Indian patent applications were filed during the current year. They include inventions in the areas of transformer winding, audio identification, synthetic jet, MEMS actuator, instructional video, polymers, wireless connectivity, curcumin derivatives, oscillator, sieving particulate materials, welding system, nano particles, semiconductor module and amplifier. Two patents were granted during the year for the applications filed earlier in the different areas of science and engineering.

Two Patent Cooperation Treaty (PCT) applications were also filed in the areas of growing of diamonds and polymers. Fifteen US patent applications were filed.
in the areas of organic mixture, arenes, chemical sensors, polymers, reactor, instructional video, collision warning, fusing images, optical fibres, cano particles and coatings.

One patent application was filed in Brazil, Canada, Europe and Japan in the area of polymer and one GCC patent application was filed in the area of polymer.

**Outreach Programmes**

- **Techconnect**
  
  Techconnect 2009 was held on April 4, 2009. Posters and demonstration of a few of ongoing R&D activities were shown to the public, apart from organizing seminars/discussions in selected areas. Participants from about 35 companies attended the one-day event.

  As part of the Techfest, Techconnect 2010 was organised during January 22-24, 2010. Seminars/presentations by faculty were organised under various themes: communication and wireless, health care, information technology, materials and chemicals, power and energy.

- **R&D exhibition**
  
  R&D exhibition with a dedicated stall was set up featuring some of the R&D breakthroughs.

- **IIT Technologies brochure**
  
  A booklet on ‘IITB Technologies’ was released on January 24, 2010, by the Director, as part of Techconnect event. This booklet consisted of technologies/IP developed at the institute and having potential for commercialisation. It is being distributed among various appropriate fora for wide dissemination.

- **PULSE**
  
  An issue of PULSE Science & Technology magazine of IIT Bombay was published highlighting some of the recent technologies developed/transferred and articles on ongoing R&D activities in the institute, among others.

**Other Initiatives**

- **National Centre for Aerospace Innovation and Research (NCAIR)**
  
  The centre is being planned to be established in the institute in collaboration with Boeing company, along with the Department of Science and Technology, Government of India. The vision of the centre is: to create an environment for industry-academia interaction on a global level and to promote innovation and knowledge-creation through technology development. It is planned to set up incubators aimed at helping the small and medium Indian enterprises to enhance their manufacturing quality to aerospace standards. Such incubators would provide technical support and manufacturing-cum-characterisation facilities to demonstrate new capabilities and enable human resource training. The Boeing contribution of around Rs.3.5 crores would be substantiated with that of DST’s Rs. 11.5 crores. This involves participation of faculty across various departments of the institute such as Aerospace Engineering, Mechanical Engineering, and Metallurgical Engineering and Materials Science.

- **Pratham – IIT Bombay Student Satellite Project**
  
  Students from the Department of Aerospace Engineering started a project which aims to launch at least five satellites within the next few years under the mentorship of IIT Bombay faculty and scientists from Indian Space Research Organisation (ISRO). ISRO would provide overall guidance and necessary critical components, and an agreement in this regard was signed on September 29, 2009. It is planned to build the first fully functional microsatellite, ‘Pratham’, in less than three years which would then be launched by ISRO. These satellites could be test-beds for the new technologies being developed in the institute and also a method for space qualification.

- **Research and Development Agenda**
  
  The Industrial Research and Consultancy Centre initiated a process during July-August 2009 to set the Research and Development Agenda for the institute to undertake research that makes a difference: to Indian society and lifestyles, in solving country’s problems by training “quality manpower”—learning by doing; by extending basic understanding, knowledge, techniques; by providing improved products, technology know-how; by providing leadership of thought and ideas in science and technology areas.

  The main objective of this effort is to analyse the issues related to R&D at the institute by:
  - Identifying the strengths and weaknesses
  - Metrics for R&D
  - Review R&D strategies of Indian and international universities
  - Facilities and equipment
  - People
  - Systems and processes
  - Industry and government linkages
  - International linkages
  - Initiatives—Wish list, resource requirement
  - Implementation road map
The larger objective of this effort is to identify various initiatives, taking into consideration the stakeholders’ feedback, and the various offices in the institute that will work on these initiatives.

Opinions were taken from various stakeholders: Faculty (~60% of them participated); Student (UG, PG & PhD). Sub-tasks were identified and each sub-task was addressed by an individual committee and a draft report was prepared. Based on this report initiatives were identified. The report is available at:


- **Know Your IRCC Event**

IRCC organised an orientation programme about IRCC practices and procedures to the faculty members on September 9, 2009, and January 13, 2010. A large number of faculty members participated in both the programmes.

- **Lectures by winners of IRCC and other Awards**

The recipients of the IRCC awards-2007 and Dr. P. K. Patwardhan Technology Development award for the year 2008 made a short presentation of their work to a vast majority of the IIT Bombay academic community on October 7, 14 and 21, 2009. Similarly, winners of Rakesh Mathur awards for excellence in research-2009 gave lectures on their work on March 2, 2010. Faculty, students and staff attended the lectures in significant numbers.

- **Lectures on 2009 Nobel Prize Winners**

Domain experts gave lectures on the work done by the Nobel Prize-2009 winners on November 4, 2009. Faculty, students, and staff attended the lectures in large numbers.

- **Project Staff Recruitment**

There were about 720 project staff members carrying out research work in various ongoing research projects as on March 31, 2010. About 350 of them joined in the financial year 2009-10.

- **Online Initiatives**

The efforts towards further automation of office procedures continued during the year and some of them are as follows:

  - Online advertisement-related module
  - Online job application system
  - Information management system for agreements/contracts and patents
  - Upgradation of a number of other online processes

### Outreach Programmes

CEP (Continuing Education Programme), QIP (Quality Improvement Programme) and CDP (Curriculum Development Programme) activities continued to attract wide interest from industry, academia and from our own faculty. The CEP courses at IIT Bombay, aimed at working professionals, sustained its significant activity despite the challenging industrial scenario prevailing throughout this period. There were CEP courses in the ‘Open’ as well as ‘In-house’ categories from almost all academic units of the institute. The QIP courses at IIT Bombay are generally meant for teachers working in universities and are fully funded by the AICTE. These courses are very popular, and a large number of college teachers have benefited from them. With a view to having more interaction between industry professionals and teachers, special attempts were made to open up the CEP courses to college teachers and the QIP courses to industry professionals. And this has been found to be a very worthwhile experience by the teachers and the industry personnel.

### Continuing Education Programme

Many of our CEP courses are now well established and continue to attract large participation. The course on Piping Engineering reached a milestone and has crossed its 54th edition in 2009. Similarly, the courses on Urban Drainage Management, Casting, Design and Simulation, Production Management for Excellence, Human Computer Interaction, Energy Management, Wind Energy Technology, etc., were well received. The sixth batch of the Certificate Course in Management with dual specialization in Marketing and Managing People was also conducted at Mumbai and New Delhi. Two editions of another newly developed course were conducted for Mathematics teachers at secondary school level – one at IIT Bombay and one at Ahmedabad.

The 7th annual course for IPS Officers on “The Role of Technology in Crime and Crime Prevention” brought 23 very senior officers from the Indian Police Service (IPS) to the campus for a week. The multidisciplinary course was highly appreciated by the IPS officers.

As part of the new initiatives by CE&QIP and SJMSOM, the second batch of a long-term Certificate Programme on General Management for Technical Professionals was conducted in distance mode using the existing facilities of Hughes Communications India Limited, Gurgaon. The course was broadcast live from their studio in Mumbai and was simultaneously available at their centres in India and abroad. The second edition, started in October 2009, had 69 participants.
registered for the course. Again, the first batch of a similar course on Supply Chain Management was also conducted and 62 people participated in the course.

The course on Piping Engineering has been made online from July 2009. About 84 participants registered all over the world and many more are expected to join. The revenue earned was Rs.10.80 lakhs. The content manager, developed during this project, is eminently suitable for technical courses and will allow many more of our CEP courses to be recast in their online versions. The courses will be made available through CEPGlobe.com. This should also offer our Continuing Education Programme a much-needed scalability and global reach without unduly taxing the infrastructure and faculty time.

The total number of CEP courses conducted this year was 104 with over 2200 people participating from all sectors of industry. The revenue from CEP courses was 3.29 crores. This includes the earnings in Foreign Currency, which touched an all-time high this year, thus indicating an increasing acceptance of and demand for our CEP courses globally.

**Quality Improvement Programme**

The response to Quality Improvement Programme has been good. Eight courses were conducted this year. In all, 175 participants from various engineering institutions/colleges attended these courses. The AICTE has now revised the budget for QIP courses from the year 2009-10 and it is expected that more number of short-term courses would be conducted.

As regards admissions under QIP category, 11 and 18 college teachers were admitted this year to the M.Tech. and Ph.D. programmes, respectively. Teachers were also taken under the advance admission scheme of the Ph.D. programme, and 19 of them would be joining the Ph.D. programme in 2010-11 session. To overcome the shortage of accommodation for the QIP students, construction of new apartments is underway.

Under CDP, three books were completed and six new proposals sanctioned during the year 2009-10.

**International Relations**

IIT Bombay assigns a significant value to its relationships with various international partners. Over the years, IIT Bombay has steadily built up a reputation for research and education both in India and abroad. This has helped in attracting a large number of bright and young researchers from all over the world to join IIT Bombay as full-time or visiting faculty members. Further, a large number of international students are now very keen to study and do research at IIT Bombay either as full-time or as exchange students. Because of globalization efforts in major universities in the world, we see a huge potential to engage in collaborative research with various partner universities. Our researchers are regularly in touch with their peers in different countries and this has resulted in an increased number of joint publications. A large number of well-known researchers and academicians across the globe have visited IIT Bombay in the last one year and several MoUs have been signed when found appropriate to be engaged. IIT Bombay has also seen a large increase in the number of governmental and ministerial delegations from various countries in African, European, Asian, North American & Oceanian continents. All these delegations have appreciated the value creation by IIT Bombay during its 52 years of existence.

A conservative estimate is that India currently needs about 6000-8000 additional faculty members holding doctoral degrees. Unfortunately, India does not produce so many Ph.D.s in science and technology. IIT Bombay, one of the largest producers of doctorates in these areas, graduates about 200 Ph.D.s annually. Hence there is a crucial need to increase our capacity to produce more doctorates annually without affecting the quality of the studentship. IIT Bombay has come out with a special programme in collaboration with an international academic partner for this purpose. A research academy has recently been established at IIT Bombay as an academic partnership between IIT Bombay and Monash University, Australia. Under this, we currently have close to 60 students registered for Ph.D., working on a range of high-impact research projects. About 70 supervisors from IIT Bombay are involved in offering joint projects with faculty from Monash University for the joint Ph.D. programme. There is already confirmed external funding for this joint venture to the tune of $6.25 million, and we are also seeking additional funding from private enterprises and government departments to ensure that this programme will be sustained successfully over the next 20 years or so.

IIT Bombay has also put emphasis on inculcating a global sense of value and culture among its students. French and Japanese language and cultural courses are now being offered by native speakers of these languages in the campus. Through an agreement with DAAD, we expect to start a similar programme in German last academic year.

**MoUs with Foreign Universities**

A GlobalTech Alliance MoU was signed among leading research universities with science and technology as their core strength. The universities are: California Institute of Technology, ETH Zurich, Georgia Institute of Technology, Imperial College of Science, Technology & Medicine, IIT Bombay, Nanyang Technological University and Shanghai Jiao Tong University.
Memoranda were also signed with many other universities. These are:

- Brno University of Technology (Czech Republic)
- Nanyang Technological University (Singapore)
- Johns Hopkins University (USA)
- University of New South Wales (Australia) – renewal of MoU
- Mekelle Institute of Technology (Ethiopia)
- University of Udine (Italy) – renewal of MoU
- Friedrich-Alexander Universitat Erlangen-Nurnberg (Germany) – Students & Scholars Exchange Program Agreement
- Wilfrid Laurier University (Canada)
- Ontario Universities International (Canada) – participating universities:
  - McMaster Univ., Queens Univ., Univ. of Toronto, Univ. of Waterloo, Univ. of Western Ontario & York Univ.
- Northeastern Univ. (USA)
- Ecole Centrale de Nantes (France)

Visits of International Delegations to IIT Bombay

IIT Bombay also witnessed a huge number of international delegations for exploring areas of collaboration and cooperation. The major ones are as follows:

- University Teknologi Petronas, Malaysia
- Hongkong University of Science & Technology
- University of Cambridge – ESOL Examinations, India Office Nanyang Technological University, Singapore
- University of Melbourne, Australia
- Eindhoven University of Technology, Netherlands
- Bogazici University, Turkey
- University of Nebraska, USA
- TU Graz, Austria
- Waterloo Institute of Nanotechnology, Canada
- Ministry of Education, China
- Ministry of International Relations, Canada
- State Minister for Education, Ethiopia & representative from Addis Ababa University, Ethiopia.
- A Quebec delegation lead by Mr. Pierre Arcand (Minister of International Relations)
- A delegation from Bhutan led by Mr. Lyonpo Nandalal Rai, Minister, Ministry of Information & Communications.
- A 100-member German delegation comprising academicians, CEOs, Ministers and representatives from Consulate of Germany, Mumbai, lead by the Minister President Guenther Oettinger from State of Baden-Wurttemberg.
- Canadian High Commissioner and Consul General
- Consul General & Dy. Consul General of Germany in Mumbai
- Consul General of Korea in Mumbai
- Consul General of Switzerland & the delegation from ETH Zurich
- French Embassy and Campus France
- Indo Italian Chamber of Co
- UK Trade & Investment and British Deputy High Commission
- American Center and Embassy of USA
- Director – Education, British Council India & Sri Lanka
- Representatives from DAAD – Mumbai, Pune & Delhi offices
- Board of Investment of Sri Lanka

In addition, several individuals visited IIT Bombay as representatives of their respective universities.

International Students

A total number of 28 international students (Nepal, Iran, Germany, Ethiopia, USA, Singapore, Czech Republic, UK and Japan) have registered at IIT Bombay during the year 2009-10. They have joined IIT Bombay for course work/project work/postgraduate studies.

Student Exchange Programme

A few students participated in the student exchange programme (under MoUs) during the academic year 2009-10, as follows:

- Autumn semester

  Two fourth year Dual Degree students from the Department of Mechanical Engineering participated in the programme, one at the National University of Singapore and one at Northwestern University (USA).

  One fourth year Dual Degree student from the Department of Aerospace Engineering participated in the programme at Purdue University (USA).

- Spring semester

  Two fourth year Dual Degree students from the Department of Mechanical Engineering participated in the programme at Purdue University (USA).

  One fourth year Dual Degree student from the Department of Computer Science and Engineering participated in the programme at Rice University (USA).
One fourth year B.Tech. student from the Department of Chemical Engineering participated in the programme at the National University of Singapore.

**French Classes**

French classes were organised for the faculty, staff and students of IIT Bombay. They were conducted in three separate batches.

**Japanese Language Initiative**

We have signed an agreement of cooperation for a Japanese Language Initiative (JLI) at IIT Bombay. The JLI is meant to empower IIT Bombay students to develop new perspectives and learn Japanese from a professional language instructor coordinated by Koo International Ltd., Japan. This is initially for a period of one year and may be extended by mutual written consent. The Japanese language course is currently being coordinated by the Chairman (Cultural Affairs), Student Gymkhana. The classes were held in two separate batches for students.

**Resource Mobilization**

One of the major challenges that the institute faces is to retain its position of excellence and to improve upon it. In addition to academic talent, it requires substantial financial resources for continued modernization of facilities and removal of obsolescence. The Government of India, through the MHRD, continues to be the primary source of funds for the institute. Sponsored projects, industrial consultancy and continuing education programmes contribute a small portion to meet our annual expenditure.

Donations from our alumni have helped us in a significant way. We have so far received over 2000 donations. This year we received 383 donations of the order of Rs. 16.30 crores from the alumni and friends of IIT Bombay (Rs. 14.60 crores from the alumni and Rs. 1.70 crores from corporations and others). Out of these, Rs. 43.00 lakhs were received from Sudhakar & Suresh Shenoy towards Shenoy Design Studio, Rs. 54.29 lakhs received from Class of ’84 (Rs. 10.00 lakhs from Mr. Arun Suresh Chandavarkar, Rs. 5.00 lakhs from K.K. Iyer, etc.), Rs. 5.42 crores from Mr. Bharat Desai towards Indoor Gymkhana, Rs. 3.36 crores from Victor Menezes towards Convention Centre, and Rs. 2.58 crores from Romesh Wadhwani towards Wadhwani Research Center for Bioscience & Bioengineering (WRCBB) and Wadhwani Electronic Laboratory.

A sum of Rs. 23.20 lakhs was received from the alumni of Hostel 4 for Hostel Alumni Team Stewardship (HATS) – started by Hostel 7; Rs. 18.60 lakhs from Prof. Ravi Kulkarni (currently, Institute Chair Professor in the Department of Mathematics) for National Centre of Mathematics (NCM); Rs. 5.00 lakhs from Mrs. Indumati Sukhatme towards prizes in the name of Dr. P. V. Sukhatme; and a sum of Rs. 6.30 lakhs was received from S.C. Mehrotra for awards to students in the Civil Engineering Department.

We also received Rs. 1.00 crore from Bharat Forge Limited; Rs. 17.99 lakhs from Boeing International Corporation India Ltd. towards Aerospace Engineering Department student scholarships and student projects; Rs. 12.00 lakhs from Infosys Technologies Ltd. towards Infosys Fellowships; Rs. 12.44 lakhs from British Gas India Ltd. towards BG Fellowship in Earth Sciences Department; and Rs. 23.25 lakhs from TechniGraphics for instituting a “Distinguished Lecture Series”.

**Faculty Affairs**

Recruiting and retaining high quality faculty is indeed a challenging task. During the period, 28 faculty members on regular basis and eight on contract basis were appointed. The number of full-time faculty members on the rolls of the institute has risen to 488, comprising 249 professors, 99 associate professors, 135 assistant professors, and five lecturers. In addition, there are 33 adjunct faculty members on the rolls.

The institute provided financial assistance to 160 faculty members for participating in international conferences. In addition, 112 faculty members travelled abroad for attending international conferences using external funding and eight faculty members went abroad on Fellowships for research work.

During the year, two faculty members retired, two took voluntary retirement, and two resigned.

The faculty of the institute contribute in diverse ways, besides educational and research pursuits, meeting national and global obligations through membership of various national committees, reviewing manuscripts for publications and editorial for journals. We are proud that their efforts have received recognition in the form of several awards and distinctions, some of which are given below:

**Prof. Srinivas Aluru**, Department of Computer Science and Engineering, has been elevated to the IEEE Fellow grade with effect from January 1, 2010, in recognition of his contributions to computational biology.

**Prof. U. K. Anandavardhanan**, Department of Mathematics, has been selected for the NASI-Young Scientist Platinum Jubilee Award in Physical Sciences for the year 2009.
**Prof. Rajdip Bandyopadhyaya**, Department of Chemical Engineering, has been elected as a member of the National Academy of Sciences, India (NASI).

**Prof. B. Bandyopahyay**, Systems and Control Engineering, has been selected as a ‘Distinguished Visiting Fellow’ by The Royal Academy of Engineering, London, in 2009 for his contribution on Variable Structure Systems with Multirate Output Feedback.

**Prof. Rabi Bastia**, Department of Earth Sciences, has been awarded the Doctor of Science in Petroleum by the Indian School of Mines, Dhanbad.

**Prof. Pushpak Bhattacharyya**, Department of Computer Science and Engineering, has been conferred the Manthan Award 2009.

**Prof. T. K. Biswal**, Professor and Head Department of Earth Sciences, has been awarded the National Mineral Award for Basic Geosciences, 2008 by the Ministry of Mines, Government of India.

**Prof. M.S.C. Bose** and **Prof. R.P. Vedula**, Department of Mechanical Engineering, have been awarded Prof. A Jaganmohan Award for Professional Development. The award is for the goodness in teaching.

**Prof. Deepankar Choudhury**, Department of Civil Engineering, has been selected for ISTE’s “Maharashtra State National Award - 2009” for his outstanding research work in Engineering and Technology. He has also received Indira Gandhi Priyadarshini Award–2009 for his outstanding services, achievements and contributions in the field of academics.

Prof. Choudhury has been inducted as an Editorial Board member of ISSMGE Bulletin for a period of four years, on the recommendation of the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE), London, U.K.

Prof. Choudhury has been selected by the Alexander von Humboldt Foundation, Germany, for the Humboldt Research Fellowship for Experienced Researchers.

Prof. Choudhury has been selected for the prestigious Bilateral Exchange Fellowship Programme 2009-10 of Indian National Science Academy (INSA), New Delhi, to carry out the research work for three months in the area of “Geotechnical Earthquake Engineering” at Department of Ocean and Civil Engineering, Kagoshima University, Japan.

**Prof. Ashish Das**, Department of Mathematics, has been selected for the “5th M.R. Pai Memorial Award” in recognition of his successful efforts leading to regulatory changes brought into the Indian Banking for the benefit of bank customers.

**Dr. Dibyendu Das**, Department of Physics, has received the “Satyamurthy Award” for his contributions to the study of simple models for non-equilibrium phenomena in soft condensed matter physics and, in particular, of the motion of dissipative systems of granular matter and the motion of a single polymer submerged in fluid flows.

**Prof. Subimal Ghosh**, Department of Civil Engineering, has been awarded the prestigious Boyscast Fellowship 2009-10 by the Department of Science and Technology.

**Prof. Tarun Kant**, Department of Civil Engineering, has been selected for the IIT Roorkee-Khosla National Award for Lifetime Achievement in the field of Engineering.

**Prof. Azizuddin Khan**, Department of Humanities and Social Sciences, has been selected for the “Cousin’s Center Global Outreach” award by American Psychosomatic Society USA.

Prof. Khan has been selected for the Bilateral Exchange Fellowship Programme 2010-11 of the Indian National Science Academy (INSA), New Delhi. He has also been selected for ESRC-ICSSR India-UK Scholar Exchanges 2009.

**Prof. Devang Khakhar**, Professor, Department of Chemical Engineering, has been elected as a Fellow of the National Academy of Sciences, India (NASI, Allahabad).

**Prof. A. S. Khanna**, Corrosion Science and Engineering, has been conferred the First Akzo Nobel awards for Excellence in Coating Research and Promotion for his excellent contribution to Research in Waterborne Coatings and promoting Coating Research in India

**Prof. S.A. Khaparde**, Department of Electrical Engineering, has been awarded the “DSK Energy Award 2009” by the Pune local centre of the Institution of Engineers (India).

**Professor Emeritus S.M. Khopkar**, Department of Chemistry, has been bestowed the Life Time Achievement Award by the Indian Council of Chemists (ICC) at its 28th conference held in North Gujarat University, Patan.

**Prof. S. Kotha**, Department of Chemistry, has been elected as a Fellow of the Indian Academy of Sciences, Bangalore.

**Prof. Malhar Kulkarni**, Department of Humanities & Social Sciences, has been conferred the prestigious
award “Maharshi Badarayana Vyas Samman for 2009” in recognition of his contributions for the cause of Sanskrit/Persian. The award was announced by the President of India on the eve of Independence Day on August 14, 2009.

Prof. S.K. Maiti of the Department of Mechanical Engineering, has been elected as a Fellow of ASME.

Prof. M.K. Mishra, Department of Chemistry, has been appointed as Associate Editor of the International Journal of Quantum Chemistry and also on the Editorial Board of the Advances in Quantum Chemistry.

Prof. Manoj Mishra, Department of Chemistry, has been honoured with the India-U.S. Professorship Award in Physics by the Indo-U.S. Science and Technology Forum (IUSSTF) and the American Physical Society (APS).

Prof. Anand Patwardhan, SJM School of Management, has been named as one of the Co-ordinating Lead Authors for the Intergovernmental Panel on Climate Change (IPCC) Special Report on “Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation”.

Prof. D.B. Phatak, Department of Computer Science and Engineering, has been honoured as one of the “50 Most Powerful People” by the Business Week under ‘Technology.’

Prof. Krithi Ramamritham, Department of Computer Science and Engineering, has been selected for the IBM Faculty award for the year 2009.

Prof. V. Ramgopal Rao, Department of Electrical Engineering, has been awarded the “ISA TechnoMentor Award 2009” by the India Semiconductor Association, Bangalore.

Dr. Anirban Sain, Department of Physics, has received the “Buti Foundation Award” for his contributions to the study of soft condensed matter physics involving polymers and biological systems.

Prof. Anil K. Singh, Department of Chemistry, has received “ISCB Award for Excellence 2009 in the Area of Chemical Sciences” for outstanding contributions.

Prof. V.K. Singh, Department of Chemistry, has been elected as a Fellow of the Indian Academy of Sciences in recognition of his significant contribution in Chemical Research in the year 2008.

Prof. V.K. Singh, Department of Chemistry, has been selected for the prestigious J.C. Bose Fellowship of the Department of Science and Technology, Government of India.

Infrastructure Development

This year we undertook construction work of four major new building projects, namely, Computer Centre and Computer Science & Engineering Department building, Type ‘II-B’ Staff Housing buildings (48 Flats) and two ‘B’ Type Faculty Housing buildings (120 flats).

The new wing for Hostel No. 10 with 292 capacity was completed and fully occupied during the academic year 2009-10. To augment our hostel capacity further, a new hostel with 573 rooms and an additional wing to Hostel No. 12 with 191 rooms are being completed, and they will be ready for occupation during the coming academic year 2010-11.

Projects such as Lecture Hall Complex (seating capacity over 4800), Bio-School building (with 3 teaching labs, 28 faculty labs, classrooms and departmental office), Convention Centre, Nano Electronic Centre, Indoor Sports Stadium, Swimming Pool, and Type ‘II-B’ Staff Housing building (24 Flats) will be completed in the next few months. The construction work for ‘C’ Type Faculty Housing building (60 Flats) is also in full swing and will be ready by January 2011.

Many other projects such as Married Students apartments, two additional Type ‘II-B’ Staff Housing buildings (96 flats), Type ‘H-1’ Staff Housing buildings (60 flats), Hostels 15 & 16 (2000 capacity) are now at various stages of planning and pre-execution.

Apart from these, the future building projects that would be taken up in the near future include Guest House expansion, Rahul Bajaj Technology Innovation Centre, building for Department of Energy Science and Engineering, and IITB-Monash Research Academy.

Central Library

The Central Library continued to be the hub of all research and academic activities of IIT Bombay and played a significant role in facilitating creation and dissemination of knowledge during the year. It offered a range of services including reference and consultation, membership and circulation, document delivery, resource sharing, information alert service, book bank for needy students, user awareness programmes, and ICT-enabled web-based services to about 8500 members. The library remains open on 360 days of the year till 11.00 pm on all working days and 1.00 am (past midnight) during examinations. It maintains a 24x7 reading hall where students can study
even after the library is closed. The library earned over Rs.37.0 lakhs for the various services rendered to professionals, educational institutions, industry and corporate houses. It also extended support to establish libraries at IIT Gandhinagar and IIT Indore.

The greatest asset of the library is its collection of books, journals, theses, reports, standards, pamphlets and other reading material that supports academic and research work of the students, faculty, staff and other users. The library added 6891 items to its collection which stands at 4,21,373 as on March 31, 2010. It also subscribed to 1264 journals.

The Central Library has its own homepage (http://www.library.iitb.ac.in), provides 24x7 access to its resources, procures about 15,000 electronic journals and databases, supports online submission of theses and dissertations, and has set up an institutional repository of publications brought out by the IIT Bombay community. The library is part of the institute-wide network and has adequate computing infrastructure to cater to the needs of the users. The WI-FI facility in the reading area continues to attract users to bring in their laptops to have seamless access to print and electronic resources.

The OPAC (Online Public Access Catalogue) is one of the most heavily used databases of the library and is also accessible 24x7 via library Web page. Besides listing all the documents available in the library, it allows online reservation, circulation, fine collection, and indicates the status of a particular book. OPAC is searchable by author, title, accession number, subject, and several other fields.

The Central Library supports electronic submission of theses and dissertations by the postgraduate and doctoral students. It maintains a full-text database of over 5000 items submitted since 1999-2000 on Intranet. During the year, 377 M.Tech. dissertations and 159 Ph.D. theses were submitted online. The library has also developed a database (providing bibliographic details and abstracts) using open source software, GSDL of all the Master’s dissertations and Ph.D. theses submitted since 1999 and 1965, respectively. This database containing over 2500 records is accessible through the library homepage.

The Central Library has set up an archive of publications (http://dspace.library.iitb.ac.in/jspui/) brought out by the institute. The archive already has over 1650 items and is being updated to cover more publications which are permissible within the copyright regulations. The archive is expected to evolve into a database of all publications produced by the IIT Bombay community and is accessible on the Internet through the library homepage.

User-education is an important activity of the library to inform, alert, educate and train users about the various resources and services of the library. In addition to the orientation programmes organized for new students, the library conducted short duration training programmes on “How to Use” various databases for the benefit of our faculty and students. The library also organized half-day interactive sessions on “Enhancing User Awareness” for new faculty and research scholars to familiarize them with various resources and services.

**Computer Centre**

The Computer Centre provides computational and network infrastructural facilities and services to the IIT Bombay user community. It is responsible for the intra-campus connectivity between the departments and also for connectivity of IIT Bombay to the outside world. During the year, the following activities have been undertaken to expand and upgrade the network infrastructure at IIT Bombay:

- Extension of the campus network facilities to new areas (residential buildings – mainly Type I – both in Hill Side and Lake Side locations) started last year is in advanced stage of completion. Laying of separate underground channels from Computer Centre to Hill Side and Lake Side residences has been completed. The target residential buildings have been wired up. Five network kiosks have been built at various locations to keep switches and network racks.

- Complete revamp of hostel networks both in terms of active and passive components has been completed in Hostels 1 through 11 during the year. Two gigabit ports have been provided per room. In addition, the cable network in Hostels 12 and 13 is currently being inspected and changes are being effected wherever necessary. The under-construction wings for Hostels 12 and 13 will be connected as and when they are ready.

- During the year, the total Internet bandwidth for IIT Bombay campus users has been increased from 108 to 218 Mbps.

**High Performance Computing Clusters:** The computing clusters GALAXY and CORONA continue to function as before. Given the space constraint, these clusters continue to be housed in Aerospace Engineering and Chemistry Department buildings, respectively. After a lot of effort towards solving the infrastructural issues, the third cluster of 512 nodes is currently operational at the ground floor of the Department of Computer Science and Engineering.
National Knowledge Network: IIT Bombay continues to be a member of the National Knowledge Network (NKN). This is a multi-gigabit network initiative started by the National Informatics Centre (NIC). This network infrastructure is being used by CDEEP to conduct Distance Education programmes.

Hardware/Software Infrastructure: All service offerings at the Computer Centre are based on OPEN SOURCE software systems. Computer Centre has registered as official mirror for various flavours of Linux Operating Systems on its anonymous FTP server which is available to the user community at large.

The institute continues to be a member of Microsoft Developer Network Academic Alliance (MSDNAA) software licensing programme. This allows the user community to use most of the Microsoft software products in a non-production environment. Campus-wide licence of AVG anti-virus software has been in operation.

Software packages such as ANSYS, MATLAB, MATHEMATICA, MAPLE, and Libraries from Numerical Algorithm Groups (NAG), etc., are available through site licenses administered by the Computer Centre.

Projects for the Near Future: The core network of IIT Bombay is quite old. The switches are nearly five years old. The underground fibre-optic cable network is operational for more than 13 years. The cable network, as it exists now, is rather ad hoc and has been patched many times because of damages (mostly during construction/repair of roads and new buildings). There is a strong case for creating a properly planned fibre-optic cabling infrastructure using single mode fibre with adequate redundancies so as to improve the reliability of network access. The replacement of core network switches is under active consideration. The goal is to have a future-ready network that can be easily migrated to a 10-gigabit infrastructure.

Institute Events

The 47th Convocation of the Indian Institute of Technology Bombay was held on Friday, August 7, 2009. Dr. E. Shreedharan, Managing Director, Delhi Metro Rail Corporation, the Chief Guest, delivered the Convocation Address. The Degree of Doctor of Science (Honoris Causa) was conferred on Mr. G. Madhavan Nair, Chairman, Indian Space Research Organisation.

IIT Bombay celebrated its 51st Foundation Day on Wednesday, March 10, 2010. Prof. M. Barma, Director, TIFR, was the Chief Guest. The Distinguished Alumnus Awards were presented to five alumni. The ‘Prof. H. H. Mathur Award for Excellence in Applied Sciences, 2009’ was conferred on Prof. M. C. Deo, Department of Civil Engineering, and the ‘Prof. S.C. Bhattacharya Award for Excellence in Pure Sciences, 2009’ was conferred on Prof. Dulal Panda, Department of Bioscience & Bioengineering.

“Vanamahotsav 2009” was celebrated on June 29, 2009. On this occasion a tree plantation drive was organised by IIT Bombay. Saplings were planted on the slope of the hill behind Hostel No. 4.

Conferences/Colloquia/Lectures/Seminars

Many conferences and lectures were organised during the past year. Some of these are listed below:

- IIT Bombay organised the 4th International Conference on “NanoScience and Technology, ICONSAT-2010” during February 17-20, 2010. It was co-organized by Bhabha Atomic Research Centre, Mumbai, and Tata Institute of Fundamental Research, Mumbai, and sponsored by the Nano Mission, Department of Science and Technology (DST), Government of India.
- The 2nd International Conference and Exhibition on “Advances in Energy Research (ICAER 2009)” was organised by the Department of Energy Science and Engineering, IIT Bombay, during December 9-11, 2009.
- Prof. Robin Batterham, Group Chief Scientist, Rio Tinto Limited, and Professorial Fellow, Department of Chemical and Biochemical Engineering, University of Melbourne, delivered an Institute Colloquium lecture on “Perspectives from an Engineer: Making a difference in the minerals and energy industries” on September 8, 2009.
- Prof. M. Ram Murty, FRSC, Queen’s Research Chair & Head, Department of Mathematics & Statistics, Jeffery Hall, Queen’s University, Canada, delivered an Institute Colloquium lecture on “Summation of Infinite Series” on October 21, 2009.
- Prof. Sunney I. Chan, Emeritus Professor, California Institute of Technology, USA, delivered an Institute Colloquium lecture on “Learning from
Nature to Develop a Catalyst for the Facile Conversion of Methane to Methanol” on November 3, 2009.

- **Dr. Indira Samarasekera**, President and Vice Chancellor, University of Alberta, Edmonton, Canada, delivered an Institute Colloquium lecture on “Forging a New Way Forward: The Role of Universities in the 21st Century” on February 11, 2010.


- **Prof. A.K. Sood**, Department of Physics, Indian Institute of Science, Bangalore, delivered an Institute Colloquium lecture on “Graphene and Nanotubes: The Rising Stars of Nanotechnology” on April 9, 2010.

- **J. C. Bose Memorial Lecture** was organised on November 11, 2009. Dr. Probir K. Bondopadhyay, Forensic Historian of Science & Technology; CEO, Rural World Communications, U.S.A., delivered the lecture on “The Bose Detector of Wireless Waves and Launching of the Communication Revolution”.


- The **Industrial Design Centre**, IIT Bombay, organised the Design Experience Seminar and the Design Degree Show, Swarna, from June 8 to 14, 2009. The seminar was jointly organised by IDC, IIT Bombay and InDeAs (India Design Association).

**Staff Development**

The Personnel Training and Development Cell organized 17 training programmes on the most preferred areas for the non-teaching Groups A, B, C and D staff members. In all 302 staff members participated in these training programmes. Besides, 45 staff members attended the training programmes conducted by outside agencies to acquire specialised job-related skills.

**Hindi Cell**

Hindi Cell is actively engaged in the implementation of the Official Language Policy of the Government of India in the institute. It trains staff members in Hindi and Hindi word processing and regularly organises Hindi word processing classes.

Hindi Pragya Classes were organized with the support of Hindi Teaching Scheme, Government of India. This year 25 staff members have successfully completed the Pragya Course. Twenty four of them received cash awards for securing good marks in this examination.

This year five staff members passed the Hindi typing examination conducted by the Hindi Teaching Scheme, and all of them have won cash prizes for their best performance in the examination.

Progress of Hindi implementation at the institute is being regularly reviewed by the Official Language Implementation Committee. We are making our best efforts to achieve the target set by the Government of India. We have got many successes. This year our landmark achievement was in successfully hosting all the web pages of Dean (IPS) in Hindi. Another remarkable success was that officers of the institute have started posting email notices in Hindi along with its English version.

We have adopted a policy of persuasion and encouragement with suitable incentives for Hindi implementation. This year we have honoured 13 staff members for their excellent contribution to this effort. Hindi workshops are regularly organized. This year we had seven Hindi workshops for the staff members and officers.

We celebrated Hindi Pakhwada with active participation from staff members. The Hindi Speech Competition, Hindi Essay Competition, Hindi Translation Competition, and Hindi Noting and Drafting Competition were also organised. On the occasion of the Engineer’s Day, a lecture in Hindi by a renowned engineer and practising lawyer, Dr. Kruti Dave, was arranged. He spoke on construction laws and their implementation. Prof. R.K. Malik, Deputy Director (AIA), who presided over the function, called upon the staff members to make the maximum use of Hindi. He also presented the prizes and trophies to the winners of Hindi competitions.
Student Activities

Sports

The year 2009-10 has been an excellent year as far as sports was concerned. At the Inter-IIT Sports Meet 2009 held at IIT Kanpur in December, IIT Bombay won Inter-IIT General Championship for the third consecutive year thus making a hat trick. This is a great achievement for IIT Bombay considering three victories in a row which no other IITs have achieved during the past 30 years.

IIT Bombay clinched gold in hockey, badminton, basketball, football, and weightlifting; silver in volleyball, swimming, and cricket; and bronze in table tennis and water polo. In women’s event IIT Bombay secured the first place in swimming and the second position in badminton and table tennis.

Besides Inter-IIT tournaments, IIT Bombay hockey team participated in the Mumbai Hockey Association league matches and fared reasonably well. Weightlifting team also participated in the Greater Mumbai District weightlifting competitions.

In the Inter-Hostel competitions Hostel No. 4 won the General Championship and, among women, Hostel No. 10 clinched the General Championship. The IV Inter-Department PG sports tournament was also conducted successfully.

Cultural Events

Various workshops in debate, music, acting, theatre and film, photography and arts, dramatics, cinema poster making, etc., were conducted by the Student Gymkhana for the benefit of students. In order to encourage students, classes for dance and music (vocal and instrumental) were held. Our students performed a play called “Swapmanagri Express” at the Prithvi Theatre Festival and received great appreciation. They represented IIT at various college competitions in debate, quiz, music, dance, drama, etc. For the first time, the Mood Indigo and the Student Cultural Council jointly organized the IIT Bombay National Debate during the last week of September 2009. The students from 34 colleges all over India participated in the three-day event.

A state-of-the-art recording studio for students has been set up at the Student Activity Centre, where students can develop their musical skill.

“Surbahaar” and “Swar Sandhya” – musical programmes by the undergraduate and postgraduate students were held this year. The performance was well appreciated by the audience. “Anjali”, the celebration of Gandhi Jayanti, was organized with the usual fervour and enthusiasm showcasing various student and faculty performances. Out of the three major events in IIT Bombay under the SPICMACAY Virasat Utsav, two were music-based, and the third one depicted a regional dance form from Orissa called “Purulia Chau”, which won great enthusiasm and audience response. This year the first ever edition of “IIT Bombay Film Festival” was also organized by the Institute Cultural Council, as a measure to provide a platform to the growing base of students interested in these activities.

Technical

“Energy GC”, an initiative by Techfest taken along with TechniC, led to an effective saving of 92,600 units of electrical consumption in the hostel area of IIT Bombay over a period of three months.

NSS

The students of the institute are involved in the National Service Scheme (NSS) during every academic year. The Government of India initiated the NSS in 1969 with the avowed intention of involving the youth in the nation building process. The NSS is to provide an essential link between the campus and the surrounding community. Not only is it expected to arouse the social consciousness of the students and teachers alike but also to provide an avenue for personality development through community service. It aims at developing amongst students a sense of participation in nation building through social work, deepens the understanding of the social environment, and enriches personality through actual participation in the day to day life of the society. This process of learning is not only a desirable supplement to the classroom education but develops in the student a sense of responsibility, tolerance and cooperation. The NSS plays a vital role in the development of the latent aspects of the student’s personality.

The activities of NSS during this academic year included teaching and training of the underprivileged sections of the society to improve their learning skills and knowledge. An increasingly large number of students joining the undergraduate programme do participate in the NSS activity and undergo courses related to this social outreach endeavours, as a part of their curriculum. This year the total number of first-year students who did NSS as an academic course was nearly 150. Many senior undergraduate and postgraduate students also join this activity as volunteers.

All the students enrolled in NSS were given an exposure to life in rural areas through visit to the underdeveloped regions within the rural areas. Almost
all of them have been taken to the rural areas by the faculty and student coordinators. The students also undergo personality development through practical training in yoga and meditation. They actively participate in the social outreach programmes of the institute thereby helping the institute to fulfill its social responsibility. Some of the activities of NSS during the academic year are as follows:

Teaching in the adult literacy programme – meant for the Staff of the Health Office and Mess Workers

Teaching the Security and other staff members for their Xth and XIth Stds. examinations under the National Institute of Open Schooling (NIOS)

Providing theoretical and practical training on basics in computer literacy to the underprivileged members of our own society and to the staff members of the institute (at NSVK)

Teaching the children of Campus School and Kendriya Vidyalaya

Specific scientific experiments in a hands-on way carried out with children from the campus school

Performed a skit at the Republic Day celebrations of the institute.

Cloth-collections drive for distribution of clothes among the poor in low-income colonies.

On the whole it was a very fruitful and fulfilling year in terms of the social outreach programmes that our students conducted. We shall strive to improve these activities manifold in the coming years.

NCC

As part of co-curricular activities, the NCC conducted regular training sessions and an annual camp. Apart from this, an advanced training course was also conducted.

Student Mentor Programme

The Student Mentor Programme for the year 2009-10 set out to impact a larger population of the student community through two parallel programmes – Institute Student Mentor Programme (ISMP) and Department Academic Mentor Programme (D-AMP). The ISMP tried to ease the concerns of the first-year students entering the institute while the D-AMP helped senior students realize their true potential in academics. The Student Mentor Programme has evolved significantly since its inception and has successfully helped many students at IIT Bombay.

Mood Indigo 2009

Mood Indigo 2009 saw immense improvement in the quality of participation, especially from the outstation colleges. Some of the topmost colleges of India came to participate for the first time in Mood Indigo 2009, like IIT Kanpur, Bits Pilani, Christ College, Bangalore, etc. All of them found Mood Indigo to be a great learning experience, being exposed to stiff competition from the entire nation.

International Night – Porcupine Tree performance

Mood Indigo 2009 saw a Grammy-nominated band, Porcupine Tree performing in the OAT. The band came to India for the first time and IIT Bombay’s tag of excellence was once again reinstated when a concert of this magnitude and quality was pulled off by the students alone.

The IIT Bombay student community which has many enthusiasts for Rock Music showered the team with appreciation on bringing artists of this stature at their own home stage.

IIT Bombay students won the overall trophy at Mood Indigo claiming the title for the most culturally sound college in India proving its mettle amongst the nation’s top colleges. Many IIT Bombay students got professional internships with Cultural academies in the form of prizes for further honing their talent.

Associations

Mood Indigo 2009 forged fruitful associations with many reputed organizations. The sponsors for the festival included respectable names like Tata Indicom, Hindustan Times, SBI, Canara Bank, Raymond, The British Council, etc.

Overall, Mood Indigo 2009 was hugely successful in achieving its mission to herald the start of unique cultural happenings in India, and to give a chance to young guns to break new ground on the cultural scene.

Techfest 2009-10

Techfest 2010, IIT Bombay’s Annual International Science and Technology festival, was successfully organized from January 22 to 24, 2010. Techfest celebrated the 13th anniversary of its existence this year. Events comprising competitions, workshops, lecture series, exhibitions and professional shows introduced the participants to various fields of science and technology. With students 75,000 strong representing about 2100 colleges from all over India and the neighbouring countries like Thailand, Australia, Sri Lanka, Venezuela and Nepal, the event was certainly the biggest till date.
With competitions in science and technology ranging from robotics to presenting the state-of-the-art solutions to real problems, to designing vehicles out of junk, participants were left spellbound by the magnitude of the festival. There were six major international competitions with total prize money of USD 8000. “Full Throttle Inferno” was a sequel to the highly famous IC engine-driven car competition held over the years. For the very first time swarm robotics was introduced in India through ANTZ, which, as part of the initiative “The Techfest World Challenge”, aimed at providing a truly international platform where students from India, Thailand, Australia and Sri Lanka participated in the finals. This year, both Nexus (the national rounds held at five cities, namely, Mumbai, Indore, Rourkela, Delhi, and Calicut, prior to the festival; for the first time, Nexus spread its wings to the eastern part of the country) and Inexus (the international rounds held in Sri Lanka, Thailand, and Australia in the month of December) were part of The Techfest World Challenge. Free Kick acted as a sequel to last year’s GOAL and was an event aimed at promoting real-time image processing. “Prayaas”, an initiative to help the society, aimed at solving the persistent energy crisis, rural and agricultural problems, health care problems, etc., that the society faces today. “Techfest Scholastic” aimed at nurturing the budding talents of the country, i.e., it focused on the school students. Robowars lived up to its legacy of being a highly involving event both for the participants and the audience. Eco-mansion and Cityracks encouraged out of the box thinking to get innovative designs for sustainable living and efficient parking. In contraptions and bascule bridge, the participants had to make a contraption and a suspension bridge out of popsicle sticks, respectively. Vorticity and mBedded Logic were events targeting people active in the fields of CFD and FPGAs. Ozone, the on-the-spot zone, provided the thrill and excitement throughout the three days by hosting a variety of quizzes, many involving activities, Junkyard Wars, and many other events. The Laser Tag and the Indian Sudoku Challenge were introduced for the first time in a student festival.

The lecture series proved to be a bridge between the students and eminent personalities. Dr Lyn Evans, Project Head, LHC (CERN), shared his experiences while heading the LHC project – mankind’s greatest contraption and a suspension bridge out of popsicle sticks, respectively. Vorticity and mBedded Logic were events targeting people active in the fields of CFD and FPGAs. Ozone, the on-the-spot zone, provided the thrill and excitement throughout the three days by hosting a variety of quizzes, many involving activities, Junkyard Wars, and many other events. The Laser Tag and the Indian Sudoku Challenge were introduced for the first time in a student festival.

The Pan-IIT Business Idea challenge was launched on August 10, 2009. Three hundred and eighty entries

For all the three days of the fest crowds flocked in huge numbers to the exhibition arena where exhibits from various universities across the globe and from industrial firms were displayed. Some of the exhibits worth mentioning are the Holey Rocks, the Eye Writer, Nos Gwawr (Winner of the World Solar Challenge Environmental Awareness Award), Accelerators Everywhere (Oxford University and CERN), Naro, Reely, Shrimp, Alice and Robolobster. The audiences were left spellbound with exhibits from the Indian Navy, the ISRO and the NDMA. The shows conducted by NDMA would be remembered by one and all.

“TechConnect”, an initiative taken along with IRCC, aimed at promotion of IIT Bombay R&D and technology transfer from the institute to the industries. It was the first time that such an event was happening in a student festival and was much appreciated by the faculty, the industry and the students.

If these activities occupied one’s daytime, even the nights were not left alone. Technoholix, spanning all the three nights, showcased a mix of cultural arts along with high-end technology. A highly popular group MAD, arguably the world’s best and most celebrated trail bikers, performed for the first time in India and left everyone spellbound. Activ8-3D had a show on 3D holographic projections. Nexus Europe and Tony Chapek, the interactive illusionist from USA, left the audience wanting for more. The Sand animation and the Pa-li-Tchi fire and pyro show on the third night provided a perfect ending to this year’s “Technoholix”.

“Scintillations” was an entirely new segment in the festival which had interactive installations in the night time. Some of the installations worth mentioning are the Solar Eiffel, the Laser Stencil, the Light Ripples, the Meza Top and the Toyota IQ. The audiences were left spellbound by the grandeur at display in “Scintillations”.

The 13th Techfest was a great learning experience for all the participants and the organisers. It will forever remain etched onto the minds of everyone who were involved with it.

E-cell activities

E-cell has been very active throughout the year. In its 10th year, the organization has explored various initiatives to address target audiences at different stages of the entrepreneurial cycle such as:

IdeaZ

The Pan-IIT Business Idea challenge was launched on August 10, 2009. Three hundred and eighty entries
were received from different IITs. All these entries were given online mentoring from Kennis Consultants. Followed by this, a panel of 30 judges consisting of industry experts, faculty of B-Schools and entrepreneurs examined the entries to select top 10 to make final presentation. The IIT Delhi won the first prize. IIT Bombay was the first runner-up and IIT Kharagpur the second runner-up.

Entrepreneurship Summit

The E-summit 2009 included panel discussions as well as workshops for aspiring and budding entrepreneurs along with an intensive mentoring programme. An important part of the E-summit was the Investor Pitch which provided a chance for budding entrepreneurs to get funding as well as venture capitalists’ points of view about their business venture. The pitch provided specifically for Seed Funding.

Enspace

The Media of E-Cell published as a regular magazine and Enspace Online, the online form and blog.

Entrepreneurship Garage

E-garage is an invite-based community which has been launched with objectives to improve technological conversion rate, to nurture ideas and hatch businesses from the campus, and to provide a platform for interaction and sharing of experiences. This has received a great enthusiasm by the student community with a membership of 75 in all.

Start-up Intern

In April 2009, a programme of start-up internship was conducted. Over 40 internship positions were offered with 25 start-ups with internship profiles ranging from core-tech projects to managerial work. Apart up from setting up start-ups, E-cell also provides support system to the existing start-ups.

Eureka

Eureka an international business plan competition was organized by the E-cell of IIT Bombay with a total prize money of USD 50,000. This is Asia’s largest B-plan competition and second largest in the world in terms of participation, resources and prize money. Over the years, Eureka’s unique format comprising mentoring with a transparent judging process has become a model for similar competitions held in India and elsewhere. Finals of Eureka 2009 and Vulture’s Nest were conducted on February 7, 2010.

Virtual Stock Market

A virtual stock market was designed for the students of IIT Bombay wherein the simulation of the stock market was conducted online. A workshop to familiarize the stock market terminology to the students was also conducted.

Student Welfare Activities

English remedial classes for weak students were conducted in both the semesters.

Concluding Remarks

We are privileged to have Dr. Anil Kakodkar as the Chairman of the Board of Governors of IIT Bombay. In over a decade of his association with this institute – first as the Member of the Board of Governors and then as its Chairman – he has guided us in raising the level of education and research programmes in our quest for becoming a global institute. Dr. Kakodkar also chairs the IIT Bombay Advisory Council, which has provided excellent inputs for taking the institute forward. I take this opportunity to thank him and all the members of the Board of Governors and the Advisory Council.

The Government of India continues to be the primary source of funds for the institute’s plan and non-plan expenditure. The institute has also been receiving generous support from its alumni and well-wishers for its growth.
Introduction

Established in 1966-67 as “Department of Aeronautical Engineering”, the department was renamed as “Department of Aerospace Engineering” in 1992. The academic programs of the department focus mainly on the science and engineering/technology behind flight vehicles and their sub-systems. The courses cover fundamentals of fluid dynamics, propulsion, structural mechanics, vehicle dynamics, control and guidance, etc., as well as applications of these fundamentals to the analysis of aerospace vehicles and also to some extent their design.

The department runs strong undergraduate and graduate programs in Aerospace Engineering and carries out basic and applied research as well as continuing education activities in various sub-disciplines of Aerospace Engineering such as Aerodynamics, Propulsion, Structures, Dynamics and Control, Design and Systems Engineering. The academic programs include the 4-year BTech degree program, the 5-year Dual Degree program, the 2-year M.Tech. program and the Ph.D. program.

The department is an excellent fusion of academics, research and technology development, coupled with education beyond the classroom and co-curricular activities. The landmark project PRATHAM, the IIT Bombay student satellite program, initiated over two years ago, involving complete design, development and the launch of a nano-satellite, under the design-build-fly initiative nurtured during the past few years by the department, indicates the new trends and new opportunities in the learning of satellite and space technologies in the department. The project is entirely a student project involving students from all departments of IIT Bombay and mentored by faculty from several departments as well as scientists from the Indian Space Research Organization.

The vision & mission

The Aerospace Department, IIT Bombay, seeks to establish traditions which will foster creativity and growth of excellence. It has the following broad objectives:

- To provide the best possible educational facilities for training bright students for the careers in Aerospace Engineering.
- To provide a creative atmosphere in which higher studies and academic research of high quality thrive both amongst the students and the faculty.
- To organize short intensive courses, conferences and seminars on current technological developments which will be of benefit to the surrounding community.
- To undertake sponsored research of practical relevance and provide developmental consultancy which will promote contact with and be of service to industries and to government aerospace programs.
- To provide leadership in curriculum design and development.

The department cherishes the hope that its graduates will be the leaders of tomorrow in the aerospace engineering and technology arena. Their education is patterned with this in view.

Department strength

The department faculty strength includes 19 full-time faculty members, 1 Adjunct Professor and 1 Emeritus Fellow. The distinguished faculty of the department includes two faculty members holding the prestigious Alexander Von Humboldt Fellowship and one faculty member holding the Institute Chair Professor award. In addition, there are around 15 permanent and 20 temporary staff members who run the administrative offices, laboratories, workshops, drawing office, and are involved with sponsored research work undertaken by the faculty. The number of students in the department is 307 out of which about 124 are graduates and 183 undergraduates.
Infrastructural facilities

The department has extensive experimental and computational facilities that support its research and teaching activities. Among these are:

**Aerodynamics Lab**, which houses the subsonic and supersonic wind tunnels, open jets, water tunnel, 6W Ar-Ion laser from Spectra Physics, computer – controlled 3D traverse system and the Laser Doppler Velocity-meter (LDV) facility; **Instrumentation Lab**, which has experimental set-ups for control education, e.g., temperature control, speed servo, torsion disk, level and flow control etc., in addition to sensors, actuators and other accessories as a part of mechatronics related facilities; **Structures Lab**, which has facilities for composite fabrication, material testing, components testing, strain and vibration measurements, drop weight and ballistic impact testing, modal testing, bench type modular polariscope system and reflective polariscope system for photo-elasticity studies, high strain rate research facilities based on the split-Hopkinson’s bar, **Propulsion Lab**, which houses axial flow compressor research test rig for rotor tip aerodynamics studies, low speed low turbulence wind tunnel, diffuser test rig for turbine exhaust diffuser system for aerodynamic analysis, centrifugal blower and motor control unit for air delivery to the cascade tunnel; **MAV Lab**; which has facilities for building & flying aircraft models, hardware in loop simulation for MAVs, facilities for design, development and implementation of autonomous control in MAVs; and **ARDB Associate Center for CFD**, which provides computational assistance with its computer servers, and work stations. The department also houses the ARDB Center for Aerospace Systems Design and Engineering (CASDE), which conducts R&D activities and continuing education related to Multidisciplinary Design Optimization, MAV system design and integration and systems engineering. Major computational facilities include a 23 node Intel Xeon Cluster, SGI Altix 8 CPU, & SGI Altix 14 CPU machines. **Aircraft Design and Computing Lab (ADCL)** houses nine PCs loaded with latest versions of softwares for teaching aircraft conceptual design and analysis, such as (RDS-Pro) Advanced Aircraft Analysis (AAA), and Aircraft Control Toolbox (ACT) which consists of a suite of MATLAB routines for modeling of control systems of aircraft, helicopters and airships. A **Shock Tunnel**, used for the simulation of hypersonic flow, capable of producing flows of air up to specific reservoir enthalpy of 1.35 MJ/kg, reservoir pressure of 0.74 MPa, and reservoir temperature 1343 K which is then expanded into the test section using a Mach 8 nozzle, has been recently designed, developed and built in the department. Models such as re-entry bodies, scramjet engine and missile-shaped bodies can be tested to study its aerodynamics.

New infrastructure

The new equipment & computing facilities were introduced at ARDB Associate CFD Center in the department which includes the following:

A 252 CPU high performance computing cluster with 2.217 Tera Flops peak performance was built at a cost of Rs. 23.26 lakhs. Also, three serial high performance server Dual Quad Core Nehahem E5520 are purchased at a cost of Rs. 3.53 lakhs.

Other new set-ups

**Major activities proposed**

- **Associate Center for Research and Development in Micro/Mini Aerial Vehicles:**

  “Associate Center for Research and Development in Micro/Mini Aerial Vehicle” was proposed to Aeronautical Research and Development Board. This activity is part of the national initiative on micro and mini aerial vehicles. Broad activities covered by this proposal are:

  i) Research into the new concepts which will result in improvement in endurance and payload capacity;

  ii) Co-operative mission between various types of vehicles, e.g., fixed wing, hovering vehicle and ground vehicles, etc.;

  iii) Hardware-In-Loop Simulation for co-operative missions.

- **Space-Based Air Navigation with GPS-Aided GEO-Augmented Navigation (GAGAN) and Indian Regional Navigation Satellite System (IRNSS):**

  This research work has been proposed to ISRO. The objective of this research work is to develop dynamics models, algorithms, and simulations of satellite-based navigation of airplanes for all flight phases – take-off, cruise, approach and landing – using GAGAN, IRNSS, and inertial measurements for navigation. An additional objective of the research is to determine the accuracy of these integrated navigation systems in order to use them for Category III precision landing of the Regional Transport Aircraft, under design at National Aerospace Laboratories.
• **Dynamics and Control of Robotics and Remote Handling Devices**

This research project has been proposed to Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam. The objective of this research is to develop multi-arm dynamics model and control of flexible robotic devices engaged in inspection and repair of high value nuclear assets, assisted by imaging sensors and servos.

**Academic Programs**

The department offers a 4-year undergraduate B.Tech. program, a 2-year graduate M.Tech. program, a 5-year integrated Dual Degree (B.Tech. and M.Tech.) program, and a Doctor of Philosophy (Ph.D.) program. The specializations offered this year for Dual Degree and M.Tech. programs are:

* Aerodynamics
* Aerospace Propulsion
* Aerospace Structures
* Control and Guidance

The curriculum is designed with the aim of catering to the country’s growing need for talented, well-trained manpower in aerospace engineering, especially in a scenario where India is poised to become a global economic superpower. As a part of the institute-wide revamping of the UG curricula, the department’s new curriculum, providing a student-centric flexible framework which covers basic inputs in the core areas as well as electives and specially designed supervised self-learning opportunities called “Supervised Learning”, entered its third year of implementation. At the end of the year, the earlier UG curriculum stands phased out. The department has also redesigned the Minor in Aerospace Engineering for the UG students of other departments which is a basket of five selected courses dealing with basics of flight mechanics, performance and design. Three new PG electives in the area of dynamics and control, specifically related to spacecraft navigation, guidance and control, were introduced.

The department aims to provide the students with a cordial atmosphere and an opportunity to acquire a multidisciplinary perspective to engineering problems.

<table>
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<tr>
<th>Student Intake</th>
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<tbody>
<tr>
<td>B.Tech.</td>
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<tr>
<td>Dual Degree</td>
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<tr>
<td>M. Tech.</td>
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<td>Ph.D.</td>
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<tr>
<th>Degrees Awarded</th>
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<tbody>
<tr>
<td>B. Tech.</td>
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<tr>
<td>M. Tech.</td>
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<tr>
<td>Dual Degree</td>
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<td>Ph.D.</td>
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**Student Activities in the Department**

**PRATHAM – A Student Satellite Program**

The IIT Bombay Student Satellite Project is a landmark project taken up by IIT Bombay students. The objective is to build a fully functional miniature satellite in less than two years which would then be launched by ISRO using the PSLV. This is a student initiative with mentorship provided by IIT-B professors and ISRO scientists. The satellite will fit in a 30*30*30 cm cube and will weigh less than 15 kg. This will require miniaturization of components. The payload is for Measurement of Total Electron Count in the ionosphere.

The year started with conducting nine Preliminary Design Reviews for each of the Subsystems within IITB. After the successful reviews, work started on developing working prototypes of the subsystems. Dr Madhavan Nair, the then ISRO Chairman, came to IITB in August and the team was fortunate to present him with an overview of the satellite. This was followed by the signing of the Memorandum of Understanding between IITB and ISRO on September 29, 2009. Soon after that, the Preliminary Design Review was conducted at ISAC, Bangalore, on December 1, 2009. Currently, the students are working on the Detailed Design Phase of the Satellite and getting ready for the Critical Design Reviews to be held in the month of June 2010.

For the relevance of the satellite to the student community, “Pratham” will be transmitting satellite data when it passes over India so that any interested university with a small ground station (costing about Rs. 10000/-) will not only be able to detect the beacon signal from our satellite but also to measure TEC above their ground station. This will spread awareness among the student community about this exciting field. In this regard, the 2nd Ground Station Workshop was held in October 2009. The 3rd and last Ground Station Workshop is scheduled for June 19, 2010.
“Pratham” was fortunate to be in the national news a couple of times in the past year. The team has been invited for guest lectures at the Systems Conference at IIT Roorkee, and at the conference organized by the Institute of Engineers at Bangalore. Pratham Team was invited to publish its first paper at the Indian Small Satellite Systems Conference at ISAC, Bangalore, in April 2010. Two papers about the work done on “Pratham” have been accepted at the International Astronautical Congress to be held in Prague at the end of September 2010.

ZEPHYR 09 - Celebrating the spirit of aviation

What started off as a one-day annual workshop a few years ago is now a pioneer herald of Aerospace for engineering colleges and students all over India. It’s a unique platform for exchange of thoughts and sharing of ideas among engineering communities connected with this fascinating field.

The “Zephyr ’09” was held during October 9-10, 2009 with an event-packed schedule consisting of competitions like MachInfinity, inspiring lectures by the aerospace stalwarts like Dr. Naveed Hussain (VP-Boeing India) and Dr. Kota Harinarayan (Chief Designer and Program Director-LCA Tejas project), innovative workshops like Balsa workshop, Model Rocketry workshop; exhibitions on powered paragliding and mobile flight simulator, a documentary on NASA missions, Aerotainment quiz. The program took the aerospace experience to a level imagined earlier and witnessed a record participation of about 5,000 students from all over India.

“Zephyr” now holds a key position of importance in the Indian Aerospace fraternity as a one-of-a-kind platform for student-industry-academia interaction.

UDAAN: A Student Outreach Program

The student outreach program “Udaan” was started in 2003 and has continued to create awareness about Aerospace Engineering among the school students. Udaan targets the schools within Mumbai and an equal number of schools in the rural areas surrounding Mumbai. Various activities are designed to take the adventure and thrills of aviation to school kids. These include Paper plane/Aero-modeling Workshop and Competition, Video shows on aviation & space, Short talk about Aircraft, Satellites, LVs, Rockets, etc., Advances in Aerospace Engineering, Careers in Aerospace. During such visits “Udaan” carries posters that depict indigenously developed satellites, Launch Vehicles, Rockets, Aircraft, etc. These are displayed during the talks and thereafter donated to the schools for permanent display in the science clubs of the schools.

Scholarships and grants for student activities

Cybergrants Donation by Boeing Co., USA:
Boeing Co. has initiated a partnership with IIT Bombay to include IIT Bombay as part its University Relations (UR) program in India. Boeing’s support through the UR program focuses on academic performance scholarship awards and design related activities and events for Bachelor and Master’s students. Performance & merit-cum-means awards were given at functions on the eve of the convocation and during the student festival “Zephyr-09”. Eight student team participated in trying to convert their ideas into designs. Design workshops and competitive events were held as part of “Zephyr-2009” & “Techfest-2010”.

Best teacher award by an alumni Dr. Jayanarayan Lala

The Annual teaching award for the faculty of the department was instituted by an alumnus of the department from the 71’ batch, Dr. Jayanarayan Lala, through an endowment. Prof. R. P. Shimpi was the first recipient of this award for PG teaching.

R & D Activities

The department has maintained and nurtured a close association with the Aeronautical, Space, Defense and the other industries of the country through invited lectures, faculty participation in continuing education. In addition to providing high technology support and inputs to the national projects like LCA, IGMDP and GSLV through sponsored and consultation projects, the research had spin-off benefits to other fields such as bio-medical engineering. Many of the research programs pursued in the department are funded by the government agencies such as ARDB and DST, government organizations such as ISRO, DRDO, HAL, BARC, NAL, ADE, GTRE, ADA, as well as private industries like SIEMENS, Pratt and Whitney Co. USA, etc.

The department faculty actively pursues research programs that address the basic engineering problems as well as applications in various fields of Aerospace science and technology, such as:

Experimental Aerodynamics, Aero-acoustics, Computational Fluid Dynamics, Grid Generation, Computational Electromagnetism, Hypersonic flows, Heat Transfer, Aerothermodynamics, Infrared Signature Suppression, Turbo-machinery and Air-breathing Propulsion, Combustion studies, Dynamics and Control of Aerospace Systems, Multi-disciplinary Design Optimization of
Aerospace Systems, Plate theories, Smart Structures, Aero-elasticity & Aero-servo-elasticity, Composite materials and Impact/Ballistic impact studies, spacecraft attitude dynamics, control, orbit estimation; satellite-based navigation of land or flight vehicles, MAV research & development.

While the research and development activities of the department continue to contribute to national Aerospace programs, some of the faculty are also engaged in basic research collaborations with research groups world over, e.g., the Technical University of Hamburg-Germany, China Jiliang University-China, Illinois Institute of Technology-USA, Tohoku University-Japan, Cambridge University U.K. Indian Institute of Science-India etc.

Sponsored Research Projects

The incomes received from sponsored research and consultancy projects:

<table>
<thead>
<tr>
<th>Sponsored Research Projects</th>
<th>: 44</th>
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<tr>
<td>New</td>
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<tr>
<td>Ongoing</td>
<td>: 25</td>
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<tr>
<td>Completed</td>
<td>: 6</td>
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List of sponsored research projects:

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
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<tbody>
<tr>
<td>Co-ordinatorship Allowances.</td>
<td>Aeronautical Research &amp; Development Board</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Annual Symposium of AR &amp; DBs Aerodynamics Panel at IIT, Bombay during 17-18.04.2009</td>
<td>Aeronautical Research &amp; Development Board</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Upgradation of Associate CFD Centre at IIT,Bombay</td>
<td>Aeronautical Research &amp; Development Board</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Development of Liquid Fuel Based Combustor Operating In Flameless Combustion Mode.</td>
<td>Aeronautical Research &amp; Development Board</td>
<td>Ongoing</td>
</tr>
<tr>
<td>DST - FIST to The Aerospace Engg. Dept.</td>
<td>Department of Science &amp; Technology</td>
<td>New</td>
</tr>
<tr>
<td>Development of High Resolution schemes for flow computations on space vehicle configurations using unstructured grids</td>
<td>Indian Space Research Organization</td>
<td>Ongoing</td>
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<tr>
<td>IIT(B) STC/Transonic Buffeting of Expendable and Reusable Launch vehicles</td>
<td>Indian Space Research Organization</td>
<td>Ongoing</td>
</tr>
<tr>
<td>IIT(B)STC / Study of Shock Turbulent boundary layer interaction in high speed air intake - Phase II</td>
<td>Indian Space Research Organization</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Student Satellite Project (ISSP)</td>
<td>Indian Space Research Organization</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Virtual laboratory experiments</td>
<td>Ministry of Human Resource Development</td>
<td>Ongoing</td>
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<tr>
<td>Hardware-In-Loop-Simulation ,MAV, On-board computer</td>
<td>National Aerospace Laboratories</td>
<td>Ongoing</td>
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<tr>
<td>Project Title</td>
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<td>Project Status</td>
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<tr>
<td>De-sensitized Tip Design for Axial Flow Compressors.</td>
<td>Pratt &amp; Whitney Co. Canada</td>
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<td>Assimilation of open source software in science and engineering education</td>
<td>Ministry of Human Resource Development</td>
<td>Ongoing</td>
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<td>Co-Operative Control Of Fixed Wing MAVs.</td>
<td>Aeronautical Research &amp; Development Board</td>
<td>Ongoing</td>
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<tr>
<td>Development Of Baseline Free Damage Detection Technique For Laminated Composite Structures.</td>
<td>Aeronautical Research &amp; Development Board</td>
<td>Ongoing</td>
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<tr>
<td>Noise Suppression Of High Subsonic Free Jets.</td>
<td>Aeronautical Research &amp; Development Board</td>
<td>Ongoing</td>
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<tr>
<td>MAV To Monitor Areas Of Interest Continuously Without Human Intervention.</td>
<td>US Department Of Defence</td>
<td>Ongoing</td>
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<tr>
<td>Steady/ Unsteady Low Speed Viscous Flow Computations On Static / Moving Grids.</td>
<td>Aeronautical Research &amp; Development Board</td>
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<tr>
<td>Metrics And Motifs In Architectures Of Complex.</td>
<td>Aeronautical Research &amp; Development Board</td>
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<tr>
<td>Axial fan performance evaluation and enhancement strategies under static and dynamic inflow distortions.</td>
<td>Aeronautical Research &amp; Development Board</td>
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<tr>
<td>Meso-scale Modeling For Monsoon Related Weather Predictions - Phase II</td>
<td>Council of Scientific &amp; Industrial Research</td>
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<tr>
<td>Development of Micro-combustors Study of Shock-turbulent Boundary.</td>
<td>Department of Science &amp; Technology</td>
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<tr>
<td>Layer Interaction in High-speed air Intake.</td>
<td>Indian Space Research Organization</td>
<td>Ongoing</td>
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<tr>
<td>Assessment of turbulence models in hypersonic reacting three-dimensional flow around re-entry flight vehicles.</td>
<td>Indian Space Research Organization</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Development of a Three Components Accelerometer Balance For Use in IITB Shock Tunnel</td>
<td>Indian Space Research Organization</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Siemens Power Generation Inc./ Annular diffuser aerodynamics for turbine delivery system.</td>
<td>Siemens Power Generation Inc., USA</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Flow computations on unstructured grids with improved accuracy : An investigation.</td>
<td>Aeronautical Research &amp; Development Board</td>
<td>Closed</td>
</tr>
<tr>
<td>Active boundary layer control in two dimensional cascade and an axial flow fan.</td>
<td>Aeronautical Research &amp; Development Board</td>
<td>Closed</td>
</tr>
<tr>
<td>Project Title</td>
<td>Agency Name</td>
<td>Project Status</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Fast finite Volume Time Domain Technique for RCS Computations of Aerospace Configurations.</td>
<td>Aeronautical Research &amp; Development Board</td>
<td>Closed</td>
</tr>
<tr>
<td>Estimation of aerodynamic coefficients of 450kg bomb using CFD.</td>
<td>Defense Research &amp; Development Organization</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Exploration of a Technique for Vibration Control of Combat Aircraft Wing With Tip Store Using Piezoelectric Stack Actuation</td>
<td>Aeronautical Development Agency</td>
<td>Closed</td>
</tr>
<tr>
<td>Experimental investigation of flow over after-burner diffuser cone.</td>
<td>Defense Research &amp; Development Organization</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Centre Of Excellence For Aerospace Systems Design And Engineering (CASDE) Phase –II.</td>
<td>Aeronautical Research &amp; Development Board</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Hybrid Composites For Structural Applications</td>
<td>Aeronautical Research &amp; Development Board</td>
<td>Closed</td>
</tr>
</tbody>
</table>

**Consultancy Projects:**

| Number of Jobs : | 23 |
| Number of Faculty involved : | 6 |
| Income Generated : | Rs.33,54,888 |

**Extension Activities**

**XVI National Seminar on Aerospace Structures, Nov 19-20,2009**

The XVI National Seminar on Aerospace Structures was organized by the Aerospace Engineering Department, IIT Bombay, on 19th and 20th November, 2009 under the aegis of the Structures Panel of the Aeronautics Research & Development Board (AR&DB). The theme of the seminar was “Structural Health Monitoring and Non-destructive Evaluation”. This event has gained prominence as a major national level event for the aerospace structures community, serving as a platform to present research work, exchange notes and share ideas for future growth of the field. Structural health monitoring (SHM) and Non-Destructive Evaluation (NDE) is of much relevance in present-day research in the area of Aerospace, Civil and Mechanical structures for in-service damage diagnosis and prognosis. Integration of the SHM/NDE systems with the structure is essential to prevent catastrophic failure as well as for predicting remaining service life and restricting further deterioration. The multidisciplinary area of SHM encompasses sensor and actuator technology, modeling and SHM based design, different non-destructive evaluation techniques, smart materials, smart structures and signal processing. The conference was aimed at bringing together the researchers and engineers working on different aspects of SHM and related areas to strengthen and synergize the ongoing research efforts in the country.

Prof. Ashok Joshi and Prof. P.M.Mujumdar, Head, Aerospace Engg. Department were the Convener and Co-Convener, respectively. Other members of organizing committee from the department, include: Prof. N.K. Naik, Prof. R.P. Shimpi, Prof. Mira Mitra and Prof. H. Arya. During the conference, Prof. Naik was felicitated for his outstanding contribution in the field.

**CEP courses conducted during the year:**


Roy, B.

**CDEEP Lecture recorded: AE 651 a PG course was delivered under CDEEP, IIT Bombay, in the Autumn semester of 2009-10.** The lecture was broadcast live under the CDEEP program, funded by Govt. of India. The entire lecture series has been recorded and has been released in a DVD package comprising all the recorded live lectures, all the lecture notes in PPT files, and the solved examples and tutorial problems

**Visitors to the Department**

Prof. R. Rajgopal, University of Iowa, visited on August 11,2009, and delivered a lecture on “Environmental Design for High Tech. Societies”.
Dr. B.N. Suresh, Distinguished Institute Guest Professor, Director, IIST, Trivendrum, visited the department twice during September 30 - October 2, 2009, and March 11-12, 2010. He delivered special lectures for the students on several topics and had a discussion with the student team members of the satellite group.

Prof. N. Wada, Tohoku university-Japan, visited the department on December 10, 2009, to explore the possibilities of research collaborations.

Prof. K.N. Ghia, Department of Aerospace Engineering and Engineering Mechanics, University of Cincinnati, USA, and Prof. Urmila Ghia, Department of Mechanical Engineering, University of Cincinnati, USA visited the department on December 12, 2009, to explore the possibilities of research collaborations.

Prof. Girimaji visited the department and delivered a lecture on “Computational Fluid dynamics” on 15th December, 2009.

Dr. Ing Heinz Herwig, Professor & Head, Institute for Thermo-Fluid Dynamics, Hamburg University of Technology, Hamburg, Germany, delivered a lecture on “The role of entropy production in momentum and heat transfer” at Aerospace department seminar hall, on January 6, 2010

A high level Delegation from Quebec, Canada visited the department on February 3-5, 2010, to explore the possibilities of student exchange program and joint research collaboration.

Prof. Rho Shin Myong, Dept. of Mechanical & Aerospace Engineering, Gyeongsang National University, Kyeongnam, South Korea, visited our department on February 16, 2010, to explore the possibilities of research collaborations.

Dr. A. Pattamatta, Principal Scientist, Thermax-India, delivered lecture on “Modeling Energy Transport in Nanostructures for Aerospace Applications” on February 18, 2010.

Conferences/ Symposia/ Workshops/ Seminars (Participated/Papers Presented)

National

Mandal, J.C.
Participated in the following symposium and seminar meeting:


Mitra, M.

Muskawad, S.D., Sharma, S.D.

International

Joshi, A., Khot, S.M.

Joshi, A., Mujumdar, P.M., Ramakrishna, D. & Krishna, Y.

Mahulikar, S.P.

Presented an invited paper; “Infrared Signature Studies of Aircraft and Helicopters,” Progress in Electromagnetics Research Symposium (PIERS-2009), (pap. no. 090107203540), August 2009, Moscow, Russia.
Mandal, J.C.
Participated in the following international conferences:
First International Conference on “Computational Methods for Thermal Problems” (ThermaComp09), September 8-10, 2009, Naples, Italy.
Indo-German Conference on PDE, Scientific Computing and Optimization in Application”, 7-9 October 2009, IIT Kanpur, India.
Third International Congress on Computational Mechanics and Simulation (ICCMS-09), 1-5 December 2009, Indian Institute of Technology Bombay, Mumbai, India.

Menezes, V., Kumar, A.

Anbuselvan, K.K.N., Menezes, V., Abhinav Kumar, K.S.N.
Presented a paper “Measurement of Drag on a Scramjet Engine in a Shock Tunnel”, in IISc Centenary International Conference and Exhibition on Aerospace Engineering (ICEAE 2009), held during May 18-22, 2009, at IISc, Bangalore, India.

Mitra, M.
International Conference on Higher Order and Spectral Methods, ICOSAHOM 09, Trondheim, Norway, June 2009
3rd International Congress on Computational Mechanics and Simulation (ICCMS09), IIT Bombay, Dec, 2009

Pant, R.S.

Pradeep, A.M.
Participated in 19th Conference of the International Society for Airbreathing Engines, September 7-11th, 2009, Montreal, Canada.

Roy, B., Melkia, Y.

Murugan, K.N., Sharma, S.D.

Deshpande, P., Sharma, S.D.

R.P. Shimpri

Sinha, K.
Co-Chairing a session in IISc Centenary International Conference and Exhibition on Aerospace Engineering (ICEAE 2009) held on May 18th-22nd, 2009, J N TATA Auditorium, Indian Institute of Science, Bangalore.

Sinha, K.
Presented papers in the 48th AIAA Aerospace Sciences Meeting Including the New Horizons Forum and Aerospace Exposition in Orlando, Florida, Jan 4-7, 2010

Sudarshan Kumar
6th International Conference on “Flow Dynamics”, November 4-6, 2009, Tohoku University, Sendai Japan.

Shaja A. S., Sudhakar K.
Presented a paper “Overrepresented and Underrepresented Patterns in System Architectures based on Components across Diverse Engineering
Invited Lectures

National

Mahulikar, S.P.

“Prediction of Infrared Signature from Aircraft Engines,” Gas Turbine Research Establishment, December 16th, 2009, Bangalore, India.

Mandal, J.C.
Invited lectures by faculty:


Mujumdar P. M.

Ramachandran, P.
“My adventures with Python”, Keynote address at PyCon India 2009, September 26, 2009, IISc Bangalore.

G R Shevare

Sinha, K.
Invited talk in Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), held on November 18, 2009, at Seminar Hall III, Main Building, Jakkur, Bangalore.

Delivered a talk in 11th Annual CFD Symposium on CFD, on August 11-12th, 2009, at Prof. Satish Dhawan Auditorium, IISc, Bangalore.

Sudhakar, K.

International

Mahulikar, S.P.
Delivered a lecture on “Role of Thermodynamics in Dynamic Ordering” at the following places:

Institute for Thermo-Fluid-Dynamics, May 19, 2009, Hamburg University of Technology, Germany.

Institute for Fluid Mechanics & Heat Transfer, Vienna University of Technology, May 27, 2009, Austria.

Faculty of Aerospace Engineering, Delft University of Technology, June 18, 2009, The Netherlands.


Pant, R.S.

Shevare, G. R.

Significant Awards/ Distinctions

Mahulikar, S.P.
“Re-invitation on A. von Humboldt Fellowship Award,” Germany, May-July 2009.

Mandal, J.C.

Chaired a session in Indo-German Conference on “PDE, Scientific Computing and Optimization in Application”, 7-9 October 2009, IIT Kanpur, India.
Member of International Advisory Committee for First International Conference on Computational Methods for Thermal Problems, Naples, Italy, September 8-10, 2009.

**Pant, R. S.**
Offered one-year visiting faculty position at Department of Aerospace & Ocean Engineering, Virginia Tech, Blacksburg, UK.

**Sharma, S.D.**
Editor-in-Chief: Four Issues of IJEMFS published

**Muskawad, S.D., Sharma, S.D.**

Keynote Address:

**Honorary Work**

**Chatterjee, A.**


**Joshi, A.**
Member of the Academic Council of the Defence Institute of Advanced Technology (DIAT), Pune. Senior Member, American Institute of Aeronautics & Astronautics.

Reviewer for the American Institute of Aeronautics and Astronautics (AIAA) SDM Conferences to be held in April 2010.

**Mandal, J.C.**
Reviewed manuscripts for the following Journals:
b. AIAA journal.
c. International Journal of Hypersonics

Expert Member of UGC to evaluate Indian Institute of Space Technology (IIST), Trivandrum.

Expert Member of National Board of Accreditation, AICTE, India.

Expert Member of Homi Bhabha National Institute (HBNI), Bhabha Atomic Research Centre, Mumbai.

**Mitra, M.**
Reviewer for following Journals:
Computers and Structures,
Proceedings of Royal Society,
Journal of Sound and Vibration,
Smart Materials and Structures,
Journal of Applied Physics,
Journal of Shock and Vibration

**Mujumdar P. M.**
Member, Structures Panel, ARDB, Min. of Defense, Govt. of India
Member, Divisional Scientific Committee, Structures Division, NAL, Bangalore

**Pant, R. S.**
Part of the Organizing committee for Aviation Day 2009 Executive Committee member of AeSI Mumbai Branch

**Pradeep, A.M.**

**Sharma, S.D.**
Team Member of Technical Evaluation for Pilot Project by BMC for AMR water meter installation in different parts of the Mumbai city.
Shimpi, R.P.
On the Editorial Board of International Journal: “Computer and Experimental Simulations in Engineering and Science”.

Reviewer for the following Journals:

International Journal of Mechanical Sciences
Meccanica

Roy, B.

Sinha, K.
Reviewed papers for the AIAA Journal, Dec 2009

Sudarshan Kumar
Reviewers for the following journals and conferences:
1. International Journal of Hydrogen Energy
2. Fuel
4. Energy and Fuel
5. 9th International ISHMT-ASME Heat and Mass Transfer Conference Jan 2010 Mumbai, India.
6. Aerospace Science and Technology

Sudhakar K.
Coordinator, Systems & Systems Engineering Panel, Aeronautics Research & Development Board, Min. of Defense, Govt. of India

Faculty Members and their Specializations

1. Pradeep A.M.
   Aerospace Propulsion, Experimental Aerodynamics, Flow Characteristics and Flow Control of Internal Flows, Experimental Methods and Flow Visualization

2. Hemendra Arya.
   Mini Aerial Vehicle, Mechatronics, Hardware-In-Loop Simulations

3. Sanjay Bhat
   Control Theory, Non-linear Systems and Dynamics, Stability Theory

4. Avijit Chatterjee.
   Computational Fluid Dynamics, Aerodynamics, Computational Electromagnetics

5. Hari Hablani
   Spacecraft Guidance, Navigation and Control, Satellite based navigation

6. Ashok Joshi
   Dynamics & Control of Flight Vehicle Structure, Aero-elasticity

7. Subhash Chandra Lakkad
   Composite Materials, Structural Design, Biomechanics

8. Shripad Mahulikar
   Aerothermodynamics, Heat Transfer in Hypersonics, Jet Propulsion, Micro-channel Cooling, Stealth Technology

9. Jadav Chandra Mandal
   Computational Fluid Dynamics

10. Victor Menezes
    Hypersonic aerothermodynamics, Hypersonic ground testing facilities and related experimental techniques, Shock waves, Medical and industrial applications of shock waves

11. Mira Mitra
    Wave propagation and structural dynamics, structural health monitoring, smart structures, wavelet, carbon nano-tubes and nano-composites, computational mechanics

12. Prasanna Mujumdar
    Structural Dynamics & Stability, Aero-elasticity, Aero-servo-elasticity, Multi-disciplinary Design Optimization, Smart Structures

13. Niranjan Naik
    Polymer Matrix Composites, Textile Composites,

14. Rajkumar Pant
    Aircraft Design, Air Transportation, Optimization

15. Prabhu Ramchandran
    Vortex methods, Particle methods, Scientific computing, Computational fluid dynamics

16. Bhaskar Roy
    Aircraft Propulsion, Turbo-machinery Aerodynamics, Axial Compressor Design and Analysis

17. Shailendra Sharma
    Experimental Techniques in Fluid Mechanics & Aerodynamics, Control of Coherent Structures in Free Shear Flow, Turbulent Mixing of coaxial ducted jets, Vortex Flow, Pulsatile Flow

18. Gopal Shevare
    Grid Generation, Computational Fluid Dynamics
19. **Rameshchandra Shimpi**  
Theory of Plates, Finite Element Method,  
Evolutionary Optimization, Material Testing,  
Experimental Stress Analysis

20. **Krishnendu Sinha**  
Computational fluid dynamics, Turbulence modeling, Hypersonic flows

21. **Sudarshan Kumar**  
Flameless and mild combustion, Micro combustion, Pattern formation of flames and propulsion

22. **Krishnarao Sudhakar**  
Systems Design, Complex Systems, Systems Engineering
Introduction

The Department of Biosciences and Bioengineering comprises mainly two areas representing Biotechnology and Biomedical Engineering. The Department aims to create an ambience for the smooth pursuit of scholarly activity in research and education, towards creating an international impact in the bio-related areas and endeavors to produce the leaders of tomorrow in this field. With the formation of the Department of Biosciences and Bioengineering, there has been a great impetus to research in the biosciences at IIT Bombay.

- Infrastructural development:
  - Protein Purification System
  - Pulse Field Gel Electrophoresis System
  - 2D Fluorescence Electrophoresis System
  - Gel Documentation System
  - Table Top Centrifuge
  - Water Purification System Freeze Dyer

Academic Programme

The academic programme currently consists of the M.Sc. Biotechnology (DBT supported), the M.Tech. Biomedical Engineering and the Ph.D. programme. The M.Tech. programme of the department is unique in that it provides an entry point for a medical doctor (MBBS) to work together with engineering students and get an engineering (M.Tech.) degree. This programme is extremely popular with doctors, and, like the M.Sc programme, draws very large pool of applicants. The institute has boosted this academic activity by funding four new scholarships in the department, and a few more are being added.

The Academic Programme of the department has been running successfully and a review of the achievements over the years has shown positive trends both in the terms of students career profile and the utility and quality of the prescribed courses. Extensive interactions with groups in Electrical Engineering, Chemical Engineering, Aerospace Engineering, Computer Science, Chemistry and Mathematics synergistically augment the facilities of these laboratories making them truly unique in the country.

Dual Degree M.Sc.-Ph.D. Programme in Biotechnology launched from the academic year 2009-10.

<table>
<thead>
<tr>
<th>Degrees Awarded</th>
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</tr>
</thead>
<tbody>
<tr>
<td>M.Sc.</td>
<td>11</td>
</tr>
<tr>
<td>M.Tech.</td>
<td>17</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>13</td>
</tr>
</tbody>
</table>

R&D Activities

Biotechnology, Biochemistry and Molecular Enzymology, Bioelectricity; Bioinformatics, Biointerfaces, Biomaterials, Biomedical Optics (Tissue Spectroscopy and Imaging), Bionanotechnology, Biosensors, Biostatistics, Computational Biology, Drug Delivery, Glycobiology, Instrumentation, Medical Signal Processing, Natural Products, Nerve-muscle Transmission, Non-invasive Diagnostic Tools, Procaryotic Biology, Rehabilitation, Synthesis of Bioactive molecules, Synthetic Polymer Chemistry, Tissue Engineering, Yeast Molecular Biology

Major focus has been to boost the research activity through funded research proposals from agencies like DBT, DST, BRNS, ADA, CSIR, FIST, Media Labs, and the like. We are also vigorously pursuing individual donors and institutions. Infrastructure building in this field is extremely expensive due to the need for superb equipment and facilities, the need to remain constantly updated, and the constant need for consumables, some of which can be frightfully expensive. Only a department that is well endowed can attract the best faculty, students and researchers to itself and keep them motivated and productive to deliver the department’s stated mission of making an impact on health care delivery. This is our endeavor at IIT’s BioDepartment.

The department has been involved in interdisciplinary research in the Biological Sciences aimed at finding
solutions to the emerging needs of the Indian population. It has a unique admixture of students and faculty from the Engineering, Medical, Biological and Physical Sciences. Its curricula have served as a model for several programmes that have been developed in the country.

<table>
<thead>
<tr>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOARD OF RESEARCH IN NUCLEAR SCIENCES</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Council of Scientific and Industrial Research</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Department of Science &amp; Technology</td>
<td>Closed</td>
</tr>
<tr>
<td>Department of Biotechnology</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure and Functional Characterization of Bacterial Cell Division Protein SepF and UgpP and their roles in Z-Ring and Septum formation</td>
<td>BOARD OF RESEARCH IN NUCLEAR SCIENCES</td>
<td>Ongoing</td>
</tr>
<tr>
<td>NANOENGINEERED “SMART TATOO” LACTATE SENSORS</td>
<td>Council of Scientific and Industrial Research</td>
<td>Ongoing</td>
</tr>
<tr>
<td>DST/ Controlled Drug Delivery using Layer-by-Layer Self-Assembly with Antibody Conjugated Magnetic PLGA Nanoparticles using Dual Drug Regimen for Brea</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>DST/ Development and evaluation of injectable biopolymer based scaffolds for cartilage tissue engineering</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Financial assistance for organization of One Day Satellite Workshop on Cancer &amp; Nanotechnology : Therapeutics and Diagnostics “ on 17.02.2010</td>
<td>Department of Science &amp; Technology</td>
<td>Closed</td>
</tr>
<tr>
<td>In Search of the novel pathways, enzymes or operons involved in the degradation of aromatic compounds using metagenomic approach.</td>
<td>Department of Biotechnology</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>
### Internally (IRCC) funded MHRD project:

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Agency Name</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oscar for Proteomics and Cell &amp; Molecular Biology</td>
<td>Internally funded by MHRD project</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

### Sponsored Research Projects initiated in 2008-09

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Sponsoring Agency</th>
<th>Status (New/Ongoing/Complete)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Development of Anti-Malarial Therapeutics Based on Chemically Modified Small Interfering RNAs”</td>
<td>Deptt. of Biotechnology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Population Heterogeneity in Saccharomyces Cerevisia: Causes and Consequences of Phenotypic Variation”</td>
<td>Board of Research In Nuclear Sciences</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Urease and Cresol-red Immobilized Nanoengineered Alginate Microspheres as Sensors for Urea Monitoring”</td>
<td>Indian Council of Medical Research</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“In Vivo Choice of Translation Initiation Sites (TISA) in the Human Malaria Parasite P. Falciparum”</td>
<td>Board of Research In Nuclear Sciences</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Financial Assistance for Malaria Meeting, to be held during March 3-5, 2009 at I.I.T. Bombay”</td>
<td>Javwaharlal Nehru Centre for Advanced Scientific Research</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“International Symposium on Emerging Areas in Biotechnology and Bioengineering Dt. 26th-28th February 2009”</td>
<td>Labindia, Johnson &amp; Johnson, Eco Chemie</td>
<td>Closed</td>
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</tbody>
</table>
### Sponsored Research Projects initiated in 2007-08

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Sponsoring Agency</th>
<th>Status (New/Ongoing/Complete)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Effects of Protein Kinase CK2 on Microtubule Dynamics and Cell Cycle Progression: Implications in Cancer Chemotherapy”</td>
<td>Council of Scientific &amp; Industrial Research</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Polymer Optical Waveguide Biosensors”</td>
<td>Department of Bio-Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Computational Investigations into the Mechanisms of Information Processing in Medium Spiny Projection Neurons in Relation to Reward Processing and Lea”</td>
<td>Department of Bio-Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“FtsZ as Antibacterial Drug Target”</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

### Inter-Department Projects:

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Sponsoring Agency</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversion of Cellulose and hemi-cellulose into sugars and ethanol</td>
<td>Council of Scientific &amp; Industrial Research</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Prediction of the kinetics of competitive metabolic networks in hydrocarbon degrading organisms : development of a structured model and experimental v</td>
<td>Department of Bio-Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Genomic analysis of microbial resistance mechanisms using Streptomyces coelicolor as a model system.</td>
<td>Department of Bio-Technology</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>
### Sponsored Research Projects initiated in 2006-07

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Sponsoring Agency</th>
<th>Status (New/Ongoing/Completed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Microtubule Dynamics as a Screen for Discovering Anticancer Drugs: Roles of Microtubule Dynamics in the Spindle Function and Apoptosis”</td>
<td>Department of Bio-Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Co-Immobilization in Nanoengineered Biopolymeric Carriers as Biosensors”</td>
<td>Department of Bio-Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Regulation of Carbon &amp; Nitrogen Metabolism in Saccharomyces Cerevisiae”</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“SERC FAST Track Scheme Entitled “ Novel Ultrathin Film Coatings for High Throughput Screening Systems”</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Pseudomonas Putida CSV86: Hydrocarbon First or Sugar First”</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Comparison of Herbal Oil Surfactants for Therapy in Adult Respiratory Distress Syndrome”</td>
<td>International Foundation For Science, Stockholm</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

### Inter-Department Projects:

<table>
<thead>
<tr>
<th>Development of “Micro-Cantilever based Sensors for the Detection of Vapours of Explosive Chemicals”</th>
<th>SBB/ Electrical Engineering</th>
<th>Department of Science &amp; Technology</th>
<th>Ongoing</th>
</tr>
</thead>
</table>
**Sponsored Research Projects initiated in 2004-05 in Bio-Medical Engineering**

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Sponsoring Agency</th>
<th>Status (New/Ongoing/Completed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Development of A Therapy for Reversal of Harmful Effects Environmental Toxi Chemicals on The Respiratory Systems”</td>
<td>DST</td>
<td>Closed</td>
</tr>
<tr>
<td>“Evaluation of the Interactions of Mycobacterium Surfactant System”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“DAE YSRA Entitle Evaluation of Herbal Based Surfactants for Therapy In Meconium Aspiration Syndrome”</td>
<td>KA == BRNS projects</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Development of Optoelectronic Devices for Detection of Water-Borne Pathogens”</td>
<td>Naval Materials Research Laboratory</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

**Sponsored Research Projects initiated in 2004-05 in Bio-Technology Centre**

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Sponsoring Agency</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Swarnajayanti Fellowship Award”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Second Indian Protein Society Symposium at IIT B during 28 to 30 October 2004”</td>
<td>Sponsored by Private Organisations</td>
<td>Closed</td>
</tr>
<tr>
<td>“Enhancement of Benzaldehyde Biotransformation Project”</td>
<td>M/S.Emmellen Biotech Pharmaceuticals Ltd</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

**Sponsored Research Projects initiated in 2003-04 in Bio-Technology Centre**

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Sponsoring Agency</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Studies on Immune Cell Signalling Mechanisms”</td>
<td>KA == BRNS projects commenced from year 1999-2000</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

**Sponsored Research Projects initiated in 2000-01 in Bio-Technology Centre**

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Sanctioned Amount</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Financial assistance to the Biotechnology Centre(FIST Program)”</td>
<td>63,85,000</td>
<td>Program</td>
</tr>
</tbody>
</table>
Consultancy Projects

The department undertook five jobs generating Rs. 13,98,073/- The total number of faculty involved was four.

Patents

Filed - Two

Extension activities

Banerjee, R
Session Chair and Organising Committee Member of Indo-American Frontiers of Engineering Symposium held during March 10-13, 2010.

Member, Organizing Committee of ICONSAT2010 held during February 17-20, 2010

Member, Editorial Board, Trends in Biomaterials and Artificial Organs

Member, Editorial Board, Icfai Journal of Nanotechnology

EC Member, Mumbai Division of Maharashtra Academy of Sciences

Punekar N.S.
EC Member, Mumbai Division of Maharashtra Academy of Sciences

Workshops

Srivastava Sanjeeva
“Quantitative Proteomics” Practical Course, University of Tartu, Institute of Technology, Estonia, February 2009.


Banerjee R
Organised a workshop on “Nanotechnology Applications in Cancer Diagnosis and Treatment”, on February 17, 2010, at IIT Bombay.

Padinhateeri, Ranjith
Participated in a an international workshop on “Molecular Motors Track and Transport, Pondichery”, January 2010

Courses

Srivastava Sanjeeva
NPTEL - Video course on “Proteomics – principles and techniques” (MHRD project, in progress).

OSCAR animations for “Proteomics” and “Cellular and Molecular Biology” (MHRD, project, in progress).

Reviewed papers for international journals – Molecular and Cellular Proteomics (August 2009), Proteomics (December 2009), Molecular and Cellular Proteomics (Dec 2009), BMC Biotechnology (February 2010).

Newspapers/Media, which featured my research activities and accomplishments - Apple Research & Technology Support Award - Innovative solution for innovative researchers, Apple, UK, February 10, 2010.


Hindustan Times - Steps for right malaria treatment, November 9, 2009.

Visitors to the Department

Prof. Sanjeev K Waghmare. Dept. of Surgery, Indiana University- Purdue University,Indianapolis. He delivered a lecture on “Quantitative proliferation dynamics and random chromosome segregation of hair follicle stem cells”

Dr. Sourav Ghosh, Ph.D., University of Arizona, College of Medicine - Phoenix, AZ, USA. He delivered a lecture on “Apical-basal polarity signaling in glioblastoma”

Dr. Carla V. Rothlin, Ph.D., Yale University, CT, USA. He delivered a lecture on “TAMing inflammation”

Dr. Pinku Mukherjee, Ph.D. Irwin Belk Distinguished Professor of Cancer Research Department of Biology UNC – Charlotte. She delivered a lecture on “Optimizing Targeted Immune-based Therapies for Cancer”

Dr. Jyotsnendu Giri, Ph.D. – Alumnus IIT Bombay, National Research Council Fellow, USA. He delivered a lecture on “Nanomaterials: Biological interaction and applications in medicine”
Dr. Sourav Datta, University of Gothenburg, Sweden. He delivered a lecture on "Enlightening 2B there: Role of B-box proteins in light signaling in Arabidopsis.”

Dr. Swati Bhattacharyya, Dept. of Medicine, Section of Rheumatology, Northwestern University. She delivered a lecture on "Signaling Circuitry in Fibrosis”

Dr. Sushanto Mitra, Chief Executive Officer, SINE. He delivered a lecture on “Introduction to SINE.”

Prof. C. Amarnath, Professor In Charge SINE. He delivered a lecture on "Funding Options for Research & Innovation.”

Dr. Arun Sripati, PhD., Carnegie Mellon University, Pittsburgh. He delivered a lecture on “Seeing Locally, Perceiving Globally: How the Inferotemporal Cortex Mediates Object Recognition.”

Soumya Sinha Roy, PhD., Thomas Jefferson University, Philadelphia. He delivered a lecture on “Mitochondria – at the crossroad of life and death.”

Dr. David Nisbet, Monash University, Australia. He delivered a lecture on “Nanobiotechnological approaches to neural and bone tissue engineering.”

Dr. C. Mauli Agrawal, Ph.D., P.E., University of Texas at San Antonio. He delivered a lecture on “Bioengineering adequate Blood Supply.”

Dr. Durba Sengupta, Alumnus, University of Groningen, Netherlands. He delivered a lecture on “Multi-scale Simulations of membrane-active peptides.”

Dr. Kiran Kondabagil, Catholic University of America, Washington DC. He delivered a lecture on “Viruses Start Your Engines! Phage T4 DNA Packaging Nanomotor: Structure, Function and Mechanism.”

Dr. Manas Kumar Santra, Postdoctoral Associate, Umass Medical School, Worcester, MA. He delivered a lecture on “Role of the tumor suppressor FBXO31 in the Regulation of DNA Damage-Induced G1/S checkpoint.”

Dr. Shamik Sen, University of California, CA. He delivered a lecture on “Cell-extracellular matrix mechanobiology in development and disease: from biophysics to cellular engineering.”

Dr. Nagendra Singh, Department of Biophysics, All India Institute of Medical Sciences, New Delhi. He delivered a lecture on “Structure biology of proteins and their complexes.”

Prof. Brenda Andrew, University of Toronto. He delivered a lecture on “The Genetic Landscape of a Cell: mapping genetic interactions using yeast functional genomics.”

Dr. Pinay Kainth, University of Toronto. He delivered a lecture on “Quantitative cell array screening to identify regulators of gene expression.”

Dr. Rajarshi Choudhury, University of North Carolina at Chapel Hill, NC, USA. He delivered a lecture on “Engineering and modular architecture of Sequence Specific TypeII RNA Endonuclease-A novel class of enzymes.”

Dr. Janaki Iyer, Oklahoma Medical Research Foundation. She delivered a lecture on “Peptidoglycan of Bacillus spp induces a pro-inflammatory response.”

Conferences/ Symposia/ Workshops/ Seminars (Participated/Papers Presented)

National

Jindal, B.
Oral presentation “Mechanistic insights into the antiproliferative anticancer action of griseofulvin”, in 78th Annual Conference of Society for Biological Chemists”, Pune, October 2009.

Singh, P.
Oral presentation “Bacillus subtilis FtsA self-assembles into bundles and sheets in an ATP independent manner and disassembles upon dilution,” 2nd In-house symposium of Department of Biosciences & Bioengineering, Feb 1, 2010. (2nd Prize)

Kuchibhatla, A.

Kapoor, S.
Poster presentation “Potent antiproliferative activity of Indanocine against Breast Cancer Cell line: Mechanism and Cellular Effects” in 2nd In-house symposium of Department of Biosciences & Bioengineering, Feb 1, 2010. (1st prize)

Asthana, J.
Delivered a talk on “Role of acetylation in microtubule stabilization and dynamics” in Graduate students meet in ACTREC, Mumbai, India, December-2009.

Sanjeeva Srivastava.
Oral presentation “Protein-protein interactions and biomarker discovery using high throughput proteomics”, Young Explorers in Indian Biology (YEIB), held during Sep 14-16, 2009 at Mumbai, India.
Shamlan M. S. Reshamwala and Santosh B. Noronha,
Poster presentation “Targeting carbon catabolite repression: a new antimicrobial strategy?” at Understanding and Managing Pathogenic Microorganisms 2010 (UMPM2010), an international conference held at the Institute of Microbial Technology, Chandigarh, India on January 22-24, 2010

Punekar N.S.
Genetic transformation in Aspergilli - from biochemistry to biotechnology; Third Golden Era of Microbiology - The Golden Jubilee Annual Conference of Association of Microbiologists of India (AMI), December 15-18, 2009, National Chemical Laboratory, Pune.

Novel dye affinity matrix library for protein chromatography, proteomics and scale up; International conference on Emerging Trends in Chemistry, January, 5-7, 2010, Department of Chemistry on the occasion of the diamond jubilee year of the University of Pune.

International

Phale P. S., Basu A. and Shrivastava R.

Chatterji, B.P., Banerjee, M., Singh, P., Panda, D.
Presented a poster “10-(3-hydroxy-4-methoxy-benzylidene)-9(10H)-anthracenone binds to tubulin at the colchicine site, Inhibits microtubule assembly and inhibits cancer cell proliferation at mitosis”., VIII European Symposium of the Protein Society, June 14-18, 2009, Zurich, Switzerland.

Singh, P

Kuchibhatla, A.

Asthana, J.
Presented a poster “Inhibition of HDAC6 activity leads to increase in tubulin acetylation and suppresses microtubule dynamics”, 49th Annual Conference of American Society for Cell Biologists, December 2009.

Oral presentation “Inhibition of HDAC6 activity leads to increase in tubulin acetylation and suppresses microtubule dynamics”, International Conference on Molecular Motors Tracks and Transport, Pondicherry, January 2010.

Jindal, B.

Banerjee, M.

Sanjeeva Srivastava, Fuentes M and LaBaer J
Poster presentation “Nucleic Acid Programmable Protein Array and Surface Plasmon Resonance Imaging to study high-throughput protein-protein interactions”, Proteomics from bench to clinic. US HUPO, held during March 7-10, 2010 at Denver, USA.

Sanjeeva Srivastava.
Oral presentation “Self-assembled protein arrays and SPRi to study protein interaction and biomarker discovery”, 5th Asia Oceana HUPO Congress, 14th ADNAT Convention & 1st PSI Conference On New Perspectives in Proteome Research, held during Feb 21-25, 2010 at Hyderabad, India.


Lakhawat R, Banerjee R.
Poster presentation “Ibuprofen loaded polymeric nanoparticles for intra-articular drug delivery”, International Conference on Nanoscience and Technology held during February 17-20, 2010 at Mumbai.

Gogoi M, Bahadur D, Banerjee R.
Poster presentation “Biphasic mixture of metal oxide composite nanoparticles for cancer hyperthermia”, International Conference on Nanoscience and Technology held during February 17-20, 2010 at Mumbai.

Banerjee R, Rao S. S.
Poster presentation “Surface active lipid nanostructures for pulmonary drug delivery”.
International Conference on Nanoscience and Technology held during February 17-20, 2010 at Mumbai.

Joshi N, Thanigavel S, Banerjee R.
Poster presentation “Aerosolised lipid nanovesicles for triggered release of paclitaxel for the treatment of lung cancer”, International Conference on Nanoscience and Technology held during February 17-20, 2010 at Mumbai. (Best Poster Award).

Poster presentation “Multifunctional magnetic liposomes for drug targeting magnetic resonance imaging and hyperthermia applications”, International Conference on Nanoscience and Technology held during February 17-20, 2010 at Mumbai.

Goyal N and Banerjee R.
Poster presentation “Non-invasive delivery of radiosensitisers for cervical cancer treatment”, International Conference on Nanoscience and Technology held during February 17-20, 2010 at Mumbai.

Thanigaivel Shanmugam and Rinti Banerjee
Oral presentation “Development of Eudragit nanoparticles for paclitaxel oral delivery to circumvent P-glycoprotein mediated multidrug resistance” – at 3rd International Symposium on Translational Cancer Research (Cell Signaling and Cancer Therapy), held during December 18-21, 2009, Bhubaneshwar, Orissa, India.

Thanigaivel Shanmugam, Nitin Joshi and Rinti Banerjee
Invited oral presentation “Nanocarrier based chemotherapy sensitizes paclitaxel to MDR human colon cancer xenograft in nude mice by angiogenesis inhibition” – at First World Conference on Nanomedicine and Drug Delivery (WCN-2010), held during April 16-18, 2010, Kottayam, Kerala, India, 686028.

N.S. Punekar
Novel dye affinity matrix library for protein chromatography, proteomics and scale up.; CHI PepTalk conference on “Protein Purification & Recovery”, January 12-14, 2009, San Diego, USA

Invited Lectures

National

Phale, P.S.
Invited lecture on “Microbial degradation of aromatics: In search of novel metabolic pathways and microbial strain” At DST work shop at IMTECH Chandigarh, from February 7-17, 2010

Panda Dula


“Interplay between Mitosis and Apoptosis: Acetylated Microtubules are kinetically Stabilized” in International Conference on Advances in Electron Microscopy and related techniques at Bhabha Atomic Research Centre, Mumbai, March 8-10, 2010.

Jindal Bhavya
“Mechanistic insights into the antiproliferative anticancer action of griseofulvin”, in IIT Pune, November 2009

Srivastava Sanjeeva
“Protein chips and its applications”, in Center for Cellular and Molecular Biology, Hyderabad, India, February 2010.

“Emerging functional proteomic techniques for biomarker discovery in cancer” in advanced Centre for Treatment, Research and Education in Cancer (ACTREC), Tata Memorial Cancer Hospital, Mumbai, India, June 2009.

Maji, Samir K
“Mal(functions) of amyloid fibrils” in Young Explorers in Indian Biology (YEIB), TIFR, Mumbai, September 2009

“AMYLOID: a surprising fold in protein world” in EMERGING CONCEPTS IN BIOTECHNOLOGY, National Institute of Technology Calicut, December 11, 2009

Banerjee, R
Invited speaker on Lipid and Biopolymeric Nanoparticles for Drug Delivery in the Asian Particle Technology Conference, New Delhi, September 2009.
Ghosh, Santanu K
“The multicopy plasmids of yeast segregate equally through cohesion mediated recognition of sisters” in CCMB, Hyderabad, December 2009

International

Panda Dulal
“Regulation of FtsZ assembly” in Scripps Research Institute, LaJolla, California, USA. December 2009.

“Interplay between microtubule dynamics, mitosis and apoptosis” in ETH Zurich, Switzerland, June 2009.


Kuchibhatla Anuradha

Padinhteeri, Ranjith
Invited talk on “Dynamics of nucleosome assembly and disassembly”, at the “Non-equilibrium Statistical Physics” conference organized by International Center for Theoretical Sciences and IIT Kanpur at IIT Kanpur in February 2010.

Srivastava Sanjeeva
“Protein microarrays for biomarker discovery”, in Johns Hopkins University School of Medicine, USA, March 2010.

“p53 and MDM2 high throughput protein interaction study using surface plasmon resonance imaging and protein microarrays”, in Biodesign Institute, Arizona State University, USA, March 2010.

Significant Awards/ Distinctions

Panda Dulal
CDRI Award for Excellence in Drug Research 2010
S. C. Bhattacharyya award for excellence in basic sciences, IIT Bombay 2010

Padinhteeri, Ranjith
Obtained the Innovative Young Biotechnologist Award (IYBA), DBT, New Delhi, 2009

Srivastava Sanjeeva
DAE Young Scientist Research Award, from department of Atomic Energy, Board of Research in Nuclear Sciences (BRNS), India, March 2010.

FAST track for young scientist, SERC, Department of Science Technology, India, March 2010.


Honorary Work

Manchanda, R.
Ph.D. examiner – for candidates at IISc, IIT-Madras
External Member, Board of Studies, National Brain Research Centre Member, Expert
Group on Neurosciences, DBT

Banerjee, R
Reviewer for Langmuir, ACS Publications
Reviewer for Journal of Controlled Release, Elsevier Publications
Reviewer for Journal of Biomedical Materials Research A and B, Wiley Publications
PhD examiner for IIT Delhi

Faculty Members and their Specializations

Core Faculty

1. Dulal Panda
Cell biology, biophysics, protein structure-function, molecular medicine and mechanism(s) of action of antifungal, anticancer and antibacterial drugs

2. K. K. Rao
Cell biology; protein biochemistry; molecular biology; genetic engineering, prokaryotic gene regulation

3. N. S. Punekar
Microbial biochemistry; enzymology; metabolic regulation; secondary metabolism; metabolic engineering; nitrogen metabolism of fungi

4. P. J. Bhat
Eucaryotic gene expression; yeast molecular genetics; eucaryotic transcriptional regulation
5. R. Manchanda  
Neuromuscular Physiology & Biophysics

6. G. Subrahmanyam  
Protein phosphorylation gene regulation, molecular mechanism of signal transduction;

7. P. V. Balaji  
Protein-carbohydrate interactions, molecular biology of glycosyltransferases; molecular modeling; docking and MD simulations

8. Soumyo Mukherji  
Bioinstrumentation, Cardiovascular Physiology, Transducers and Biomedical Sensors, Biosensors

9. P. S. Phale  
Aromatic hydrocarbon degradation, elucidation of metabolic pathways, molecular enzymology and kinetics, genetics engineering, bacterial physiology, Bio-surfactant production and its significance.

10. Rinti Banerjee  
Biomaterials & Artificial Organs, Haemorheology & Biomedical Fluid Dynamics

11. Swati Patankar  
Molecular parasitology and genomics applied to the malarial parasite *Plasmodium falciparum*

12. Rohit Srivastava  
Fluorescent Biosensors, Nanoengineered Sensors, Controlled Release, Layer-by-Layer Assembly, BioMEMS

13. Samir Maji  
To study the amyloid formation by protein/peptides in the diseases and functional amyloid perspective

14. Sanjeeva Srivastava  
Proteomics, Systems Biology, Stress physiology and cellular responses

15. Santanu K. Ghosh  
Understanding mechanism of faithful chromosome segregation during meiotic cell division.

16. Padinhateeri, Ranjith  
Nucleosome dynamics and Chromatin assembly, Dynamics of Actin and Microtubules, Mechanics of DNA

Associate Faculty

17. Jayesh Bellare  
Nanotechnology and micro-engineering; biomedical devices surfactants; Cryo-electron and optical microscopy

18. Santosh Noronha  
Biochemical engineering, recombinant biotechnology, computational biology

19. H. S. Shankar  
Biochemical Engg., vermiculture

20. A. K. Suresh  
Biochemical Engg., multiphase reactions

21. K. V. Venkatesh  
Biochemical and food engineering

22. P. Wangikar  
Biothermodynamics; Biophysical Chemistry

23. S. Chaudhari  
Medical Image & Signal Analysis

24. U. B. Desai  
Medical Image & Signal Analysis

25. V. M. Gadre  
Communication Engineering Control & Instrumentation

26. P. C. Pandey  
Bioinstrumentation, Medical Image & Signal Analysis

27. A. Q. Contractor  
Electrochemistry, Conducting polymers, Biosensors

28. S. Durani  
Drug design; de nova Protein design; Enzyme catalytic principles; Active site characterization

29. Nand Kishore  
Biothermodynamics; Biophysical Chemistry

30. Sambasivarao Kotha  
Organic Synthesis; non-coded amino acids.

31. Anil Kumar  
Bio Polymers

32. C. P. Rao  
Electrochemistry, Conducting polymers, Biosensors

33. Y. U. Sasidhar  
Molecular Biophysics; Protein folding.

34. A. K. Singh  
Bioorganic chemistry; Photoreceptor membrane proteins; Photochemistry and photobiology.
35. Sumathi Suresh
Remediation of pesticides using biological & chemical methods. Biological treatment for removal of textile dyes, biodegradactose of hydroxybenzatoite and phthalates

36. Rajani R. Joshi
Computational Biology, Bioinformatics, Biostatistics

37. G. G. Ray
Ergonomics

Distinguished Guest Professor

38. G. Padmanaban
Malaria research

39. Dr. Hartmut Michel, Noble Laureate
Photosynthesis research
Introduction

The Department of Chemical Engineering has a strong focus on excellence in education and research. The department has a dynamic faculty with a wide range of research specializations. Research activities in the department are supported by excellent research students (Ph.D., M.Tech. and Dual Degree), very competent technical staff, and good experimental and computational facilities.

The admission of students into the Ph.D. programme continues to show an uptrend and has contributed to an increase in the research activity of the department. The department also received good funding for sponsored projects this year. The total number of international journal publications this year is 82.

The Department-Industry interactions have grown this year, including continuing education courses (both open- and in-house programmes), consultancy, and technology transfer.

Academic Programmes

<table>
<thead>
<tr>
<th>Degrees Awarded</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Tech.</td>
<td>62</td>
</tr>
<tr>
<td>Dual Degree</td>
<td>22</td>
</tr>
<tr>
<td>(B.Tech., M.Tech.)</td>
<td>31</td>
</tr>
<tr>
<td>M.S. (by Research)</td>
<td>18</td>
</tr>
</tbody>
</table>

R&D Activities

The department is involved in a variety of frontier and traditional areas in chemical engineering research, under the broad areas of:

- Biological Systems Engineering
- Energy & Environment
- Materials Engineering
- Process Systems Engineering
- Reactor Engineering
- Transport Phenomena and Complex Fluids

The department received grants from various sources towards many new projects during the year, apart from various ongoing projects. The summary of which is as follows:

<p>| Sponsored Research Projects | 85 |
| Sponsored Projects (New Projects) | 24 |
| Completed Projects | 13 |
| Faculty involved | 27 |</p>
<table>
<thead>
<tr>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse Osmosis Thin Film Composite Membranes: Investigations into structure, property and function</td>
<td>DOW Chemical International Pvt. Ltd.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Synthetic biology of cyanobacteria for solar ethanol”</td>
<td>Indo-French Centre for The Promotion of Advanced Research</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Development of Incremental Machine Direction Stretching Process for Manufacture of Fluoro Polymer Films”</td>
<td>Bhabha Atomic Research Centre</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Aerosol Routes for the Synthesis of Nanoparticles with Controlled Structural Properties: Application to Biodegradable Particles for Drug Delivery”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“General Strategies for Nanoparticles of Controlled Size, Shape and Composition: Magnetite as a Case Study for MRI Applications”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Segregation and packing of granular mixtures during burden distribution”</td>
<td>TATA Steel Ltd., Jamshedpur</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Multi-scale simulation of III-V Compound Semiconductors alloys”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Intracellular changes occurring during adaptation of Mammalian cells to suspension culture”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Nucleation during granulation with viscous liquid binders under controlled shear flow”</td>
<td>Procter &amp; gamble technology (Beijing) Co. Ltd., China</td>
<td>Ongoing</td>
</tr>
<tr>
<td>&quot;Process and Catalyst development studies for synthesis of biodiesel&quot;</td>
<td>TCE Consulting Engineers Ltd., Mumbai</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Experimental and Numerical Investigation of Oil Recovery from Fractured Reservoirs”</td>
<td>Oil &amp; Natural Gas Commission, Ahmedabad</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“DuPont young professor award”</td>
<td>DuPont</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Inter Facial Processes Controlling Lead Mobility In Environmental Systems”</td>
<td>McDonnell academy, St. Louis, USA.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“National Faculty Development Centre (NCP Scheme)”</td>
<td>AICTE, Delhi</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Electrification of Village Kolha using Straight Vegetable Oil and Bio-gas”</td>
<td>Donation</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>
Consultancy Projects

The department undertook 31 jobs generating Rs. 1,79,92,424/-. The total number of faculty involved was 12.

Extension Activities

Following CEP courses were conducted during the year:

- Advances in Distillation Systems: Principles & Practices
- Piping Engineering
- Optimization Techniques for Chemical Engineering Applications
- Petroleum Refining Processes
- Online Course on Piping Engineering
- Piping Engineering
- Advanced Pipeline Technology
- Piping Engineering
- Elements of Chemical Engineering (Refresher & Advanced)
- Elements of Chemical Engineering

Symposium

Research Scholars’ Symposium 2010

Seminars

Prof. Supreet Saini
“Coordinated Regulation and Control of gene expression in Salmonella Pathogenesis” 25 February 2010

Dr. Prashant Valluri
“Spatiotemporal instabilities in two-phase flows”, 7 January 2010

Dr. Sanket Deshmukh
“Molecular Simulation Studies of Transport in Temperature-Sensitive Hydrogels” 6 January 2010

Dr. Sumit Sharma
“Structure and stability of proteins upon adsorption to hydrophobic surfaces” 27 November 2009

Dr. Ravi Methkar
“Recent trends in Lithium-ion batteries” 29 October 2009

Dr. Ujjal K. Ghosh
“Application of Chemical Engineering Research in Environmental Remediation”, 8 October 2009

Dr. Karnail Singh
“Understanding Film Formation Mechanism in Latex Dispersions”, 6 August 2009

Dr. Manish Prasad
“Multi-Scale Modeling and Simulation of Aggregation Processes in Crystalline Semiconductor Materials” 4 May 2009

Dr. Abhijit Chatterjee
“Bottom-up Multiscale Modeling based Rational design for chemical engineering applications” 23 April 2009

Dr. Himanshu Khandelia
“Lipid Gymnastics and Regulation of Ion Pumps” 15 April, 2009

Dr. Prakash Karpe
“Green House Gas Emissions: Challenges to the Process Industry” 14 April 2009

Visitors to the Department

Prof. Doraiswami Ramkrishna, School of Chemical Engineering, Purdue University, West Lafayette, IN 47907, USA, gave a seminar on “The Metabolic Modeling Landscape” on 25 March 2010

Dr. Anup K. Singh, Manager (Biosystems), Research & Development Department, Sandia National Laboratories, Mailstop 9291 7011 East Ave, Livermore, CA, USA, gave a seminar on “Lab-on-a-chip Devices for Medical Diagnostics & Studying Cell Signaling” on 17 March 2010

Prof. Nivedita R. Gupta, Department of Chemical Engineering, University of New Hampshire, Durham, NH, USA, gave a seminar on “Drops Rising in Channels” 4 March 2010

Prof. Rajagopalan Srinivasan, Department of Chemical and Biomolecular Engineering, National University of Singapore, Republic of Singapore 119077, gave a seminar on “Image-based Sensors for Control of Particulate Processes” 17 February 2010

Prof. K. Kesava Rao, Department of Chemical Engineering, Indian Institute of Science, Bangalore, gave a seminar on “Excess fluoride in drinking water: health effects, estimation and removal” 21 January 2010

Prof. P. K. Das, Department of Mechanical Engineering, Indian Institute of Technology Kharagpur, West Bengal, gave a seminar on “Development of Some Computational Algorithms for Multiphase Flow” 14 January 2010

Dr J. Ravi Prakash, Monash University, gave a seminar on “Unfolding of Polymeric Globules in Extensional Flow” on 22 December 2009
Prof. Tanmay Lele, Department of Chemical Engineering, University of Florida, USA, gave a seminar on “Force generation in the intracellular cytoskeleton” 15 December 2009

Prof. Daren Chen, Department of Energy, Environmental & Chemical Engineering, Washington University in St. Louis, USA, gave a seminar on “Experimental Tools for Nanoparticle Research”, 1 December 2009

Prof Nitin Kaistha, Department of Chemical Engineering, Indian Institute of Technology Kanpur, Uttar Pradesh, gave a seminar on “Plantwide Control for Throughput Maximization: A Case Study” 5 November 2009

Prof. Himadri B. Pakrasi, Director, I-CARES, Washington University, Saint Louis, MO 63130, USA, gave a seminar on “Carbon Capture and Bioenergy Production by Photosynthetic Organisms”, 22 September 2009

Dr. Frank Schael, Ehrfeld Mikrotechnik BTS GmbH, Mikroforum Ring 1, 55234 Wendelsheim, Germany, gave a seminar on “Modular Micro Reaction Technology: From Lab to production” 10 September 2009

Dr. Csaba Sinka, University of Leicester, United Kingdom, gave a seminar on “Challenges in pharmaceutical powder processing” 20 August 2009

Prof. Jong Wook Hong, Department of Mechanical Engineering, Auburn University, USA, gave a seminar on “Integrated Nanofluidic Systems for Systems Biotechnology”, 11 August 2009

Conferences /Symposia/Workshops and Seminars (participated)

Tirumkudulu Mahesh, S.
International Polymer and Colloids Group Conference, II Ciocco, Italy, 6-11 July 2009.

SERC School-cum-Symposium on Rheology of Complex Fluids, IIT Madras, Chennai, January 4-9, 2010.

Venkataraman Chandra
Lead Author, for the review publication, “Bounding the Role of Black Carbon in Climate, International Global Atmospheric Chemistry project (2009-2010)

Jadhav Sameer

ICONSAT 2010, IIT Bombay, Mumbai, February 2010

Bhartiya Sharad

Heat transfer equipment course (with Prof. R. Thaokar), United Phosphorous Ltd.), December 2009

Mahajani Sanjay, M.
26th Annual International Pittsburgh Coal Conference, Pittsburgh, PA, USA, Sept 2009

International Conf. on Adv. in Energy Research (ICAER) - 2010, Mumbai, India; Responsible for organizing a half-day workshop on Gasification Technologies

Venkatesh, K. V.
Phenotypic Analysis of the Osmoadaptation in Saccharomyces Cerevisiae, Jignesh Parmar, Sharad Bhartiya and KV Venkatesh, ICSB, Aug. 31 - Sept. 3, 2009, Stanford, California, USA

Mathematical Modeling of Cell Signaling Networks: Cell Cycle Regulation of Schizosaccharomyces pombe, Anbumathi P, Sharad Bhartiya and KV Venkatesh, ICSB, Aug. 31 - Sept. 3, 2009, Stanford, California, USA

Characterization of Heterogeneity in Phenotypic States of Corynebacterium glutamicum, Meghna Rajvanshi, Kalyan Gayen and KV Venkatesh, ICSB, Aug. 31 - Sept. 3, 2009, Stanford, California, USA

Venkataraman Chandra
Lead Author, for the review publication, “Bounding the Role of Black Carbon in Climate, International Global Atmospheric Chemistry project (2009-2010)

Sunthar, P
Delivered Lectures on “Brownian Dynamics Simulation” in SERC School on Molecular Dynamics Simulations, May 6-8, IISc Bangalore

Presented paper on “Intrinsic Viscosity of Polymers in a Good Solvent Universal Values from Simulations” in Australia-Korea Rheology Conference, Nov 1—4 2009, Sydney Australia

American Physical Society, Division of fluid dynamics, DFD 2009 Minneapolis, US ;Large deformation studies of vesicles under electric field
Delivered Lectures on “Polymer Rheology” in SERC School on Rheology of Complex Fluids, Jan 4—7 2010, IIT Madras, Chennai

Participated in SERC Symposium on Complex Fluids, Jan 8—9 2010, IIT Madras, Chennai

Roy Sandip
2nd European Green Process Engineering & Process Intensification Conference, Venice - Italy, 14 - 17 June 2009

Juvekar Vinay, A.
International COMSOL conference, Nov 13-14,2009 (Bangalore)


International Conference on Nanoscience and Technology, Feb17-20, 2010 (IIT Bombay)

Invited Lectures

National

Gupta Santosh, K.

Mahajani Sanjay
“Process Intensification using Reactive Distillation” at UPL, Ankleshwar, India, May-2009


“Biodiesel Process” in Biodiesel Workshop at Tara village, Panvel, India, February-2010

Venkatesh, K. V.
“Chemotaxis in E. coli”, Rajitha Vipulla, Mahesh T and KV Venkatesh, CCMB-IISER-NCL Theoretical and Mathematical Biology Symposium, Pune, 2009

“Heterogeneity in Metabolic Networks”, Meghana Rajvanshi and KV Venkatesh, NCL Diamond Jubilee Symposium-Advances in Chemical Engineering and Process Technology, June 4-6, NCL, Pune 2009


Invited Keynote lecture to Faculty of University of Pune, December 2009

Distinguished UGC Fellow lecture, Department of Chemical Engineering, IISc. Bangalore, Feb 2010

Tirumkudulu Mahesh, S
“Instability of a Moving Liquid Sheet in the Presence of Acoustic Forcing”, NCL, Pune, July 30, 2009

“Cracking in drying colloidal films of hard and soft particles”, IIT Madras, Chennai, January 8, 2010

“Instability of a Moving Liquid Sheet in the Presence of Acoustic Forcing”, Mechanical Engineering Department, IIT-Kanpur, Feb 15, 2010

Jadhav Sameer
Invited lecture at IISER Pune, May 2009
Invited lecture at Complex Fluids 2010, DST sponsored SERC School and Symposium, IIT Madras, January 2010

Sunthar, P
Delivered a talk on “Intrinsic Viscosity of Polymers in a Good Solvent: Cross-over Function from Simulations” in SERC Symposium on Molecular Simulations, May 9 2009, IISc Bangalore

Gudi Ravindra, D
Invited to deliver guest lecture at NIT Trichy on “Advanced Process Control and Optimization”, January 2010

Juvekar Vinay, A.
ACEPT Symposium: Advances in Chemical Engineering and Process Technology, June 5-6,2009, NCL Pune

Moudgalya Kannan, M.


Venkataraman Chandra
Invited Lecture, National Climate Research Conference, Indian Institute of Technology Delhi, March 5-6, 2010

Plenary Lecture, Conference of the Indian Aerosol Science and Technology Association, Bose Institute, Darjeeling, March 22-24, 2010
International

Jadhav Sameer
Invited lecture at Department of Chemical Engineering, Monash University, February 2010

Moudgalya Kannan, M.

Significant Awards and Distinctions

Venkataraman Chandra
H.H. Mathur Award for Research Excellence in Applied Science, a one-time career award from IIT Bombay, March 2009

Tirumkudulu Mahesh, S
Reviewed papers for Langmuir Journal

Gudi Ravindra, D.
Herdillia Award for Excellence in Basic Research presented by IChE, December 2009

Bhartiya Sharad
Invited as a visiting professor to LAGEP (Automatic Control Laboratory) in University of Lyon, France

Awarded DST - SERC project on Modeling, identification, estimation and control of hybrid systems

Honorary Work

Venkatesh K. V.
Associate Editor, BMC Systems Biology.
Member Editorial Board, International Journal of Systems and Synthetic Biology International Judge for international Genetically ENgineered Machines competition (iGEM), MIT USA, November 2009

Viswanathan Ganesh, A
Reviewed papers for BMC Systems Biology

Bhartiya Sharad
Member of IPC, Control Systems 2010, Sept 15-17, Stockholm, Sweden

Mahajani Sanjay, M.

Gudi Ravindra D.
Nominated to the Editorial Board as Associate Editor for IFAC Journal of Process Control

Juvekar Vinay, A.

Moudgalya Kannan M.
Member, Standing Committee, National Mission on Education through ICT; MHRD, Government of India

Member, International Scientific Advisory Committee, Scilab

Venkataraman Chandra
Member, Editorial Board, Aerosol Science and Technology

Member, Editorial Board, Journal of Atmospheric Chemistry

Member, Indian Network for Climate Change Assessment, Ministry of Environment and Forests, Government of India

Member, Expert Committee for Enhancement of Scientific Capacity in the MoEF, Government of India

Reviewer for the international journals: Atmospheric Environment, Aerosol Science and Technology, Environmental Science and Technology, Atmospheric Research

Faculty Members and their Specializations

1. Jhumpa Adhikari
   Statistical Thermodynamics, Molecular Simulations

2. Preeti Aghalayam
   Reactor Modelling, Multiphase Reaction, Catalysis, Renewable Resources, Pollution, Coal Gasification

3. Rajdip Bandyopadhyaya
   Porous Media, Colloids, Aerosols, Thin films, Surface Science, Nanoparticles, Nano-composites, Molecular Simulations

4. Jayesh Bellare
   Separations, Surface Science, Nanoparticles, Microscopy, Drug Delivery

5. Sharad Bhartiya
   Process Control, Modelling, Identification
<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Research Interests</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Mani Bhushan</td>
<td>Process Safety Analysis, Process Control, Optimisation, Identification</td>
</tr>
<tr>
<td>7</td>
<td>S Ganeshan</td>
<td>Heat and Mass Transfer</td>
</tr>
<tr>
<td>8</td>
<td>Ravindra D. Gudi</td>
<td>Process Safety Analysis, Process Control, Optimisation, Identification, Biochemical Engineering</td>
</tr>
<tr>
<td>9</td>
<td>Santosh Kumar Gupta</td>
<td>Reactor Modelling, Process Control, Optimisation</td>
</tr>
<tr>
<td>10</td>
<td>Sameer Jadhav</td>
<td>Surface Science, Computational Flow Modelling (CFD), Drug Delivery, Biomolecular Engineering</td>
</tr>
<tr>
<td>11</td>
<td>Vinay A. Juvekar</td>
<td>Surfactants, Separations, Rheology, Electrohydrodynamics, Multiphase Reaction, Surface Science, Polymer Physics</td>
</tr>
<tr>
<td>12</td>
<td>Devang V. Khakhar</td>
<td>Surfactants, Rheology, Granular Flow, Reactor Modelling, Polymer Processing, Nanocomposites, Drug Delivery</td>
</tr>
<tr>
<td>13</td>
<td>Late Kartic Chandra Khilar</td>
<td>Surfactants, Porous Media, Colloids, Coatings, Green Engineering</td>
</tr>
<tr>
<td>14</td>
<td>Sanjay. M. Mahajani</td>
<td>Separations, Computational Flow Modelling (CFD), Multiphase Reaction, Catalysis, Renewable Resources, Coal Gasification</td>
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<tr>
<td>15</td>
<td>Ranjan Kumar Malik</td>
<td>Separations, Modelling, Energy Integration</td>
</tr>
<tr>
<td>16</td>
<td>Anurag Mehra</td>
<td>Surfactants, Multiphase Reaction, Nanoparticles, Molecular Simulations, Food Engineering</td>
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<tr>
<td>17</td>
<td>Sarika Mehra</td>
<td>Systems Biology, Computational Biology, Biomolecular Engineering</td>
</tr>
<tr>
<td>18</td>
<td>Arun Sadashio Moharir</td>
<td>Separations, Reactor Modelling, Optimisation, Modelling, Pollution</td>
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<tr>
<td>19</td>
<td>Kannan M. Moudgalya</td>
<td>Process Control, Modelling</td>
</tr>
<tr>
<td>20</td>
<td>Mamata Mukhopadhyay</td>
<td>Separations, Food Engineering</td>
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<tr>
<td>21</td>
<td>V. M. Naik</td>
<td>Surfactants, Separations, Electrohydrodynamics, Colloids, Surface Science, Polymer Processing, Nanoparticles, Food Engineering</td>
</tr>
<tr>
<td>22</td>
<td>Hemant Nanavati</td>
<td>Statistical Thermodynamics, Polymer Processing, Polymer Physics, Nano-composites, Molecular Simulations, Renewable Resources</td>
</tr>
<tr>
<td>23</td>
<td>Janaky Narayanan</td>
<td>Surfactants, Rheology, Surface Science, Microscopy</td>
</tr>
<tr>
<td>24</td>
<td>Santosh Noronha</td>
<td>Renewable Resources, Green Engineering, Systems Biology, Computational Biology, Biomolecular Engineering, Biochemical Engineering</td>
</tr>
<tr>
<td>25</td>
<td>Sachin C. Patwardhan</td>
<td>Process Control, Modelling, Identification</td>
</tr>
<tr>
<td>26</td>
<td>V Govardhana Rao</td>
<td>Separations, Rheology, Heat and Mass Transfer</td>
</tr>
<tr>
<td>27</td>
<td>Sandip Roy</td>
<td>Surfactants, Separations, Process Safety Analysis, Surface Science, Statistical Thermodynamics, Renewable Resources</td>
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<tr>
<td>28</td>
<td>Hariharan S. Shankar</td>
<td>Pollution, Biochemical Engineering</td>
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<tr>
<td>29</td>
<td>P. Sunthar</td>
<td>Surfactants, Granular Flow, Fluid Mechanics and Stability, Computational Flow Modeling (CFD), Polymer Physics, Drug Delivery</td>
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<tr>
<td>30</td>
<td>A. K. Suresh</td>
<td>Heat and Mass Transfer, Multiphase Reaction, Catalysis, Nanoparticles, Biochemical Engineering</td>
</tr>
<tr>
<td>31</td>
<td>Rochish M Thaokar</td>
<td>Surfactants, Electrohydrodynamics, Computational Flow Modelling (CFD), Colloids, Statistical Thermodynamics, Nanoparticles, Drug Delivery</td>
</tr>
</tbody>
</table>
32. **Mahesh S Tirumkudulu**  
Surfactants, Rheology, Computational Flow Modelling (CFD), Colloids, Coatings, Thin films, Surface Science, Drug Delivery

33. **Chandra Venkataraman**  
Aerosols, Surface Science, Nanoparticles, Nanocomposites, Drug Delivery, Renewable Resources, Pollution, Climate Change

34. **K. V. Venkatesh**  
Food Engineering, Systems Biology, Biomolecular Engineering, Biochemical Engineering

35. **Madhu Vinjamur**  
Porous Media, Heat and Mass Transfer, Coatings, Food Engineering, Renewable Resources

36. **Ganesh A Viswanathan**  
Reactor Modelling, Multiphase Reaction, Systems Biology, Computational Biology, Biomolecular Engineering

37. **Pramod Wangikar**  
Process Control, Modelling, Computational Biology, Biomolecular Engineering, Biochemical Engineering
Introduction

The Department of Chemistry comprises 30 faculty members with expertise in various areas of chemistry and allied subjects and has a large number of motivated young students assisting the faculty in their research. There is an ongoing effort to maintain quality teaching and research standards and to generate adequate financial support. The department has emerged as one of the leading centers for education and research in India.

Academic Programme

The General Chemistry programme of the department consists of 2 theory and 2 laboratory courses in the core curriculum of the first year B.Tech./Dual Degree M.Tech. programmes and has received much praise for the molecular level understanding it provides to all areas of technology. The department also offers an additional course to third year B.Tech./Dual Degree M.Tech. (Chemical Engineering) students. Furthermore, the department has three well-established academic programmes leading to M.Sc. and Ph.D. degrees: 2-year M.Sc. for post-B.Sc. students, with entrance through JAM, 5-year integrated M.Sc. Chemistry with entrance through JEE, and Ph.D. in Chemistry. The syllabi of all these are reviewed and updated periodically in order to meet the changing scenario in chemistry.

The Department of Chemistry is involved in research problems of both basic and applied nature in frontier areas through sponsored research projects, and as part of the M.Sc. and Ph.D. programmes. A range of expertise in various specializations is available within the department. Faculty members of the department disseminate the outcome of research through research publications, seminars and through participations in symposia. Every year around 100 papers are being published in reputed journals.

The faculty also participated in a variety of activities relevant to academic life. These include lectures in CEP courses and refresher courses of other universities, helping other institutions in critical review of their academic and research programmes, evaluating students’ dissertations, serving as experts in different committees, peer review of research project proposals submitted to funding agencies, and contributing to various journals at home and abroad as referees and as members of editorial boards.

R & D Activities

The faculty of the Department of Chemistry is involved in attracting research funding through various national and international sponsoring agencies in addition to industrial support. During 2009-10, the department has added 21 new sponsored projects with a total financial outlay of Rs. 3.5 crores and completed 12 projects. Eighty projects are under investigation by various faculty members. The faculty involved was 28. An income of Rs.4,65,000/- was generated through three jobs involving three faculty members. The department encourages the staff working on these projects to use the research outputs for obtaining their Ph.D. degree. A large number of students registered for the department’s Ph.D. programme have been financed through sponsored projects and individual CSIR and UGC fellowships. Polymeric Sensors Pvt. Ltd., a start-up company by one of our faculty members, has been admitted to SINE for incubation.

<table>
<thead>
<tr>
<th>Sponsored Projects:</th>
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<tbody>
<tr>
<td>Ongoing Projects</td>
<td>: 80</td>
</tr>
<tr>
<td>New Projects</td>
<td>: 21</td>
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<tr>
<td>Completed Projects</td>
<td>: 12</td>
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Consultancy:

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<th>Consultancy:</th>
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<tbody>
<tr>
<td>No. of Jobs</td>
<td>: 03</td>
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<tr>
<td>Patents</td>
<td>: 02</td>
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</tbody>
</table>
### Details of Sponsored Research Projects initiated in 2009-10 in the Chemistry Department

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Equipment Grant for Asymmetric Synthesis</td>
<td>Alexander Von Humboldt Foundation Germany</td>
<td>Ongoing</td>
</tr>
<tr>
<td>3.</td>
<td>Asymmetric synthesis of pyranonaphthoquinones through Dotzannulation and asymmetric methods</td>
<td>Board of Research in Nuclear Sciences</td>
<td>Ongoing</td>
</tr>
<tr>
<td>4.</td>
<td>Amplification of chirality and autocatalysis in the asymmetric synthesis of aminophosphonates’</td>
<td>Board of Research in Nuclear Sciences</td>
<td>Ongoing</td>
</tr>
<tr>
<td>5.</td>
<td>Experimental and computational studies of the conjugates of calixarenes as receptors towards ions and molecules including those of lanthanides and act</td>
<td>Board of Research in Nuclear Sciences</td>
<td>Ongoing</td>
</tr>
<tr>
<td>6.</td>
<td>Synthesis of Conformationally Constrained α-Amino Acid Derivatives</td>
<td>Council of Scientific and Industrial Research</td>
<td>Ongoing</td>
</tr>
<tr>
<td>7.</td>
<td>CSIR Junior Research Fellowship in r/o Ms. Sanhita Sinharay</td>
<td>Council of Scientific and Industrial Research</td>
<td>Ongoing</td>
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<tr>
<td>8.</td>
<td>CSIR Junior Research Fellowship in r/o Mr. Mritunjay kumar Tiwari (Roll No. 119175)</td>
<td>Council of Scientific and Industrial Research</td>
<td>Ongoing</td>
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<tr>
<td>9.</td>
<td>CSIR Junior Research Fellowship in r/o Mr. Pratiti Chatterjee</td>
<td>Council of Scientific and Industrial Research</td>
<td>Ongoing</td>
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<tr>
<td>12.</td>
<td>Identification and Study of Mechanism of Ammonic Chaneling in the Purine Biosynthetic Enzyme Formly Glycinamide Synthetase</td>
<td>Council of Scientific and Industrial Research</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Project Title</td>
<td>Agency Name</td>
<td>Project Status</td>
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<td>13.</td>
<td>INDIA-MPG (MAX-PLANCK SOCIETY)</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
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<tr>
<td>14.</td>
<td>Evolutionary Design with L - and D- Amino Acid Structures as alphabet?</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
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<tr>
<td>15.</td>
<td>Synthesis and biochemical evaluation of chemically modified RNA cleaving 10-23 and 8-17 DNA enzymes</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
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<tr>
<td>16.</td>
<td>Development of new strategies for post-translational peptide modificatins</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
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<tr>
<td>17.</td>
<td>Indo-South African joint project entitled, “Gold nanoparticles as artificial enzymes.</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>18.</td>
<td>Syntheses and scale-up of high contrast processable electrochromic polymers based on conjugated dialkoxythiophenes.</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>19.</td>
<td>ILTP Fellowship Scheme for Russian Scientists to Dr. Yury Torubaev, Institute of General and Inorganic Chemistry</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>20.</td>
<td>Role of intramolecular coordination in isolation of novel organochalcogen and organomercury compounds : Selenium catins, telluroxanes and metal.</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
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<td>21.</td>
<td>Dynamics of Water Molecules and Hydronium Ions in Proton Transfer Membranes for Fuel Cells</td>
<td>aval Research Board</td>
<td>Ongoing</td>
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</tbody>
</table>

**Internally (IRCC) funded by MHRD project:**

<table>
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<tr>
<th>Sr. No.</th>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>OSCAR for Chemistry higher education</td>
<td>Internally funded by MHRD project</td>
<td>Ongoing</td>
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</tbody>
</table>

**Details of Sponsored Research Projects initiated in 2008-09 in Chemistry Department**

<table>
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<th>Sr. No.</th>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Financial Assistance 2nd Term (Level-II) support to the Department of Chemistry, Indian Institute of Technology, Powai, Mumbai -400076, (Maharashtra)</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>2.</td>
<td>Sarnajayanti Fellowship- “New Strategies for synthesis of natural products and natural product like molecules”.</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Project Title</td>
<td>Agency Name</td>
<td>Project Status</td>
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</tr>
<tr>
<td>3.</td>
<td>Triazole bridged porphyrin assemblies by click chemistry: Synthesis, metallation, electrochemical and photophysical studies.</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>4.</td>
<td>DST-Development of dimeric Fischer carbine complexes: Bidirectional approach to the synthesis of naphthoquinone natural products</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>5.</td>
<td>Development of Fluorescent sensors and their high throughput imaging in complex environments at the single molecule level.</td>
<td>Council for Scientific and Industrial Research</td>
<td>Ongoing</td>
</tr>
<tr>
<td>6.</td>
<td>Synthesis, structure and stereochemical nonrigidity of compounds with intramolecular coordination of the hypervalent type: their use in the synthesis</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
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<td>7.</td>
<td>Ni, Pd, Ti and Zr Complexes of Non-Functionalized and N/O-Functionalized N-Heterocyclic Carbenes (NHCs) for Ethylene and ????-Olefin Oligomerization,</td>
<td>RELIANCE INDUSTRIES LTD., MUI</td>
<td>Ongoing</td>
</tr>
<tr>
<td>8.</td>
<td>hydrogen bonding in multifunctional molecules Infrared-ultraviolet double-resonance spectroscopic investigation in the gas phase.</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
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<tr>
<td>9.</td>
<td>Synthesis and Biophysical Studies of Novel G-Quadruplex DNA Stabilizing Agents Based on 1,8- Naphthyridine</td>
<td>Council for Scientific and Industrial Research</td>
<td>Ongoing</td>
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<td>11.</td>
<td>Ir-Uv And Uv-Ir Double Resonance Spectroscopic Investigation Of Excited State Proton Transfer Process In The Gas Phase</td>
<td>Council for Scientific and Industrial Research</td>
<td>Ongoing</td>
</tr>
<tr>
<td>13.</td>
<td>DBT-Post doctoral Fellowship in t/o Ms.Shipra Agrawal</td>
<td>Department of Bio Technology, GOI, New Delhi</td>
<td>Ongoing</td>
</tr>
<tr>
<td>14.</td>
<td>Research Associateship in t/o Mr.Rajkumar Joshi, in the CSIR Scheme</td>
<td>Council for Scientific and Industrial Research</td>
<td>Ongoing</td>
</tr>
<tr>
<td>15.</td>
<td>Research Associateship/Fellowship in t/o Mr. Boodida Sathyanarayana, in the CSIR Scheme</td>
<td>Council for Scientific and Industrial Research</td>
<td>Ongoing</td>
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<tr>
<td>Sr. No.</td>
<td>Project Title</td>
<td>Agency Name</td>
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</tr>
<tr>
<td>17.</td>
<td>Synthetic Studies in Pyranoinaphthoquinone Antibiotics</td>
<td>Indian National Science Academy</td>
<td>Ongoing</td>
</tr>
<tr>
<td>18.</td>
<td>CSIR Junior Research Fellowship in r/o Ms. Sukanya Bhattacharya (Roll No. 112802)</td>
<td>Council of Scientific and Industrial Research</td>
<td>Closed</td>
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<td>Department of Information Technology</td>
<td>Ongoing</td>
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**Details of Sponsored Research Projects initiated in 2007-08 in Chemistry Department**

<table>
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<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>CSIR-Research Associate Dr. (Ms.) Doyel Kumbhakar Under Prof. G K Lahiri, Chemistry Department</td>
<td>Council of Scientific &amp; Industrial Research</td>
<td>Ongoing</td>
</tr>
<tr>
<td>2.</td>
<td>Transition Metal Based Sandwich and Half Sandwich Derivatives with Donor Functionalities Synthesis Organometallic Chemistry and Catalytic Applications</td>
<td>Council of Scientific &amp; Industrial Research</td>
<td>Ongoing</td>
</tr>
<tr>
<td>5.</td>
<td>Molecular complexity from aromatics Studies on synthesis of complex bridge and ring fused ploycyclic rthers.</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>6.</td>
<td>Time resolution and microheterogeneous media</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>7.</td>
<td>Development and implementation of quantum chemical approaches for investigation of electron scattering and auger resonances.</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>8.</td>
<td>J.C. Bose Fellowship.</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>9.</td>
<td>Cyclodiophosphazanes as building blocks to design inorganic rings, cages and clusters with both main group and transition elements and their catalytic</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>
### Details of Sponsored Research Projects initiated in 2006-2007 in Chemistry Department

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Functionalized Polycarbocyclic Frameworks as Novel Ligands and Organocatalysts in Asymmetric Reactions.</td>
<td>Council of Scientific &amp; Industrial Research</td>
<td>Ongoing</td>
</tr>
<tr>
<td>5.</td>
<td>Quantitative and Mechanistic Aspects of Drug-Protein Interactions; Thermodynamic and Spectroscopic Studies</td>
<td>Council of Scientific &amp; Industrial Research</td>
<td>Ongoing</td>
</tr>
<tr>
<td>6.</td>
<td>Synthetic studies on Aigialomycin and Salicyclidahalides.</td>
<td>Department of Science &amp; Technology</td>
<td>Closed</td>
</tr>
<tr>
<td>7.</td>
<td>Processable Transparent Conducting .. dioxythiophenes.</td>
<td>Department of Science &amp; Technology</td>
<td>Closed</td>
</tr>
</tbody>
</table>

### Inter-department projects:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>IIT BOMBAY - MONASH research academy project.</td>
<td>Monash University, Australia.</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

### Sr. No. | Project Title | Agency Name | Project Status
---|----------------|-------------|----------------|
10. | Ramanna Fellowship | Department of Science & Technology | Ongoing |
11. | Synthetic and catalytic studies of n-heterocyclic carbenes (NHC) and their late transition metl. complexes | Department of Science & Technology | Ongoing |
12. | Probing the role of loop formation during protein folding with molecular dynamics simulations | BRNS | Ongoing |
13. | Design and implementation of IR + UV laser field profiles for selective control of bond cleavage in prototypical tri and polyatomic systems | BRNS | Ongoing |

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<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Coupling of Nitrovinyl anion with novel carbon ......centred electrophiles</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>9</td>
<td>Ramanna Fellowship</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>10</td>
<td>Development of new Cu(II)-amine-phosphate and related complexes for polymerization of 2.6-dimethyphenol.</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>11</td>
<td>Bioinorganic avalanches of synthetic glycol-conjugates: Binding, conformation, structure and inhibition of lectins and glycosidases and ion sensing pro</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>13</td>
<td>Feasibility of 10 um/min Cu plating on thin PVD seed layers</td>
<td>Applied Materials Inc., Santa Clara Ca.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>14</td>
<td>Synthesis of Edot.</td>
<td>Vijay Chemical Industries</td>
<td>Ongoing</td>
</tr>
<tr>
<td>16</td>
<td>Cis-Heteroporphrin Building Blocks Bearing Two Different Functional Groups And Their Use In The Synthesis Of Covalent And Non-Covalent</td>
<td>KA == BRNS projects commenced from year 1999-2000</td>
<td>Ongoing</td>
</tr>
<tr>
<td>17</td>
<td>De novo Protein Design, Customizing Forms and Functions Stereochemically</td>
<td>KA == BRNS projects commenced from year 1999-2000</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

**Inter-department project**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Exploration of Design and Fabrication of Sensors for DEtection of Explosives</td>
<td>Defence Research &amp; Development Organisation</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>
### Details of Sponsored Research Projects initiated in 2005-2006 in Chemistry Department

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Theoretical Investigation of Magnetic Molecules and Magnetism in Molecular Crystals</td>
<td>CSIR</td>
<td>Ongoing</td>
</tr>
<tr>
<td>2.</td>
<td>Heterochiral Peptides Customizable As Bipartite Receptors</td>
<td>CSIR</td>
<td>Ongoing</td>
</tr>
<tr>
<td>3.</td>
<td>Electronic and vibrational spectroscopic …reactions in gas phase.</td>
<td>DST</td>
<td>Closed</td>
</tr>
<tr>
<td>4.</td>
<td>Application of olefin metathesis in organic synthesis.</td>
<td>DST</td>
<td>Closed</td>
</tr>
<tr>
<td>5.</td>
<td>Upgradation of the National single crystal X-ray diffraction facility at IIT Bombay with a CCD equipped diffractometer system.</td>
<td>DST</td>
<td>Closed</td>
</tr>
<tr>
<td>6.</td>
<td>Investigation of the processes of formation and thermal decomposition of ………clusters.</td>
<td>DST</td>
<td>Closed</td>
</tr>
<tr>
<td>7.</td>
<td>Emeritus Fellowship for Prof. Talwar Satya Sarup</td>
<td>AICTE</td>
<td>Ongoing</td>
</tr>
<tr>
<td>8.</td>
<td>Senior Research Associateship</td>
<td>CSIR</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

### Inter-department project

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Nanoelectronics Centre</td>
<td>INFORMATION TECHNOLOGY</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

### Details of Sponsored Research Projects initiated in 2003-2004 in Chemistry Department

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Regional Facility for Isothermal Titration Calorimetry in Biologically...</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>2.</td>
<td>Design of New and Novel Nanoconstruction Tools,</td>
<td>DST</td>
<td>Closed</td>
</tr>
<tr>
<td>3.</td>
<td>National Facility for Protein Sequencing,</td>
<td>DST</td>
<td>Closed</td>
</tr>
<tr>
<td>4.</td>
<td>Studies of Vitamin A and E Compounds in DNA Repair and Cancer Chemotherapy</td>
<td>KA == BRNS</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>
Details of Sponsored Research Projects initiated in 2002-2003 in Chemistry Department

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Polymer supported catalysis (Reliance Industries Ltd.)</td>
<td>Sponsored by Private Organisation 02SP015</td>
<td>Ongoing</td>
</tr>
<tr>
<td>2.</td>
<td>Fund for Improvement of S &amp; T Infrastructure in Universities and Higher Educational Institutions (FIST)</td>
<td>DST 02DS015</td>
<td>Closed</td>
</tr>
<tr>
<td>3.</td>
<td>Financial Grant for the Swarnajayanti Fellowship</td>
<td>DST 02DS044</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

Recognition

The contributions of the members of the faculty have been recognized in the form of Vice Presidentship of the Indian Society of Chemists and Biologists, Fellow of the Indian Academy of Science and achievement of MRSI-Medal 2010. Many from the faculty serve as members of the Project Advisory Committees of the DST, CSIR and DAE. Members of the faculty also serve on the Editorial Boards of several reputed journals. Some of the publications have been placed among top 10-25 downloaded articles.

Interaction with scientists through seminars and other formal programmes is an integral part of its academic activity. Further, the faculty keeps abreast of the developments in the scientific world through visits and interactions with various research groups within the country and abroad.

Other Activities

The Department organized IRIS 12 (12th International Symposium on Inorganic Ring Systems) at Holiday Inn Resort in Goa, India during August 16-21, 2009.

Conferences/Symposia/Workshops/Seminars (presented and participated)

National

Singh, Anil K.


“Synthesis and characterization of uniform narrow-size nanoparticles of cholesteryl esters using hydrophobicity and microemulsion”, In-house symposium, Department of Chemistry, IIT Bombay, February 27, 2010.

“From photoactive organic molecules to photoresponsive materials of biological and opto-

**Datta, S.N.**

*Theoretical and Computational Chemistry Conference 09*, University of Pune, December 18-20, 2009.

*In-house symposium*, Department of Chemistry, I.I.T. Bombay, February 27, 2010

**Kotha Sambasivarao**
“Design and Syntheses of conformationally constrained α-amino acid derivatives”, *In-House symposium*, Department of Chemistry, IIT-B, February 27, 2010


“Synthesis of biaryl derivatives by using cross-enyne metathesis, Diels–Alder reaction, and Suzuki coupling as key steps”, *CRSI Symposium on Chemical Sciences*, IICT Hyderabad, February 5-7, 2010, Ps-342


“Approaches towards the synthesis of unusual α-amino acid derivatives”, *In-House symposium*, Department of Chemistry, IIT-B, February 27, 2010.

**Balkrishna, M.S.**


“Large bit bisphosphite, 1,3-C_{6}H_{4}[OPOC_{10}H_{6}(μ-S)C_{10}H_{6}O]_{2}: Synthesis, copper(I), and gold(I) complexes”, *12th International Conference on Inorganic Ring Systems (IRISXI)*, Goa, India, August 16-21, 2009.


**Murugavel, R.**

**Kaliappan, K.P.**
NOST meeting at Goa from May 1-4, 2009

*Second Indo-German Symposium in “Frontiers in Chemistry”* at University of Leipzig, Germany from September 16-20, 2009

Presented a poster titled “Synthetic Studies on Platensimycin, Platencin and Palmerolide A” at *Gordon Research Conference (Natural Products)* held at Tilton School, New Hampshire, USA, from July 26, 2005 to July 31, 2009.

**Ghosh, P.**

**Patwari, G.N.**

*12th International symposium on Inorganic Ring systems in Goa in 2009*
Fernandes, Rodney A.
Professor Ram Chand Paul VIth National Annual Symposium held in the Department of Chemistry, Punjab University, Chandigarh. Between 5th-6th March 2010.


In-House Symposium IIT Bombay 2010, February 27, 2010, PS-8
Poster: Total Synthesis of all Stereoisomers of Phenatic Acid B. Poster No. PS-8

Pradeepkumar, P.I.
Given a talk in the 1st Max Planck India-Fellow Meeting, held on December 1-3, 2009 at Centre for Cellular and Molecular Biology (CCMB), Hyderabad

Kulkarni, Suvarn S.
RSC-IITB symposium, February 4, 2009
CRSE symposium, February 6-8, 2009
RSC-IITB mini symposium on Green Chemistry January 2010
In House symposium, IITB, February 26, 2010

International

Singh, A.K.

“Design, synthesis and antiradical activities of vitamin E compounds”. ISCB’s 14th International Conference on Chemical Biology Discovery, Perspectives and Challenges, Central Drug Research Institute, Lucknow, January 15 – 18, 2010.


Mathur, P.

Singh, H.B.

“Organochalogen and –mercury chemistry: Role of intramolecular secondary interactions”, Seminar on Orgmetallic Chemistry in memory of Prof. T. N. Srivastava, held at Lucknow University, March 31st 2010.


Tembe, B.L.
“Faculty development in Blended and Online Learning”, Workshop, March 15 -17, 2010, san Diego, California

Rao, C.P.
An invited lecture has been delivered at the 10th International conference on calixarenes held in Korea University, Seoul, Korea, during July 13-16, 2009. The title of the invited talk was, “Lower rim calixarene conjugates in the recognition of amino acids, peptides and proteins”.

Presented a poster on “Lower rim calixarene conjugates in the recognition of biologically important metal ions” at the 10th International conference on calixarenes held in Korea University, Seoul, Korea, during July 13-16, 2009.

Murugavel R.
22nd ICCBIC in Bratislava, Slovakia, June 7-12, 2009
IRIS-12, August 16-21, 2009

Ghosh, P.
“Ag(I) and Au(I) Complexes of a New Class of 1,2,4-Triazole based N/O-functionalized N-heterocyclic Carbene”, 238th American Chemical Society National Meeting, Washington DC, USA, August 16-20, 2009.


Sunoj, R.B.

Choudhary Arindam
2010 Participated in MANA International Symposium, Tsukuba, Japan
2010 Participated in International Conference of Nanoscience and Nanotechnology, IIT-Bombay
2010 Helped in Organization of ICONSAT, IIT-Bombay

Pradeepkumar, P.I.
Given a talk in the Frontiers of Bioorganic Chemistry symposium, held on May 15, 2009 at Uppsala University, Sweden

Rajaraman, G.
13th International congress on Quantum Chemistry Helsinki, Finnnland, 22” – 27” June 2009.
European conference on Molecular magnetism, Wroclaw, Poland, 4-7th October 2009.

Invited Lectures

National

Singh, Anil K.

“Organic Synthesis – New Domains and Dimensions”, Department of Chemistry, Gujarat University, Ahmedabad, November 07, 2009

“Organic and bioorganic chemistry- new domains and dimensions”, Department of Chemistry, University of Allahabad, November 27, 2009


“Photoactivation of biomolecules and light-driven biomolecular machines”, National Seminar on Contemporary Research in the Field of Materials Science and the Interface of Chemistry and Biology, University of Allahabad; , January 31 to February 02, 2010.


Datta S.N.

“Photosynthesis in C4 Plants: ATheoretician’s Views”, University of Pune, December 18, 2009.


Kotha Sambasivarao


“Application of olefin metathesis in organic synthesis”, DST-Group Monitoring Workshop, Central College, Bangalore, August 9, 2009.


Balkrishna, M.S.

“Designing and fine-tuning of phosphorus based ligands with functionalities for transition metal chemistry and catalytic reactions”, Madurai Kamraj University Madurai, March 30th 2010.

“Designing and fine-tuning of phosphorus based ligands with functionalities for transition metal chemistry and catalytic reactions”, Indian Institute of Technology Madras, Chennai, October 8th 2009

Murugavel, R.

“RSC Lecture” at Ruia College, September 19, 2009

“IIT Bombay IRCC Best Paper Award Lecture”, October 7, 2009

Kaliappan, K.P.

Delivered an invited lecture on “Design, Syntheses and Evaluation of New Natural Product like Molecules” at Syngenta R & T Center on February 19, 2010.

Delivered an invited lecture on “New Strategies in Syntheses of Biologically Active Natural Products” at Syngenta R & T Center on February 18, 2010.

Delivered an invited lecture on “New Versatile Strategies for Syntheses of Natural Products and Natural Product like Molecules”, at University of Madras on December 21, 2009.

Delivered an invited lecture on New Versatile Strategies for Syntheses of Natural Products and Natural Product like Molecules, IACS, Kolkatta, on December 11, 2009.

Delivered an invited lecture on “Nature to Natural Products and Mores” at Nycomed, Mumbai, on September 1, 2009.

Delivered an invited lecture on “Challenges and Opportunities in Target and Diversity-Oriented Syntheses” at Astrazeneca Pharmaceuticals, Bangalore.

Delivered an invited lecture on “New Strategies for Syntheses of Platensimycin, Platencin and Palmerolide A” at NOST meeting in Goa on May 3, 2009.

Sunoj, R.B.

Discussion Meeting on “Chemical Reactions in Unusual Media”, National Chemical Laboratory, Pune, October 2009.

47
“Molecular orbital theory in organic chemistry”, Royal Society of Chemistry, West India Section symposium for post graduate students, Ruia college, 2009.


**Ghosh, P.**
Delivered an invited lecture on “Emerging Horizons of Functionalized N-heterocyclic Carbenes: Catalysis and Beyond”, at the Indian Institute of Science Bangalore, October 27, 2009

Delivered an invited lecture on “Emerging Horizons of Functionalized N-heterocyclic Carbenes: Catalysis and Beyond”, at the Indian Institute of Technoplogy Kanpur, January 12, 2010

Delivered an invited lecture on “Emerging Horizons of Functionalized N-heterocyclic Carbenes: Catalysis and Beyond”, at the Ahmednagar College, Ahmednagar, Maharashtra, February 13, 2010

**Fernandes Rodney, A.**
Delivered an invited lecture on “Strategic Utility of Orthoester-Claisen Rearrangement in the Synthesis of Bioactive Molecules”, Organic Chemistry Division, Indian Institute of Chemical Technology (IICT), Hyderabad, on April 6, 2010

Delivered an invited lecture on “Development of Chiral ?-Allylpalladium Complexes: Asymmetric Allylation of Imines” at the International Symposium on Ostwald 100 Years of Catalysis in Chemical Research, Sam Higginbottom Institute of Agricultural Technology and Science, Allahabad, UP, India, on November 4, 2009

**Pradeepkumar, P.I.**
Given a talk at the Max Planck Institute of Biophysical Chemistry, Gottingen, Germany, on December 9, 2009

**Kulkarni Suvarn, S.**
One-pot methods for glycomics” at Bioschool, IIT Bombay, November 17, 2009

**International**

**Murugavel R.**
Plenary lecture at 22nd ICCBIC in Bratislava, Slovakia, June 7-12, 2009
Invited lecture at IRIS-12, August 16-21, 2009
Invited lecture at Ruhr Universität Bochum, Germany, October 30, 2009
Invited lecture at Universität Duisburg-Essen, Germany, February 2010

**Kaliappan, K.P.**
Delivered a lecture on “New Versatile Strategies for Platensimycin, Platencin and Palmerolide A” at the second Indo-German Symposium held at the University of Leipzig on September 20, 2009.

Delivered an invited lecture on “Challenges and Opportunities in Syntheses of Natural Products and Natural Product like Molecules” at UMASS, Amherst, on July 23, 2009.

Delivered an invited lecture on “Challenges and Opportunities in Syntheses of Natural Products and Natural Product like Molecules” at NCI Bethesda, on July 17, 2009.

**Ghosh, P.**
Associate Editor of Global Journal of Inorganic Chemistry, Simplex Academic Publishers.

**Sunoj, R.B.**
Indo-German Conference on Modeling Chemical and Biological Reactivity (MCBR2), Wildhard Kreuth, Germany, October 2009.

Department of Chemistry, The Ohio State University Columbus, Ohio (USA). June 2009.

Center for Computational Quantum Chemistry (CCQC), University of Georgia, Athens USA, July 2009.

**Fernandes Rodney, A.**
Mr. Arun B. Ingle was awarded BEST POSTER award in Ram Chand Paul Vlth National Annual Symposium held in the Department of Chemistry, Punjab University, Chandigarh for the the poster entitled: “Total Synthesis of (+)-Cephalosporolide E and (-)-Cephalosporolide F en route to Bassianolone” Alexander von Humboldt Foundation Germany grant for HPLC instrument.

**Pradeepkumar, P.I.**
Given a talk at the Max Planck Institute of Biophysical Chemistry, Gottingen, Germany on December 9, 2009

**Significant Awards and Distinctions**

**Singh, A.K.**
Scientist-in-Charge, Organic & Biochemistry, Indian Chemical Society’s Annual Convention of Chemists-2009
DAE Specialist Group Member (R&D Sector – Advanced Chemical Sciences)
Vice President, Indian Society of Chemists & Biologists Member, Senate/ Board of Faculty/Advisory Council of academic institutions
Chairman, Academic Committee, Gujarat Technical University, Ahmedabad
Editorial Board Member of research journals
Member, UGC-SAP/CAS advisory committees.
Singh, V.K.
J.C.Bose Fellow

Kotha, S.R.
Elected as a Fellow of Indian Academy of Sciences 2010
NOST Council Member (2007-2010)
Editorial Board Member (*J. Chem. Sci.*. Indian Academy of Sciences 2008–)
Editorial Board Member (*Journal of Amino Acids*)

Murugavel, R.
MRSI Medal 2010
DFG Mercator W3 Professorship 2009-2010

Sunoj, R.B.
Nature publishing group international travel grant 2009 toward participating and chairing a session in the Gordon Research Conference on Physical Organic Chemistry, June 2009, New Hampshire, USA

Excellence in Teaching Award from IIT Bombay for the year 2009

Ghosh, P.
Associate Editor of Global Journal of Inorganic Chemistry, Simplex Academic Publishers.

Fernandes Rodney, A.
Mr. Arun B. Ingle was awarded BEST POSTER award in Ram Chand Paul Vth National Annual Symposium held in the Department of Chemistry, Punjab University, Chandigarh for the the poster entitled: “Total Synthesis of (+)-Cephalosporolide E and (-)-Cephalosporolide F en route to Bassianolone”

Alexander von Homboldt Foundation Germany grant for HPLC instrument

Infrastructure Developed

Kumar Anil
High Pressure Homogenizer

Sunoj, R.B.
As the convener for IIT Bombay’s first supercomputing facility, I have been instrumental in setting up the ‘SpaceTime’ high performance computing cluster.

Ghosh, P.
Has set up a “State-of-the-Art” Organometallic Synthesis Laboratory having Glove box, High-vacuum line, Fume Hoods (3), High pressure reactor (1) and GC/GCMS instrument, etc.

Pradeepkumar, P.I.
State-of-the-art DNA and RNA synthesis facility

Kulkarni, S.S.
A classroom is transformed into a fully functional chemical lab 347. Lab is inaugurated and is functional since November 2009. 4 Ph.D. and 2 M.Sc. students working.

Patents

Kumar Anil
“Functional Amplified Fluorescence Polymers,”


Membership of Scientific Societies/ Bodies/ Organizations

Singh, A.K.
American Chemical Society
American Society for Photobiology
Chemical Research Society of India
Indian Biophysical Society
Indian Chemical Society
Indian Council of Chemists
Indian Society for Bioorganic Chemistry
Indian Society of Chemists & Biologists
Indian Photobiology Society
Indian Society of Radiation and Photochemical Sciences
Indian Society of surface Science and Technology
Institution of Chemists, India

Datta, S.N.
Member of American Chemical Society

Balkrisha, M.S.
Life Member of Indian Chemical Society
Life Member of Chemical research Society of India
Life Member of Crystallography Society of India
Life Member of Catalysis Society of India
Member of American Chemical society
Fellow of Royal Society of Chemistry
Editorial Board Member of Indian Journal of Chemistry, Section A.
Editorial Board Member of Indian Journal of Chemical Technology
Kaliappan, K.P.
Fellow of the Royal Society of Chemistry (FRSC, London)
Member of the American Chemical Society
Life Member of the Chemical Research Society of India

Sunoj, R.B.
Life Member of the Chemical Research Society of India
Life Member of World Association of Theoretically Oriented Chemists (WATOC)

Ghosh, P.
Member of the American Chemical Society
Life Member of the Chemical Research Society of India

Fernandes Rodney, A.
Life member of Chemical Research Society of India

Kulkarni, S. S.
Applied for MRSC

Honorary Work

A.K.Singh
Chairman, Academic Committee, Gujarat Technical University, Ahmedabad.
Chairman, Committee for Design and Development of M.Sc.5-Yr Intgtd. (Chemistry) Programme, SVNIT Surat.
Member, DAE Specialist Group (R&D Sector) – In Advanced Chemical Sciences.
Member, Board of Faculty of Science, University of Allahabad.
Member, Governing Council, Atomic Energy Education Society.
Vice-President of the Indian Society of Chemists & Biologists and Council Member of many other professional organizations.
Examiner/Reviewer of – Ph.D. thesis from various institutions; Research Projects from various national and international funding agencies, and Research papers in several, Indian and foreign Journals.
Member, Peer Review Groups/Expert Committee of various academic/research institutions, national academy, etc..
Member, UGC-SAP Advisory Committee (Chemistry) of Gujarat & Kakatiya universities.
Member, Senate, VJTI, Mumbai.
Conference Programme Committee Member/Session Chairman/Advisory Council Member, etc.

Datta, S.N.
Evaluator of DST project proposal.
Referee for a Quantum Chemistry software.

Kotha Sambasivarao
Reviewed research proposals for DST and CSIR, External examiner for Ph.D. Thesis, Selection committee member of Telangana University, Rajiv Gandhi Knowledge University, BARC, CMAP.
UGC-SAP advisory committee member – Shivaji University, Kholapur

Singh, V.K.
Evaluated various Ph.D. theses from various universities, and DST, CSIR research projects, Chemical Sciences Research Committee CSIR, New Delhi, for SRF and RA.
Reviewed several manuscripts for the journals such as Tetrahedron Letters, Tetrahedron, Synlett, Arkivoc, etc.

Murugavel, R.
Convener, Chemistry of Functional Materials-2009, August 14-16, Goa
CRSI Council Member 2008-2011

Kumar Anil
Served in the Editorial Board of “Polymer Reviews”

Kaliappan, K.P.
Member of the review committee of the DST to advise the National Facility for Combinatorial Natural Products at IICT-Hyderabad
Examiner JAM

Evaluated several Ph.D. theses from various universities and institutes

Reviewed several manuscripts various journals

Evaluated several projects from various funding agencies like CSIR, DST, IFCOS, etc.

Sunoj, R.B.
Reviewer of DST projects

Reviewer and adjudicative reviewer of Royal Society of Chemistry journals such as Chemical Communications, Physical Chemistry Chemical Physics, and Organic and Biomolecular Chemistry.


Reviewer of Journal of Chemical Sciences (An Indian Academy of Sciences publication)

Reviewer of Georgian Academy of Sciences research proposal.

Ph.D. Thesis examiner for Osmania university.

Ghosh, P.
NMR and GCMS Incharge, Chemistry Department, Indian Institute of Technology, Bombay.

Balkrisna, M.S.
Academic Activities: (Research and Teaching)
Research areas:
· Main Group Chemistry.
· Transition Metal Organometallic Chemistry.
· Homogeneous Catalysis & Biological Studies

Chowdhury Arindam
Reviewed a manuscript from Langmuir (ACS) in 2009

Reviewed two manuscripts for International Journal for Nanoscience and Nanotechnology (2010)

Reviewed a grant from ACS-PRF, 2009.

Fernandes Rodney, A.

Faculty member and their area of Specialization

1. A. K. Singh
   General: Organic Chemistry
   Specific: Chemistry of vision and photocontrol of structure and function of biomolecules – Retinal-bound photoreceptor proteins - synthesis and characterization of bacteriorhodopsin analogs.
   Development of photoswitchable systems, photoswitchable enzymes as reagents.
   Biomolecular caging – Synthesis of novel phototriggers and their applications in caging of drugs and bioactive natural products.
   Excited state studies of linear polyenes – Synthesis, photochemical and photophysical studies of linear polyenes including retinoids, diphenylpolyenes, indolic polyenes.
   Fluorescence probes – Synthesis of neutral hydrophobic probes for various applications including characterization of microenvironment of organized assemblies and proteins, and as diagnostics.
   Radioprotective/antioxidant agents – Vitamin A and E related radioprotective / antioxidant compounds - synthesis and assay of their antiradical abilities.
   Organic nanoparticles – Synthesis, characterization and biomedical applications.

2. S. Durani
   General: Organic Chemistry
   Specific: Bio-Organic Chemistry, Structural and Computational Biology, Medicinal Chemistry

3. M. K. Mishra
   General: Physical Chemistry
   Specific: Quantum Chemistry

4. Pradeep Mathur
   General:Inorganic Chemistry
   Specific:Organometallic Chemistry

5. H. B. Singh
   General:Inorganic Chemistry
   Specific:Organometallic Chemistry

6. Sambhu N. Datta
   General:Physical Chemistry
   Specific: Theoretical Chemistry, Relativistic theory, Magnetic molecules and materials, Aspects of Photosynthesis
7. A. Q. Contractor
   General: Physical Chemistry
   Specific: Electrochemistry

8. B. L. Tembe
   General: Physical Chemistry
   Specific: Theoretical Chemistry, Statistical Mechanics, Molecular Dynamics

9. C. P. Rao
   General: Inorganic Chemistry
   Specific: Coordination Chem. and Bioinorganic, Biomimetic and Biointeraction Chemistry of model Molecules and Protein/enzyme Chemistry, Biochemistry and Biology of Glyco-conjugates Bioinorganic and Biophysical Chemistry of Lectins. Enzyme-inorganic Materials, Biomimetic chemistry of calixarenes and metal modified calixarenes; Transition metal saccharide chemistry and Biology; Glycosidic bond formation: Role of metal ions and metal ion complexation; Transition metal coordination chemistry of protected saccharides; Isolation, purification and bioinorganic reactivity studies of enzymes; Lanthanide metal ion saccharide chemistry

10. V. K. Singh
    General: Organic Chemistry
    Specific: Organic Synthesis and Photochemistry

11. Sambasivarao Kotha
    General: Organic Chemistry
    Specific: Unusual amino acids, peptide modifications, metathesis reaction, Suzuki-Miyaura cross-coupling reaction, and new synthetic methodology.

12. G. K. Lahiri
    General: Inorganic Chemistry
    Specific: Transition metal ions mediated intramolecular and intermolecular organic transformations via the activation of C-H and C-X (F, Cl, Br) bonds. Development of mononuclear and multinuclear ruthenium and osmium complexes as efficient photo-redox assemblies. Development of heterogenized homogeneous metal cluster based catalysts for enantioselective organic transformations. Development of new class of metal complexes as possible models for the active site of metalloenzymes

13. Y. U. Sasidhar
    General: Physical Chemistry
    Specific: Protein folding

14. Nand Kishore
    General: Physical Chemistry
    Specific: Biothermodynamics and Biophysical Chemistry

15. M. S. Balakrishna
    General: Inorganic Chemistry
    Specific: Main group chemistry; Transition metal organometallic chemistry, Homogeneous Catalysis & Biological Studies

16. R. Murugavel
    General: Inorganic Chemistry
    Specific: Organometallic Chemistry of Main Group Elements; Silicate and Phosphate Materials Chemistry; Supramolecular Chemistry and Coordination Polymers

17. Anil Kumar
    General: Organic Chemistry
    Specific: Synthetic Polymer Chemistry

18. M. Ravikanth
    General: Inorganic Chemistry
    Specific: Porphyrin and its analogs: Synthesis and Photodynamics

19. I. N. N. Namboothiri
    General: Organic Chemistry
    Specific: Organic Synthesis, Physical Organic Chemistry/ Reaction Mechanism

20. K. P. Kaliappan
    General: Organic Chemistry
    Specific: Organic Synthesis and Chemical Biology

21. A. Datta
    General: Physical Chemistry
    Specific: Time resolved spectroscopy; Applications of fluorescence spectroscopy, organized assemblies, porphyrin photophysics

22. R. B. Sunoj
    General: Organic Chemistry
    Specific: Computational and applied theoretical chemistry

23. Prasenjit Ghosh
    General: Inorganic
    Specific: Organometallic Synthesis; Homogeneous Catalysis.

24. G. Naresh Patwari
    General: Physical Chemistry
    Specific: Experimental Spectroscopy and Chemical Dynamics.

25. Arindam Chowdhury
    General: Physical Chemistry
    Specific: Optical Microscopy: Single Molecule Imaging and Spectroscopy
26. **Rodney A. Fernandes**  
General: Organic Chemistry  
Specific:  
a) Synthetic Organic Chemistry: Asymmetric Synthesis of Natural Products, Asymmetric Catalysis.  
b) Organometallic Chemistry: Chiral Palladium Catalysis and Asymmetric Reactions.  
c) Enzymatic Chemistry: Chemo-Enzymatic Synthesis

27. **Pradeep Kumar P.I.**  
General: Organic Chemistry  
Specific: Chemical Biology of Nucleic Acids

28. **Ruchi Anand**  
General: Physical Chemistry  
Specific: Protein Crystallography

29. **Suvarn S. Kulkarni**  
General: Organic Chemistry  
Specific: Carbohydrate synthesis

30. **Gopalan Rajaraman**  
General: Inorganic Chemistry  
Specific: Applied computational Chemistry
Introduction

The Department of Civil Engineering with its multifaceted faculty continues to maintain and cultivate its strong links with the building and construction industry and academic and research institutions both within and outside the country. Besides high quality teaching and instruction at both UG and PG levels, the Department is actively involved in basic and applied research and consultancy and provides high quality technical advisory support through various R & D projects and consultancy to various organizations. The department has attracted significant amount of sponsored research funding from government and private agencies.

Academic Programmes

The Department of Civil Engineering offers broad-based undergraduate B.Tech. degree programme. A dual degree (B.Tech.-M.Tech.) programme is also run in structural engineering. Postgraduate M.Tech. (admissions through GATE/sponsorships) and Ph.D. (through selections/ sponsorships) programmes are offered in the following five specializations:

- Transportation Systems Engineering
- Geotechnical Engineering
- Water Resources Engineering
- Structural Engineering
- Geodesy and Remote Sensing

This year, 43 M.Tech. and 35 Ph.D. students were admitted in the above specializations. In the first year, 86 students were on rolls in the B.Tech., 14 in the dual degree B.Tech./M.Tech. programmes. The students that graduated from the department are as follows:

<table>
<thead>
<tr>
<th>Degree Awarded</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Tech.</td>
<td>51</td>
</tr>
<tr>
<td>M.Tech.</td>
<td>43</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dual Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Tech.</td>
</tr>
<tr>
<td>M.Tech.</td>
</tr>
</tbody>
</table>

Significant Awards / Distinctions

**Choudhury D.**


Indira Gandhi Priyadarshini Award – 2009, All India National Unity Conference (AINUC), New Delhi, India, November 2009.


**Deo M.C.**
Prof. H H Mathur Award for excellence in applied research, IIT Bombay.

**Gupta Kapil**

**Subimal Ghosh**
BOYSCAST Fellowship 2010 from Department of Science and Technology, Government of India for
carrying out research related to climate change in Oak Ridge national Laboratory, TN, United States of America.

Nominated as Lead Author position in writing Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) by Ministry of Environment and Forests, Government of India.

**R&D Activities**

**Sponsored Research**

<table>
<thead>
<tr>
<th>Sponsored Research</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Projects</td>
<td>67</td>
</tr>
<tr>
<td>New</td>
<td>14</td>
</tr>
<tr>
<td>Ongoing</td>
<td>44</td>
</tr>
<tr>
<td>Completed</td>
<td>9</td>
</tr>
</tbody>
</table>

The department received 14 new sponsored projects with a sanctioned outlay of Rs. 5.23 crores. Some of the new sponsored projects (ongoing) are as below:

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Sponsoring Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some Investigations on Cracking Characteristics of Fine-Grained Soils</td>
<td>DST</td>
</tr>
<tr>
<td>Hydraulic Model Investigations for Design of Raft Foundations for Bridges</td>
<td>MoSRTH</td>
</tr>
<tr>
<td>Development of Resistance Factors for Shallow Foundations Using Laboratory Load Test Data</td>
<td>DST</td>
</tr>
<tr>
<td>Behaviour of shallow footings subjected to underground and overground blast loading</td>
<td>DST</td>
</tr>
<tr>
<td>Derivation of operating rules for a multi-purpose reservoir using soft computing techniques</td>
<td>MoWR</td>
</tr>
<tr>
<td>Developing integrated catchment management strategies for sustainable water use in response to climate change</td>
<td>Australian-Aid Project</td>
</tr>
<tr>
<td>Development of Reliability Based Guidelines for the Design and Flaw Evaluation of Nuclear Piping System</td>
<td>BRNS, DAE</td>
</tr>
<tr>
<td>Affordable Urban Modular Residential Buildings in Steel in India Belgium</td>
<td>ArcelorMittal R&amp;D, Belgium</td>
</tr>
</tbody>
</table>

**Consultancy Work**

Consultancy projects, numbering 240, worth about Rs. 7.52 crores were undertaken during the year. The number of faculty members involved in the above consultancy work was 23.

**Extension Activities**

In order to encourage and facilitate interaction amongst practitioners and researchers, the following activities were organized:

**Conferences**


**Workshops**


Short-Term Courses

QIP Course “Finite Element Method and Applications in Engineering”, held during October 12-16, 2009 (Prof. Eldho T.I & Prof. Y.M. Desai)


CEP Courses


In-house Programme on Advanced Foundation Engineering for Tecnimont ICB, Mumbai, December 10-12, 2009.


Visitors to the Department and their presentations


Dr. Graham Owens, FREng MSc PhD CEng FIStructE FRSA, President of the Institution of Structural Engineers, “A Rewarding Career in Structural Engineering” on November 9, 2009

Mr. P.B Vijay, former Director General, CPWD, “Gas Pressure Welding (Splicing) or Rebars” on January 11, 2010.


Mr. Lance Carter, PE – Technical Director, Strata Systems, Inc., “Geogrid and Geocell: Theory, applications and case studies” on February 16, 2010

Mr. P. K. Wattal, Head of Back-End Technology Division, BARC, “Sustainability of the Indian Nuclear Programme” on February 27, 2010

Mr M.D. Kudale, Joint Director, CWPRS (Central Water resources and Power Research Station), Pune, “Coastal Erosion and Protection” on February 27, 2010

Mr. Mohan V. Jatkar, Chief Technical & Safety Officer & Member, Board of Management in Gammon India Ltd., “Challenges faced by the Bridge Construction Industry”, February 28, 2010.

Mr Anil Banchhor, ACC Cement, “RMX- Distribution challenges” on February 28, 2010.


Participation in Conferences/Symposia/Workshops/Seminars

Bajoria, K. M.
Participated and chaired session on Advanced strategies and Rehabilitation, International Conference on Construction Chemicals- Imperatives for enhancing consumption of construction chemicals in India, Feb 11-12, 2010, Nehru Centre, Mumbai, India.

Chandiramani, N. K.
**Choudhury, D.**
Participated and made oral presentation of a technical paper in *GeoFlorida-2010, Annual Congress of the Geo-Institute of ASCE*, February 20-24, 2010, West Palm Beach, Florida, USA organized by GI-ASCE.

Participated in the *3rd International Congress on Computational Mechanics and Simulation (ICCM09)* during December 1–5, 2009, jointly organized by the Indian Association for Computational Mechanics (IndACM) and IIT Bombay, India. Also acted as the Chairman of a session during ICCMS09.

**Dasaka, S.Murty**
Participated in the *Indian Geotechnical Conference (IGC-2009)*, Guntur, Andhra Pradesh, February 18-20, 2010

**Deo, M.C**

**Eldho, T.I.**


Participated in the *International Workshop Climate Change and Water Resources Management, Integrated Catchment Management Strategies for Sustainable Water Use in Response to Climate Change*, Nov. 201-21, Puri, Orissa.


Participated in the *National Conference on Coastal Processes and Management*, Centre for Earth Science Studies, Trivandrum, Kerala, 5-7 February 2010.

Participated in the *National Workshop on Hydroinformatics*, MS University Baroda, 14th February, 2010.

**Gopal R Patil**
Attended conference on *Building Infrastructure: Challenges and opportunities*, March 23, 2010, Vigyan Bhavan New Delhi, organized by Planning commission, Government of India

**Gupta, Kapil**
Participated and presented a paper in *EWRI- ASCE International Conference on Water Resources and Environment*, Chennai, 5-7 January 2010


Participated and presented a paper in *8th International Conference on Urban Drainage Modelling*, Tokyo, Japan, 7-11 September, 2009

Water Sensitive Urban Design (WSUD) 2009 Conference, Perth, Australia, 5-8 May 2009

**Ghosh S**


**Janga Reddy, M.**
Coordinated a session, presented a paper and served as associated editor for *Proceedings of 4th Indian International Conference on Artificial Intelligence* (IICAI-2009), held at Tumkur, India, December 16-18, 2009.

Co-chaired a session and presented a paper in *National Conference on Sustainable Water Resources Management and Impact of Climate Change (SWRM-2010)*, held at BITS-Pilani campus Hyderabad, March 5-6, 2010

**Jothiprakash, V.**


K.V. Krishna Rao
Participated in A two-day workshop on Sustainable Urban Transportation was jointly organised by IIT Bombay and University of South Australia during 27-28 April 2009 at IIT Bombay.

Participated as an expert panelist at the City Planning and Governance Summit: Modeling the New Urban India on January 20, 2010 at Hotel Taj Mahal Palace and Towers, Mumbai conducted by Times Grey Cell, Bennett, Coleman & Co.Ltd.

Rastogi A.K
Participated and made oral presentation of a technical paper “Role of Inverse Modeling in Groundwater System Simulation” 8th IAHS Scientific Assembly and 37th IAH Congress – Organised by NGRI, Sept 6-12, Hyderabad, 2009.


Tarun Kant
Chaired the organizing committee for the Third International Congress on Computational Mechanics and Simulation (ICCMS-09) which was held at IIT-Bombay on 1-5 December 2009.

Vedagiri P
Attended and successfully completed certification course on “Road Safety Audit” organized by International Roads Federation (IRF) and Australian Road Research Board (ARRB).

Participated in the conference on “Building Infrastructure: Challenges and Opportunities” organized by Infrastructure Planning Commission, Government of India.

Invited Lectures
Banerjee Sauvik
Taught two lecture sessions of the CEP/QIP short term course on “Finite Element Method and Applications in Civil Engineering” coordinated by Prof. Y.M.Desai and T.I.Eldho in the department between 12-16 October, 2009

Choudhury, D.

“State-of-the-art Research on Behaviour of MSW Landfill under Static and Seismic Loading Conditions,” on 4th February, 2010 at Institute for Computer Science, University of Bayreuth, Germany.

“Theory of Vibrations and Seismic Design Principles for Geotechnical Structures as per Design Codes”, organized by MIT Aurangabad, India and sponsored by National Disaster Management Division of Ministry of Home Affairs, Govt. of India during National Programme for Capacity Building of Architects in Earthquake Risk Management (NPCBAERM) during November 9 – 14, 2009.

“Integrity of Sub-Structural Systems during Earthquake: Indian and International Perspectives,” organized by Indian National Academy of Engineering (INAE), New Delhi, India during Fourth National Symposium on Frontiers of Engineering (NatFOE – 4) on 17th September, 2009, at Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam, India

“Geotechnical Earthquake Engineering: Recent Research at IIT Bombay”, on 3rd July, 2009, at Institute of Lowland Technology (ILT), Saga University, Japan.

“Behaviour and Design of Reinforced Soil-Wall under Seismic Loading: Recent Research at IIT Bombay”, on 2nd July, 2009, at Dept. of Civil Engineering, Kyushu University, Japan.

“Geotechnical Earthquake Engineering: Recent Research Findings at IIT Bombay,” on 1st July, 2009, at Dept. of Civil and Environmental Engineering, Yamaguchi University, Japan.

“Earthquake Resistant Design of Geotechnical Structures: Research at IIT Bombay”, on 29th June, 2009, at Disaster Prevention Research Institute (DPRI), Kyoto University, Japan.

“Recent Research on Geotechnical Earthquake Engineering at IIT Bombay”, on 26th June, 2009, at Institute of Technology, Shimizu Corporation, Japan.

“Geotechnical Earthquake Engineering: Recent Research Findings at IIT Bombay”, on 25th June, 2009, at Dept. of Civil Engineering, Tokyo Institute of Technology (TTT), Japan.

“Geotechnical Earthquake Engineering: Recent Research and Developments at IIT Bombay”, on 22nd May, 2009, at Dept. of Ocean Civil Engineering, Kagoshima University (KU), Japan.
Deo, M.C.

Eldho, T.I.


Gopal Rao K

Special guest lecture at College of Engineering, Thiruvananthapuram, Goa College of Engineering Goa, JJM College of Engineering Jaisingpur Maharashtra, Maharashtra Institute of Technology Pune.

Gupta Kapil

Singh, D.N.


Subimal Ghosh
“Climate Change and Downscaling” in International Symposium on Integrated Catchment Management for Sustainable Water use in response to Climate Change held in Melbourne, Australia during September 1-2, 2009.


Tarun Kant
Invited Talk, in 10th US National Congress on Computational Mechanics (USNCCM-10), Columbus, Ohio, USA, 16-19 July 2009

Delivered a keynote Lecture in Proc. International Conference on Advances in Mechanical and Building Sciences in the 3rd millennium (ICAMB-2009), VIT University, Vellore, 14-16 December 2009.
Vedagiri, P
“BRTS for Mumbai-Why we must and How We can” at Observer Research Foundation Mumbai, March 2010.


Viswanadham, B.V.S.
“Field testing methods for assessing efficacy of ground improvement techniques” was delivered on March 16, 2010, during CEP-QIP training programme on Site investigations and relevance to infrastructure organized at IIT Bombay

“Ground improvement techniques for infrastructure projects” was delivered on March 16, 2010 during CEP-QIP training programme on Site investigations and relevance to infrastructure organized at IIT Bombay

“Model studies on the performance of reinforced highway slopes” was delivered at CRRI National Get Together (NGT 2010) organized by Central Road Research Institute, New Delhi on March 6, 2010.

“Potential of geosynthetics for landfill containment applications” was delivered during National Workshop on Application of Geosynthetics in Civil and Mining Engineering, January 23-25, 2010 organised at Goa

“Stability of geosynthetic reinforced soil slopes” was delivered during National Workshop on Application of Geosynthetics in Civil and Mining Engineering, January 23-25, 2010 organised at Goa

“Centrifuge modelling of geosynthetic reinforced soil structures” was delivered on August 11, 2009 during CEP-QIP training programme on Geosynthetic Reinforced Soil Structures, organized by the department of Civil Engineering, IIT Madras.

“Studies on Waste Containment Systems and Relevance to India” was delivered at the department of Civil Engineering, SV University, Tirupathi on April 5, 2009.

Honorary Work

Banerjee Sauvik.

Member of the Local Organizing Committee, 3rd International Congress on Computational Mechanics and Simulation (ICCMS09) held at IIT-Bombay on 1-5 December 2009


Chandiramani, N. K.

PhD thesis examiner (Department of Mechanical Engineering, IISc Bangalore)

GATE paper setter (Aerospace Engg – Structures part)

Reviewed DST Projects.

Choudhury, D.
Editorial Board Member and Coordinator for Asia of ‘ISSMGE Bulletin’ (Quarterly Newsletter), published by International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE), London, U.K.

Editorial Board Member of ‘International Journal of Geotechnical Earthquake Engineering (IJGEE)’ (ISSN: 1947-8488), IGI publishing.

Editorial Board Member of Journal ‘Disaster Advances’ (ISSN: 0974-262X), published from India.

Guest Editor for a Special Issue on “Earthquake Geotechnical Engineering – Recent Developments” published in Volume 2, Issue 3 (pp. 515 – 572) of ‘American Journal of Engineering and Applied Sciences (AJEAS)” (ISSN: 1941-7020), Science Publications, USA.


Responsible Member to shortlist the ASCE Papers for nomination of Awards from UNSAT committee of Geo-Institute, American Society for Civil Engineers (GI-ASCE), USA.


Organizing Committee Member, 3rd International Congress on Computational Mechanics and Simulation (ICCMS09) during December 1 – 5, 2009, jointly organized by Indian Association for Computational Mechanics (IndACM) and IIT Bombay, India. Also acted as a Chairman of a session during ICCMS09.

Reviewer for GeoFlorida 2010: Advances in Analysis, Modeling & Design, Annual Conference of Geo-Institute (GI), ASCE, USA.

Advisory and Technical Committee Member, International Conference on Advances in Concrete, Structural and Geotechnical Engineering (ACSGE-2009) during October 25 – 27, 2009, organized by Birla Institute of Technology & Science (BITS), Pilani, Rajasthan, India.

Serving as Nominated Expert Member of the Departmental Undergraduate Programme Committee (DUPC) of Department of Civil Engineering, College of Engineering, Pune (COEP), India, since January 2009.

Expert Member, of the Board of Research and Studies for North Maharashtra University (NMU), Jalgaon, India, nominated by Hon’ble Vice Chancellor of NMU.

Reviewer of PhD thesis of Department of Civil Engineering, Indian Institute of Science, Bangalore, India.

Dasaka, S.Murty

Deo, M.C.

Associate Editor of ASCE Journal of Computing in Civil Engg.

Member, Editorial Board of the International Journal of Ships and Offshore Structures, Taylor and Francis, U.K.

Member, Editorial Board of the Open Ocean Engineering Journal, Bentham Press, Oxford, UK. (www.bentham.org/open/tooej)


Editor: Special issues of the ISH Journal of Hydraulic Engineering - 2009

Member, Board of Directors, Konkan Railway Corporation

Member, Advisory Board, National Water Academy

Member, expert committee, INCOIS, DOD, GOI, Hyderabad

Member, Faculty Selection Committees of IIT Delhi, KGP, Madras, Bhubaneswar

Member, Scientists Selection Committees of NIO, Goa

Member, Advisory Boards of UPSC

Member, Program Management Board, NIOT, Chennai

Selection Committee for best paper of ISH

Member, Executive Council, Indian Society for Hydraulics

Session Chair of a few conferences held in India and abroad

Examiner, Ph.D thesis of IITM, NIT S,

Reviewed around 25 papers for various national and international journals and project proposals of some national agencies.

Eldho, T.I.
Vice-Chairman, GATE 2009, IIT Bombay.

Associate Editor of International Journal of Ecology and Development.


Executive Council Member, Indian Society of Hydraulics, Pune.

Technical Review Committee Member of ICAR, Rubber Dam project, implemented by Indian Rubber Manufacturing Research Association, Thane.

Technical Committee Member of 17th APD-IAHR Congress held at New Zealand in 2010.

Reviewed Project proposal for DST, New Delhi, 2009.


Chaired a Session in National Conference on Coastal Processes and Management, Centre for Earth Science Studies, Trivandrum, Kerala, 5-7 February 2010, pp. 185-195.


Gopal Rao K
AICTE-NBA Accreditation expert team member.

Expert Member PhD evaluation, Karunya University, Coimbatore

Gupta Kapil

Member- Editorial Board: Urban Water Journal

Member of two International working groups of the IAHR/IWA joint committee on Urban Drainage: Sewer Systems and Processes Working Group (SS&PWG), Urban Rainfall Group (URG)

Convener and Member, Expert committee for drafting the “Guidelines for urban flood disaster management” for National Disaster Management Authority, Government of India, New Delhi


Member, DST technical expert sub-committee on Interventional Strategy Building for Water Programme, Government of India, New Delhi

Ghosh, S
Reviewer of research project proposals submitted to DST

Reviewer of research completion reports submitted to BRNS, DAE

Reviewer of course-materials developed under National Mission Programme on Education(NMPE)-ICT

Examiner of PhD thesis from IIT Roorkee

Session Chair in the International Conference on Mechanics, Materials and Management, Trivandrum, India, 2010

Expert member of Department Undergraduate Programme Committee (DUPC) of Dept of Civil Engineering, College


Jangid, R.S.

Editorial Board Member, The Open Ocean Engineering Journal.

Editorial Board Member, The Open Construction and Building Technology Journal.

Editorial Board Member, Earthquakes and Structures Journal.

Independent Director, ETC Network Limited.

Jothiprakash, V.
Co-opted member ISH, CWPRS, Pune, 2010-2012

Indian Examiner for Ph.D and M.S thesis of IIT Madras and Anna University.


Kant, T.

Chairman: AICTE-NBA accreditation committees.

Reviewer: IJCMEESM, CMES, Journal of Sound and Vibration, Computational Mechanics, Computers and Structures, PhD theses of IISc, IITKgp, IITM, VNIT-Nagpur, Patna University and Pune University.

K.V.Krishna Rao
Member of the Scientific Committee of World Conference on Transportation Research Society (WCTRIS)

Member of the Standing Technical Advisory Committee on Road Works, Municipal Corporation of Greater Mumbai

Mandal J.N.
Member of the International Scientific Advisory Board (ISAB) of the world City water Forum 2009

Rao E.P.

Rastogi, A. K.
Invited to evaluate Ph.D. Thesis, Dept. of Civil Engg, MSU Baroda, - April 2009

Invited to conduct Ph.D. viva, Dept of Civil Engineering, IISc Bangalore Octr, 14, 2009

Member Expert Panel – Indian National Committee on Groundwater (Govt. of India)

Co- Convenor: Groundwater Resource Management in Hard Rock Areas - International Association of Hydrological Sciences (IAHS) and International Association of Hydrogeologist (IAH) Joint Convention, Hyderabad, Sept. 6-12, 2009

Research Papers were reviewed for the following journals: Journal of Hydrology, KSCE Jr. of Civil Engineering, International Journal of Water, Journal of Environmental Monitoring and Assessment, Advances in Civil Engineering

Review of Research Project Proposal from DST.

Singh, D.N.
Editorial Board Member—International Journal of Geomechanics, ASCE

Editorial Board Member—International Journal of Geotechnical Engineering

Editorial Board Member—Geotechnical Testing Journal, ASTM International

Editorial Board Member— Geomechanics and Geoengineering (Taylor & Francis)

Editorial Board Member— Korean Society of Civil Engineering (KSCE) Journal of Civil Engineering

Editorial Board Member— Geomechanics and Engineering (GAE), An International Journal of Computational and theoretical Geomechanics, Foundation Engineering, Engineering Applications, Site Characterization.

Guest Editor: Special Issue of the KSCE, Journal of Civil Engineering, Korean Society of Civil Engineers, which has been named as Advances in Geomechanics. Volume 13, Number 4, July 2009
Guest Editor: Special Issue: Geomechanics in the Emerging Social and Technological Age: International Journal of Geotechnical Engineering, Guest Editors: Nagaratnam Sivakugan* and Devendra Narain Singh, Volume 3, Issue 4, October 2009. Civil & Environmental Engineering School of Engineering and Physical Sciences, James Cook University, Australia

**Subimal Ghosh**

**Tom. V Mathew**

**Vedagiri. P**
Reviewer- Cities : the International Journal of Urban Policy and Planning

Elected as a Life Member of the Indian Roads Congress, New Delhi.

Elected as Associate Member of the Institution of Engineers (India).

**Faculty Members and their Specializations**

1. **K.M. Bajoria**  
   Structural engineering: Computer aided design, Non-linear analysis, Nuclear structures.

2. **P. Banerji**  

3. **S. Banerjee**  
   Structural engineering: Structural and solid mechanics, Ultrasonic wave propagation in solids, Non-destructive quality evaluation of composites, Structural health monitoring, Dislocation mechanics, Multiscale materials modeling.

4. **N. K. Chandiramani**  
   Active vibration control, Nonlinear dynamics, Stability; Computational mechanics; Solid mechanics.

5. **D. Choudhury**  
   Geotechnical engineering: Geotechnical Earthquake Engineering, Earth retaining structures, Slope Stability, Anchor, Pile, Bearing capacity problems, Earth Dams, Seismic effects on Reinforced Soil-Wall, Dynamic Soil-Structure interaction problems, Tsunami resistant design of waterfront structures, Seismic behavior of Landfills, Seismic Ground Characterization, Behavior of Subgrade Soil under Cyclic railway and airways loads, Centrifuge Modeling, Fundamentals of soil behaviour for fine grained soils, DDL theory.

6. **Dasaka S. Murty**  
   Geotechnical engineering: Site investigation, Stability of shallow and deep foundations, Reliability based design, Ground improvement, Landfill engineering and modeling of soil and rock.

7. **Deo, M.C.**  
   Ocean engineering: Random data analysis using artificial intelligence techniques, Neural networks, Genetic programming, Model trees, Locally weighted learning, Support vector machines, Soft computing, Data mining, Statistical and stochastic analysis, Hydrology (Random data analysis using soft computing tools)

8. **Desai, Y.M.**  

9. **D.M. Dewaiiker**  
   Geotechnical engineering: Offshore foundations, Ground improvement, Seepage.

10. **S.L. Dhingra**  

11. **T.I. Eldho**  
<table>
<thead>
<tr>
<th></th>
<th>Name</th>
<th>Specialization</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.</td>
<td>Janga Reddy Manne</td>
<td>Water resources engineering: Water resource systems, Evolutionary computation for single and multi-objective optimization, Stochastic hydrology, Soft computing applications in hydrology, Climate change impacts on watersheds, water resources and agriculture, Design and performance evaluation of drip and sprinkler irrigation systems, Application of remote sensing and GIS tools in watershed development and management, Precision agriculture and developing decision support systems for water resources management.</td>
</tr>
<tr>
<td>18.</td>
<td>R.S. Jangid</td>
<td>Structural engineering: Structural mechanics, Structural dynamics and earthquake engineering, earthquake-resistant design, Base isolation for a seismic design of structures, Seismic isolation of bridges and liquid storage tanks, Non-classically damped system, Vibration control using tuned mass dampers.</td>
</tr>
<tr>
<td>19.</td>
<td>V. Jothiprakash</td>
<td>Water resources engineering: Water resources systems analysis, Reservoir operation, Policy issues, Multi-objective analysis, Stochastic hydrological modeling, Irrigation water management.</td>
</tr>
<tr>
<td>20.</td>
<td>A. Juneja</td>
<td>Geotechnical engineering: In-situ and laboratory engineering properties of soil, Numerical and physical modeling in geotechniques, Earthwork, Ground improvement.</td>
</tr>
<tr>
<td>22.</td>
<td>K.V. Krishna Rao</td>
<td>Transportation systems engineering: Travel demand modeling, Evolutionary algorithms, Neural networks and GIS in transport planning, Traffic design and analysis.</td>
</tr>
<tr>
<td>23.</td>
<td>J.N. Mandal</td>
<td>Geotechnical engineering: Geosynthetics for civil engineering construction.</td>
</tr>
<tr>
<td>24.</td>
<td>B.S. Pani</td>
<td>Water resources engineering: Diffusion of jets and plumes, Multiple diffusers, Offshore pipelines, Scour problems, Cooling water structures.</td>
</tr>
</tbody>
</table>
28. **G. R. Patil**
   Transportation systems planning, Network optimization, Freight transportation modeling, Traffic operations, Demand modeling, Traffic emissions

29. **Ravi Sinha**
   Structural engineering: Earthquake engineering, Vibration control and isolation, Structure rehabilitation and condition monitoring, Disaster management.

30. **D.N. Singh**
   Geotechnical engineering: Environmental geotechnics, Radioactive waste disposal, Solid waste utilization, Geotechnical centrifuge modeling.

31. **Subimal Ghosh**
   Water resources engineering: Uncertainty modeling, Water resources systems, Hydroclimatology.

32. **Tom.V. Mathew**
   Transportation systems engineering: Traffic flow modeling and simulation, Transportation network optimization, control and management.

33. **G. Venkatachalam**

34. **P. Vedagiri**
   Transportation systems engineering: Travel demand modeling, Evolutionary algorithms, Traffic design and analysis.

35. **B.V.S. Viswanadham**
   Geotechnical engineering: Centrifuge modeling, Soil reinforcement, Ground improvement, Environmental geotechnics-waste materials’ behaviour, waste containment systems.
Introduction

The Department of Computer Science and Engineering offers educational programs at the undergraduate and postgraduate levels. The M.Tech. program is a second level program in computer science and engineering. The students admitted to this program are selected on the basis of their scores in the GATE examination in computer science and engineering. The focus of the Ph.D. program is on advanced research in computer science and engineering.

The department has 40 faculty members with research interests in all the major areas of computer science and engineering. Some of the research areas are: Algorithms, Compilers, Database Systems, Graphics, Machine Learning, Information Retrieval, Computer Networks, Programming Languages, Embedded Systems and Software Engineering. The department has created a number of specialised laboratories, where both students and faculty carry out advanced research and development activities. Until now, the department has produced more than 30 Ph.D.s in various areas. The faculty and students have published their work in reputed international journals and conferences.

The department has played a major role in the field of computer science and engineering in the country. Faculty members have written a large number of standard textbooks and have participated in producing learning material for various courses in computer science and engineering. The department has a strong interaction with the industry. Faculty members carry out sponsored projects for government agencies and for the industry. They also act as consultants to the Industry.

The department is committed to promote basic research as well as sponsored research and development, and to train manpower in emerging areas. A list of the research groups and centers in the department are as follows: Centre for Formal Design and Verification of Systems, Centre for Indian Language Technologies, Database and Information Systems Laboratory, Embedded Real-time Systems Laboratory, GCC Resource Centre, Gigabit Networking Laboratory, Graphics and Vision Laboratory, Laboratory for Intelligent Internet Research and Systems and Networks Research Group. The department faculty members collaborate with national and international researchers and industries for research and development activities. Some industries have provided resource for setting up advanced laboratories in the department, and have provided lucrative fellowships for M.Tech. and Ph.D. programs.

The department provides and maintains high-end computing facilities for students and faculty. Several large common computer laboratories are used for supporting classes and M.Tech. and Ph.D. students are provided with individual machines as part of the computing infrastructure. Additionally, several research groups maintain their own computing resources.

The department library, in addition to providing support for instructional assistance, also has copies of software manuals, B.Tech., M. Tech. and Ph. D. dissertations, and Technical Reports produced in the department. The library also collects information about the technical reports available in the sister computer science departments and computer research organizations and industry.

Academic Programmes

<table>
<thead>
<tr>
<th>Degrees Awarded</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Tech.</td>
<td>37</td>
</tr>
<tr>
<td>M.Tech.</td>
<td>85</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>3</td>
</tr>
<tr>
<td>Dual Degree</td>
<td>17</td>
</tr>
</tbody>
</table>
Fellowship Details

1. Infosys fellowship for Ph.D. students: 4
   IBM fellowship for Ph.D. students : 1

2. Vijay Vashee and Vincent Fernandez fellowship for M.Tech & DD students
   M.Tech.: 2  Dual Degree: 3  Total: 5

3. Microsoft Research India Fellowship for PhD students: 1

R & D Activities

Sponsored Research Projects

<table>
<thead>
<tr>
<th>Sponsored Research Projects</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ongoing</td>
<td>89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completed</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty involved</td>
<td>32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

New Projects

“IITB-CommTel Multi-Service Transport Platform (MSTP) Development” by COMMITEL NETWORKS PVT LTD


“GCC Resource Center” by Department of Information Technology

PERISCOPE: Pragmatic Efficient Reliable Internet working solution using Consumer-Centric Omnipresent Ethernet” by Department of Information Technology

“Understanding Motion: Surface 3D Deformation From Video Data” by Department of Science & Technology

“Advanced Research Lab for Geospatial Information Science and Engineering” by Department of Science & Technology

“GEYSERS: Generalized architecture for dynamic infrastructure services.” by European Commission

“Virtual Machine Placement in Infrastructure Clouds” by INTERNATIONAL BUSINESS MACHINES CORPORATION, Bangalore.

“Microsoft Research India Outstanding Young Faculty Award” by Microsoft Research India Outstanding Faculty Award(under IRCC)

“Logical Methods for Compositional Shape Analysis.” by Microsoft Research Lab India Pvt.Ltd.

“Unrestricted Grant for Research Support” by Microsoft Research Lab India Pvt.Ltd.

“Microsoft Grant” by Microsoft Research Lab India Pvt. Ltd.

“Empowerment of Student & Teachers through Synchronous &asynchronous instruction” by Ministry of Human Resource Development.


“Project OSCAR++, Open Source Course-ware Animation Repository for higher education.” by Ministry of Human Resource Development.

“Creation of Machine translation tools and resources for English to Dravidian Languages” by Ministry of Human Resource Development.

“Type specific QoS based routing in Event Dissemination networks” by SAP Research, Brisbane, Australia.

“StrucFus (Infrastructure for information fusion System)” by Swedish Research Council, Sweden.

“Interference and Affinity Characterization of Vms for Server Consolidation in Infrastructure Clouds.” by YAHOO SOFTWARE DEVELOPMENT INDIA PVT. LTD.

“Yahoo Research Grant.” by YAHOO SOFTWARE DEVELOPMENT INDIA PVT. LTD.

“Large Scale Gene Expression Analysis on High Performance Parallel Computers for Functional Genomics and Systems Biology.” by Department of Science & Technology.

“Indian Language Corpora Initiative.” by Department of Information Technology.

“Second Generation Area Traffic Control System(CoSiCoSt2G).” by Department of Information Technology.

“Real-Time Transit Trip Planner and Route Information System.” by Department of Information Technology.

“India-UK Advance Technology Centre (IU-ATC) of Excellence in Next Generation Networks Systems and Services.” by Department of Information Technology.


“Developing suitable pedagogical methods for various classes, intellectual calibers and research in e-learning” by Ministry of Human Resource Development.

“Functional site annotation for structural genomics proteins.” by RESEARCH PAPER AWARD SCHEME.

Completed Projects

Indo-Us Workshop on Geospatial Information for Developing Countries by Indo-US Science & Technology Forum, New Delhi

aAQUA Mini-Context sensitive information to farmers. By Nokia India Pvt.Ltd.

IBM Faculty Award for Research Work in the area of Automatic Computing by International Business Machines Corporation, USA.

Architectural Information Extraction From Object Oriented Sources by IBM INDIA PVT. LTD. PUNE

Analysis and Design Of Wireless, Mobile and Multiservice Communication Networks by MHRD.

Improving GCC Ports of ABACUS and ANUPAMA by DRDO.


Methodology and Milllware for Application Integration (M/S.Larsen & Tubro Infotech Ltd.) by Private Organisations.

Ongoing Projects


Development of tool for formal verification of VHDL based data and control dominated designs used in safety critical systems by Board Of Research in Nuclear Sciences

Tetherless Human Interface for Simulators (THISS) by Defence Research & Development Organisation

Euro-India ICT Co-Operation by European Commission

Research and Deployment of Next Generation metro Networks ? Roadmap for Carrier Ethernet and 100 Gigabit Ethernet by Agilent Technologies, USA.

Semantic Linkage Between The Web, Intranet And Wikipedia: Discovery And Exploitation in Search And Aggregation by HP Labs.


Research Collaboration on Mobile and Wireless Systems, with Microsoft Research India(MSRI) by Microsoft Research Lab India Pvt.Ltd.

Real Time Multiple Sensors To Track Multiple Targets Projected on a Screen by Defence Research & Development Organisation.

Information Aggregation from tables on the Web by Yahoo Inc.

2008 IBM FACULTY AWARD by International Business Machines Corporation.

Analyzing programs manipulating recursive data structures. By Microsoft Research Lab India Pvt.Ltd.

Development & Evolution of Sanskrit Word-Net” by Central Institute of Indian Languages.

Rural Connectivity and applications, Wireless Communications and Networking by Tata Teleservce.

Design and development of a real time operating system (RTOS) for safety critical application by BARC.

Extending Framework for WFS-based Interoperability of GIS Sources. By Department of Science & Technology.

Re-Designing the farmer-extension-agricultural research/education continuum in India with ICT-mediated knowledge management. By Indian council of agricultural research.

IBM FACULTY AWARD / Building a self-aware and self-tuning distributed system using queuing theoretic and control theoretic by IBM Corporation.

IBM FACULTY AWARD / lburg based instruction selection in GCC by IBM.

IBM FACULTY AWARD by IBM.
IBM FACULTY AWARD, Integrating Indian Language processing resources and tools and semantic search capabilities with the UIMA by IBM CORPORATION, NEW YORK.

IBM Faculty Award/Approximate search and coverage based verification techniques for flattened circuits with locally specified by IBM Corporation., USA.

Microsoft Award/Soumen Chakrabarti/ Scalable annotation, search & aggregation of semistructured graph and text data models. By Microsoft Corporation.

GALLA – Low Cost Retail Management System by Media Lab Asia.

Microsoft India Distinguished Research Award / Linguistic Data Management of Indian Language Resources. By Microsoft Research India, Bangalore.

Large Scale Application Development and Knowledge Dissemination in Natural Language Processing and Text Mining (HP Labs, Bangalore) by HP Labs, Bangalore.

Setting up a TePP web portal at IIT Bombay by Technology Info. Forecasting & Assesment Council.

INTELLIGENT POWER GRID INITIATIVES IN INDIA by IBM.


Research Support for INAE Young Engineer Awardees by Indian National Academy of Engineering.

CROSS LINGUAL INFORMATION ACCESS (CLIA) SYSTEM by Ministry of Communications & Information Technology.

Development of Indian Language to Indian Language Machine Translation System (IL-IL MT)-Consortium Leader : IIIT Hyderabad by Ministry of Communications & Information Technology.

English to Indian Languages Machine Translation (E-IL-MT)-Consortium Leader – CDAC, PUNE. By Ministry of Communications & Information Technology.

Book on “Data Flow Analysis : Theory and Practice” by Taylor and Francis Group, LLC, USA.

Entity and Relation Types in Web Search: Annotation, Indexing and Scoring Techniques Award Number: 15196 by Microsoft Corporation.

Integrating Entities, Types and Relations into Search: Annotation, Indexing and Scoring Techniques. By International Business Machines Corporation.

Crop disease forecasting services and expert crop advisory to farmers over information kiosk networks. By PAN ASIA ICT(Asian Media for Information & Communication Center, Singapore).

IBM Faculty Award of Prof.S.Sudarshan by IBM Corporate Technology, Ny.


Metamodelling & Architecture by IBM India Pvt.Ltd., Pune.

Formal Verification of Software Systems by Microsoft India (R&D) Pvt.Ltd., Hyderabad

Formal Verification of Large State Transition Systems by General Motors India Pvt.Ltd., Bangalore.

E-Outreach by Technology Info. Forecasting & Assessmant Council.

TCS-IIT BOMBAY Laboratory for Intelligent Systems. By Tata Research Development & Design Centre, Pune.

Special Manpower Development Programme for VLSI Design and related Software (SMDP-II) by Department of Electronics.

Building Check-Dams for drinkig Water: A Teaching and Research Initiative”.

Ontology Based Framework For Integration of Geographic Information. By DST.

Association For Computing Machinery – Internation collegiate Programming Contest-IBM Canada Ltd. By IBM Canada Ltd.

Time category in Computer Science and Engineering Sept. By DT003 ?

Partial redundancy elemination by Indo-US Collaboration.


Centre for formal design and verification of Software by BRNS.

Network security lab (m/s.nevisnetworks Indi Pvt. Ltd.Pune) by Private Organisation.
Developmental Informatics by Private Organisations.

Multimodal Participatory Content Repository for the Education of Rural Children by Private Organisations.

IBM Faculty awards - IBM Global Services India Pvt. Ltd. By Private Organisations.

Financial Assistance for research project entitled “Enabling Web-based work flow over object oriented GIS Models for NRDMS”. By Department of Science & Technology.

Open source software by IBM Global Services India Pvt. Ltd., Bangalore.

Ekalavya Project by Private Organisations.


Exchange of Ideas on Data Mining and Data Cleaning Projects-Microsoft Research by Microsoft Research.

Consultancy Projects

The department undertook 23 jobs generating Rs.1,34,40,508.

The total number of faculty involved was 11.

Extension activities

Conferences

Organized the 5th International Global Wordnet Conference during Jan 31 - Feb 4, 2010, which was participated by close to 150 delegates from India and abroad. International participants included those from Japan, China, Korea, Thailand, Iran, Turkey, Hungary, Poland, Russia, France, Germany, UK, Sweden and South Africa.

Seminars/Workshops

The Department of Computer Science & Engineering (CSE), IIT Bombay, and Department of Computer Science, University of Minnesota, USA, under the Indo-U.S. Science and Technology Forum (IUSSTF), have planned a 3-day workshop on “Geospatial information for developing countries: Science and Technology” during December 16-18, 2009, to discuss state-of-the-art in GIS technologies, understand the challenges in applying them to problems in developing nations, and set future research directions.

2010-02-18 : clouds@iitb: Lecture series on topics in Cloud Computing (6th March, 2010)

Cloud Computing is generating quite a buzz with regards to architecture, design and solutions of distributed systems. Clouds@IITB is a lecture and discussion series on topics related to Cloud Computing. The aim of this event is to understand the hype, issues, research avenues, work-in-progress and instantiated solutions. clouds@iitb is half-day lecture series on topics related to Cloud Computing.

Short-term courses

Continuing Education Programme

The following courses were offered under CEP,

- Skill development for post production activity in e learning
- Abstractions and pattern oriented design
- Courses for coordinators for effective teaching / learning of computer programming
- Advanced programming in C++
- Effective teaching / learning of computer engineering
- Compiler construction with introduction to GCC
- Introduction to Robotics
- Advanced C++ programming
- Introduction to Robotics
- Advanced C++ programming

Visitors to the Department

Prof. Rahul Mangharam, University of Pennsylvania. He delivered a lecture on “Networked Cyber Physical Systems and Highlights of Ongoing Work at the Embedded Real-Time Systems Lab at Upenn”

Dr. Ganesh Ramalingam, Microsoft Research India. He delivered a lecture on “Logical Concurrency Control from Sequential Proofs”

Dr. S. Muthukrishnan, Google and Rutgers. He delivered a lecture on “Internet Ad Systems”

Mr. Aditya Phatak, Vice President, Life Sciences Sales, Persistent Systems Inc. He delivered a lecture on “Informatics Solutions for Clinical and Translational Research”.

 visitors to the Department
Prof. Shailesh Tipnis, Mathematics Department, Illinois State University. He delivered a lecture on “Anti-directed Hamilton cycles and 2-factors”

Prof. Manik Varma, Researcher at MSRI and Adjunct professor at IIT Delhi. He delivered a lecture on “More Generality in Efficient Multiple Kernel Learning”

Ramakrishna, Red Hat. He delivered a lecture on “10 Things a FOSS Developer Should Know”

Suriya Subramanian, Dept. of Computer Science, University of Texas at Austin. He delivered a lecture on “Dynamic Software Updates: A VM-centric Approach”

Prof. Amit Sheth, Wright State University. He delivered a lecture on “Semantics to Empower Services Science: Using Semantics at Middleware, Web Services and Business Levels”

Balaji Vasan, he delivered a lecture on “Scalable machine learning algorithms: Applications in vision, speech and geostatistics”

Prof. Samarjit Chakraborty, Institute for Real-Time Computer Systems, TU Munich, Germany. He delivered a lecture on “Automata-theoretic Modeling of Streaming Applications”

Dr. Sameera Poduri, University of Southern California. He delivered a lecture on “Mobile Sensing Networks: From Robots to Phones (Faculty Candidate Talk)”

P. P. S. Narayan, Director of Engineering, Yahoo!, Engineering of the Sherpa product Yahoo! He delivered a lecture on “Sherpa: a next-generation structured-record distributed storage service”

Shivani Agarwal, Massachusetts Institute of Technology. He delivered a lecture on “Ranking Problems in Machine Learning: Theory and Applications”

Mahesh Ramasubramanian, VFX Supervisor, DreamWorks Animation, DreamWorks Animation. He delivered a lecture on “Art and Technology in Animation Film Making A behind the Scenes from the Movie: Monsters vs. Aliens”

Michael Henderson, Director of Technologies, DreamWorks Animation India, DreamWorks Animation India. He delivered a lecture on “Where is the technology in an animation company?”

Dr. Ashish Darbari, University of Southampton in England. He delivered a lecture on “Faculty Candidate Talk - Ashish Darbari SHRUTI: An Industrial Strength Formally Certified SAT Solver.”

Dr. Krishna N. V., IBM Research. He delivered a lecture on “Compiling for Multicore Systems”

Prof. Majd F. Sakr, Carnegie Mellon University, Qatar. He delivered a lecture on “Desert Science - Ongoing research projects at Carnegie Mellon’s Qatar Campus”

Prof. Pascal Fua, EPFL, Lausanne. He delivered a lecture on “Modeling Deformable Surfaces from Single Videos”

Prof. Virendra C. Bhavsar, University of New Brunswick, Canada. He delivered a lecture on “Semantic Matching and Applications”

Prof. Indira Thouvenin, Département des systèmes mécaniques, Université de Technologie de Compiègne, France. He delivered a lecture on “Informed Virtual Environments: Interaction and Knowledge”

Prabhakar Raghavan, Yahoo! Labs. He delivered a lecture on “Heavy tails and models for the Web and social networks”

Rupak Majumdar, Department of Computer Science, University of California, Los Angeles. He delivered a lecture on “What’s Decidable for Asynchronous Programs?”

Mr. Benoit Razet, INRIA France. He delivered a lecture on “Effective Eilenberg Machines”

Mr. Mihir Choudhury, Rice University. He delivered a lecture on “Approximate Logic Circuits: Theory and Application”

Prof. Alan Mycroft, University of Cambridge. He delivered a lecture on “Programming Language Design and Analysis Motivated by Hardware Evolution”

Prof. Ryosuke Shibasaki, Center for Spatial Information Science, University of Tokyo. He delivered a lecture on “4D Geospatial Service Infrastructure for Human and Machine Collaboration”

Prof. Sanjay Chawla, School of Information Technologies, University of Sydney. He delivered a lecture on “A Unified Approach for Global and Local Outlier Detection in Large Databases”

Prof. Alan Mycroft, University of Cambridge. He delivered a lecture on “Combined Code Motion and Register Allocation Using the VSDG”

Jayanthkumar Kannan, Intel Labs Berkeley and University of California, Berkeley. He delivered a lecture on “A Data Capsule Framework For Web Services: Providing Flexible Data Access Control To Users”
Conferences/Symposia/Workshops/Seminars (Participated/Papers Presented)

National

Diwan, A.A.
Participated in the Homi Bhabha Birth Centenary Workshop on Introduction to Graph and Geometric Algorithms held July 15-18, 2009 at Indian Institute of Science, Bangalore.

Participated in the Research Promotion Workshop on Introduction to Graph and Geometric Algorithms held Jan. 7-9, 2010 at National Institute of Technology, Trichy.

International

Saketha Nath J

Bhaskaran Raman
3rd ACM Workshop on Networked Systems for Developing Regions (NSDR’09), a workshop in SOSP’09, Big Sky, Montana, USA, 11 Oct 2009.

Sudarshan S
International Conference on Very Large Databases (VLDB), Lyon France, September 2009

International Conference on Management of Data (COMAD), Mysore, Dec 2009

Bhattacharyya, Pushpak
was the organizing chairman of the 5th International Global Wordnet Conference, held at hotel Residence and IIT Bombay, 31st Jan- Feb 4, 2010.

Bhattacharyya, Pushpak
chaired sessions in International Conference on Natural Language Processing held at Hyderabad, December, 2009.

Rajeev Gupta, Krithi Ramamritham, Mukesh Mohania,
“Ratio Threshold Queries over Distributed Data Sources”, Proc. of IEEE International Conference on Data Engineering (ICDE), March, 2010.

Krithi Ramamritham
“Maintaining Coherent Views over Dynamic Distributed Data”, International Conference on Distributed Computing and Internet Technologies (ICDCIT 2010), LNCS, February 2010 (keynote talk).

Saikat Mukherjee, Srinath Srinivasa, Krithi Ramamritham

Saikat Mukherjee, Srinath Srinivasa, Krithi Ramamritham,

Invited Lectures

National

Ranade A.G.


Saketha Nath J

Sharat Chandran


Kameshwari Chebrolu
**Bhattacharyya, Pushpak**


**International**

**Kameshwari Chebrolu**

Solving Developing-World Problems: Academicians’ Challenges, CCC Workshop on Computer Science and Global Development, August 1-2, 2009, Claremont Resort and Spa, Berkeley, CA

**Bhattacharyya, Pushpaka**


“Natural Language Processing at IIT Bombay with focus on Statistical Machine Translation”, Xerox European Research Center, Grenoble, France, June 4, 2009.


**Significant Awards/Distinctions**

**Sudarshan S., and Chakrabarti Soumen**

“IITB Research Paper Award” for the paper “Keyword searching and browsing in databases using BANKS”.

**Sarawagi Sunita**

“IITB Research Paper Award” for the paper “Functional sites in protein families uncovered via an objective and automated graph theoretic approach”.

**Bhattacharyya Pushpaka**


**Phatak D.B.**

‘Excellence in Teaching’ Award for the year 2009.

**Krithivasan Ramamirtham**

Fellow of the Indian Academy of Sciences, Jan 2010. DASFAA 10+ Best Paper Award for 2010 for DASFAA1995 paper.

**Honorary Work**

**Ranade A.G.**

Member of the program committee, European Symposium on Algorithms (ESA) 2009.

Member of panel on scientific computing, Naval Research Board, Govt. of India.

Member of the selection committee, Dept of CSE, IIT Guwahati.

**Saketha Nath J**

Served as PC-member for PAKDD-2010 (14th Pacific-Asia Conference on Knowledge Discovery and Data Mining).

**Parag Chaudhuri**

Program Committee member for Computer Graphics International Conference 2010 (To be held in Singapore).


Program Committee member for Experience Workshop, Co-organized with the Third International Conference on Pattern Recognition and Machine Intelligence (PRMI’09), December 2009, IIT Delhi.

**Sharat Chandran**

Top Tier Program committee reviewer: WACV, ACCV, CVPR, ICCV, Eurographics Other Program Committee reviewer: NCC, NCV-PRIP-G Reviewer of Proposals: DST

**Kameshwari Chebrolu**


TPC member of WISARD 2010

**Sudarshan S.**

Vice-Chair of Program Committee, IEEE International Conference on Data Engineering (ICDE) 2010

Associate Editor of ACM Transactions on Database Systems

Associate Editor of IEEE Transactions on Knowledge and Data Engineering

**Diwan, A. A.**

Faculty Members and their specializations

1. **Bharat Adsul**  
   Formal methods in Concurrency, Logics and Games.

2. **Srinivas Aluru**  
   Parallel algorithms and applications, bioinformatics and systems biology, combinatorics scientific computing, applied algorithms

3. **Varsha Apte**  
   Performance Evaluation of Computer Systems and Networks

4. **Kavi Arya**  
   Functional Programming Applications (Domain Specific Languages), Embedded Systems/Parallel Programming Languages, Distance Learning

5. **Ashwin Gumaste**  
   Optical Networks, Telecommunication Networks, Data Centers, Carrier Ethernet

6. **Umesh Bellur**  

7. **Pushpak Bhattacharyya**  
   Natural Language Processing, Machine Learning, Machine Translation, Cross Lingual Information Retrieval

8. **Moreshwar R. Bhujade**  
   Hardware verification, Neural networks

9. **Supratim Biswas**  
   Parallel and Distributed Processing, Neural Networks, Architecture

10. **Soumen Chakrabarti**  
    Hypertext databases, Data mining

11. **Supratik Chakraborty**  
    Formal techniques for analysis, verification, validation of digital systems, Asynchronous timing analysis.

12. **Parag Chaudhuri**  
    Computer Graphics

13. **Kameswari Chebrolu**  
    Wireless Networks

14. **Om P. Damani**  
    Natural Language Processing

15. **Sharat Chandran**  

16. **Dhananjay Madhav Dhamdhere**  
    Distributed Algorithms, Programming Languages, Operating Systems, Optimizing Compilers

17. **Ajith Diwan**  
    Graph Theory, Algorithms.

18. **Sridhar Iyer**  
    Mobile Computing, Distributed Systems, Educational Software.

19. **Saketha Nath J**  
    Machine Learning, Data Mining, Convex Optimization

20. **Rushikesh K Joshi**  
    Object Oriented Systems, Distributed Systems, Software Architectures

21. **Shashikant Kelkar**  
    Software Engineering And Quality Assurance (Testing and Matrices)

22. **Uday Khedkar**  
    Programming Languages, Compilers, Data Flow Analysis.

23. **Purushottam Kulkarni**  
    Sensor and Wireless Networks, Distributed Systems and Data Dissemination. Developing solutions to problems in above areas for non-urban/rural settings.

24. **Bernard Menezes**  
    Information Appliances, Electronic Commerce, Java Security, Parallel Computing, Time Series Forecasting

25. **Gopalakrishnaswami Nagaraja**  
    Machine Intelligence, Pattern Recognition,

26. **Deepak B Phatak**  

27. **Krithi Ramamritham**  
    Databases, real-time systems, and distributed applications, Dynamic Data in sensor networks, embedded systems, mobile environments and the web.
28. **Bhaskar Raman**  
   Computer networks, Wireless systems,  
   Communication system design for developing regions

29. **Ganesh Ramakrishnan**  
   Statistical Relational Learning, Graphical Models,  
   Some other topics in Machine Learning such as  
   Support Vector Machines, Information Extraction

30. **Abhiram G Ranade**  
   Algorithms and Combinatorial Optimization

31. **Krishna Shankaran Narayanan**  
   Formal Methods, Bio-inspired Computing

32. **Anirudha Sahoo**  
   Computer networks, Voice routing, QoS in  
   networks, wireless networks, wireless sensor  
   networks, WiMax

33. **Amitabha Sanyal**  
   Functional Programming, Compilers, and  
   Programming Languages

34. **Sunita Sarawagi**  
   Data mining: integrating mining with relational  
   DBMS, temporal mining, OLAP; integrating  
   mining with OLAP, indexing multidimensional  
   data, precomputation techniques, E-commerce;  
   mining extensions, Extending relational DBMS,  
   Wide-area distributed database systems

35. **Nandlal L Sarda**  
   Databases, Information Systems, Software  
   Engineering

36. **Sivakumar G**  
   Automated Reasoning, Logic Programming,  
   Rewrite Systems, Networks, Distributed  
   Systems

37. **Milind Sohoni**  
   Combinatorial Optimization, Mathematical  
   Programming, Algorithms

38. **Sudarshan S**  
   Database Systems

39. **Sundar Vishwanathan**  
   Algorithms, Combinatorics, Complexity Theory.
Academic Activities

The Department of Earth Sciences offers the following five academic programs.
(i) M.Sc. Applied Geology (2 years)
(ii) M.Sc. Applied Geophysics (2 years)
(iii) M.Tech. Geoexploration (2 years)
(iv) M. Tech. Petroleum Geosciences (2 years)
(v) Ph.D.

<table>
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<tr>
<th>Student Intake</th>
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<tbody>
<tr>
<td>M.Sc. (Appl. Geology)</td>
<td>24</td>
</tr>
<tr>
<td>M.Sc. (Appl. Geophysics)</td>
<td>11</td>
</tr>
<tr>
<td>M.Tech. (Geoexploration)</td>
<td>23</td>
</tr>
<tr>
<td>M. Tech. (Petroleum Geoscience)</td>
<td>12</td>
</tr>
<tr>
<td>Ph.D</td>
<td>24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Degrees Awarded</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ph.D</td>
<td>05</td>
</tr>
<tr>
<td>M.Tech</td>
<td>20</td>
</tr>
<tr>
<td>M.Sc. (Appl. Geology)</td>
<td>17</td>
</tr>
<tr>
<td>M.Sc. (Appl. Geophysics)</td>
<td>13</td>
</tr>
</tbody>
</table>

The M.Sc. curriculum emphasizes on basic science while the M.Tech. (Geoexploration) program offers specializations in applied field mineral, groundwater, petroleum explorations. Schlumberger Asia Services Ltd. provides fellowships to two M. Tech. students.

The department signed an agreement with BG, India under which two visiting faculty positions have been funded by the BG, India. BG, India provides also fellowships to two M.Tech. students of Petroleum Geoscience course and has provided grant for development of a laboratory.

The research activities in the department are focused both on basic research as well as on the applied aspects, addressing the issues of national needs. The major research areas include natural history, hydrocarbon and mineral exploration, seismology, engineering geology and geothermal energy. As part of the ISRO-sponsored moon mission program of the country, the faculty are participating in research projects on terrestrial analogues for planetary exploration. The DST approved a major project on national facility in geochronology. Research activities in the areas of seismology and natural hazards continued with support from various agencies.

The DST sanctioned an amount of Rs. 192.00 Lakhs under the FIST program to strengthen the postgraduate teaching and research facilities in the department in March 2010.

R&D Activities

<table>
<thead>
<tr>
<th>Sponsored Projects</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ongoing Projects (No.)</td>
<td>33</td>
</tr>
<tr>
<td>New Projects (No.)</td>
<td>07</td>
</tr>
<tr>
<td>Completed Projects (No.)</td>
<td>05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consultancy</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Jobs</td>
<td>28</td>
</tr>
</tbody>
</table>

Sponsored research projects, both in pure and applied geology and geophysics, were carried out in the department. The research facilities in the department include XRD, ICP-AES, Cathodo-luminescence microscope, SEM-EDS, Laser Raman Spectrophotometer, UV-visible spectrophotometer, experimental hydrothermal system, fluorescence microscope, digital seismographs, gravimeter, compressive strength testing equipment, fluid-inclusion set up, digital image processing and GIS facilities and a computer lab with Sun Workstation.
## New Sponsored Research Projects initiated in 2009-10

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Agency Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expert team visiting to landslide affected areas in J &amp; K</td>
<td>Department of Science &amp; Technology</td>
</tr>
<tr>
<td>Organic Geochemistry of Tertiary Lignites and Carbonaceous Shales of Kutch,</td>
<td>Department of Science &amp; Technology</td>
</tr>
<tr>
<td>Gujarat</td>
<td></td>
</tr>
<tr>
<td>SERC FAST TRACK PROPOSALS FOR YOUNGSCIENTISTS 2009-10“Slope stability analysis in and around Rampur Area, Himachal Pradesh”</td>
<td>Department of Science &amp; Technology</td>
</tr>
<tr>
<td>Landslide risk analysis of road cut hill slopes near Mahabaleshwar, along the state highway via Poladpur, Satara District, Maharashtra.</td>
<td>Department of Science &amp; Technology</td>
</tr>
<tr>
<td>Morphotectonic Variability along the NW Himalayan Front: Tectonics-climate Coupling.</td>
<td>Department of Science &amp; Technology</td>
</tr>
<tr>
<td>Characterization of Bauxites from Jamnagar area, Gujarat, India and their mineral beneficiation.</td>
<td>Gujarat Mineral Research &amp; Development Society</td>
</tr>
<tr>
<td>River dynamics and Flood Risk evaluation of the Kosi River North Bihar plains: in integrated approach.</td>
<td>Ministry of Earth Sciences</td>
</tr>
</tbody>
</table>

## New Infrastructure

1. Almeda XR Laser Raman Spectroscope
2. Thermal Emission Spectrometry setup
3. Sand Box Deformational Rig
4. Petrog point counter stage for grain counting
5. Electrical Resistivity Meter
6. Proton Precision Magnetometer
7. Cerchar abrasivity index apparatus
8. Fracture toughness apparatus
9. Bending strength apparatus
10. Blast vibration monitor

## Visitors to the Department

- Dr. K. S. R. Murthy, CSIR Emeritus Scientist, National Institute of Oceanography, Visakhapatnam. He delivered a lecture on “Impact of Intraplate Seismicity on the tectonics of Indian Passive Margins”.
- Mr. Arijit Chaudhary, Consultant to Bharat PetroResources Ltd. (subsidiary of BPCL), Mumbai. He delivered a lecture on “Global Warming”.
- Prof. Abdellaker Chaouch, Total Professor Association (TPA), France. He delivered a lecture on “Advances in Seismic Exploration”.
- Dr. Bernhard Friedrichs, METRONIX, Berlin, Germany. He delivered a lecture on “Application of MT technique”.
- Dr. C. H. Mehta, He delivered a lecture on “Significance of Fresnel Zones in Seismic Reflection Prospecting”.
- Prof. Octavian Catuneanu, University of Alberta, Canada. He delivered a lecture on “Sequence Stratigraphy”.

## Conferences (Participated/ Papers Presented)

### National

Jadav, G.N.,

Presented Keynote paper and two other joint research papers at National Seminar on Exploration Techniques in Sustainable Management of Groundwater. ETSMG 2010, held at SRTM University, Nanded, on February 5, 2010. Chair of a session in ETSMG-2010.
Presented a paper entitled “A GIS-based hydrogeological study of a part of the Vedganga river basin in Kolhapur district, Maharashtra” at the National Conference on *Groundwater Resource Development and Management in Hard Rocks* to be held at the University of Pune, February 12-13, 2010.

**Pandalai, H.S.**

**Invited Lectures**

**National**

**Mohan, G.,**

One week Short-Term Training Programme on “Analysis and Design of Earthquake Resistant Structures”, at SCOE Kharghar, Navi Mumbai, from January 5-9, 2010.


**Jadav, G.N.,**
“Fluid Inclusion Study and its Important Application”, at The School of Environmental and Earth Sciences North Maharashtra University Jalgaon, Umavi Nagar, Jalgaon 425 001, on November 29, 2009.

**Patel, S. C.,**
“Metamorphic Textures and Pressure-temperature Paths” at the Geological Survey of India Training Institute, Hyderabad on September 11, 2009.

“Earth’s Internal Structure, Petrology and Plate Tectonics” at the Centre of Excellence in Basic Sciences, Kalina Campus, Mumbai, during August 2009.

**Sheth, H. C.,**
“Volcanoes”. K. J. Somaiya College of Science, Vidyavihar, Mumbai, September 12, 2009 as part of the 50-year Golden Jubilee celebrations of the College.


**Singh, T. N.,**
“Static and Dynamic Modeling of Landslide Prone Area of Uttarakhand”, Tata Institute of Social Sciences, Mumbai, 2010

“Prediction and Monitoring of Blast Induced Ground Vibrations”, J. J. Morgan College of Engineering, Kolhapur, Maharashtra, 2010


“Numerical Simulation a Useful Tool of Landslide Study”, Brainstorming session on landslide at University of Nagaland, Kohima, 2009.


**International**

**Chandrasekharam, D.**

**Singh, T. N.,**
“Safe Blast Design for Large Open Cast Mines in India,” Dept. of Civil Engineering, Monash University, Melbourne, Australia, 2010

**Significant Awards/Distinctions**

**Biswal, T. K.**
National Mineral Award, 2008, received from Ministry of Mines on Basic Geosciences.

**Sheth, H. C.**
IIT Bombay Young Investigator Award for 2007 (awarded on Teacher’s Day, September 5, 2009)

**Honorary work**

**Banerjee, S.**
Editorial board, Journal of the Geological Society of India
Chandrasekharam, D.

Conducted “School in Geothermics” at the Abdus Salam International Centre for Theoretical Centre, Trieste, Italy” 26th October – 7 November 2009.

Conducted Short Course on “Arsenic pollution in groundwater-West Bengal” at the China University of Geosciences, Beijing & Wuhan; 30 November-5th December, 2009

Jadav, G.N.
Vice-President, Indian Institute of Mineral Engineers (IIME)-Mumbai-Pune Chapter
Member, Editorial Board, Journal of Geological Society of India, Bangalore, Karnataka.
Executive Committee member, Indian Institute of Mineral Industry, (IIME), Jamshedpur, Jharkhand.

Mohan, G.
Member of Panel of Editors for “Geohorizons.”

Mukherjejee, S.
Member, Scientific and Technical Committee and Editorial Review Board on Natural and Applied Sciences of the World Scientific and Engineering Academy and Society.

Technical Committee Member, Convener and Panel Member, International Conference: Environmental Sustainability with Green Building Technology (ICESGBT-2010), 15-17 March, 2010.

Mukul, M.
Associate Editor, Journal of Earth System Science.

Pande, K.
Member: DST Fast Track Proposal Committee
CSIR Member PAC Earth Atmosphere Ocean and Planetary Sciences.

Pandalai, H.S.
Member, Editorial Board, Journal of Mathematical Geosciences,
Member, Selection Committee, UPSC Geologists Examination,
Member, Sectional Scrutiny Committee, National Mineral Awards -2007
Member, Faculty Selection Committee, IIT Roorkee,
Member, Academic Council, Indian School of Mines, Dhanbad
Member, Board of Studies, Earth Sciences, University of Pondicherry
Member IGCP-540 on “Gold-bearing Hydrothermal fluids of Orogenic Deposits”

Patel, S.C.
Member, National Working Group for IGCP-557 entitled “Diamonds, Xenoloths and Kimberlites”.
Member, Advisory Editorial Committee, Gondwana Geological Magazine, Nagpur.

Ramakrishnan, D.

Saraswati, P.K.
Editorial Board:
Journal of Petroleum Geology (Blackwell, UK),
Indian Journal of Geology (Kolkata),
Journal of Palaeontological Society of India (Lucknow),
Energy Exploration and Exploitation (Multi-Science, UK)
Member, Expert Committee (WOS-A), DST
Member, Peer Review Group, Directorate General of Hydrocarbons, Ministry of Petroleum & Natural Gas

Singh, T. N.
Member, Editorial Board, International Journal of Advances on Geology, Institute of Advance Scientific Research Irvine California, USA.
Member, Editorial Board, International J. of Earth Sciences and Engineering
Member, Editorial Board, Indian Landslide Journal
Member, Editorial Board, Indian Mining & Engineering Journal
Member, Editorial Board, International Journal of Pollution Research
Member, Editorial Board, International J. of Biological Sciences and Technology
Member, Governing Council, Indian Geotechnical Facility, DST, New Delhi
Member, Technical Advisory group for J&K Rail line alignment, Ministry of Railways, New Delhi
National President and Executive Body Member of CAFET – INNOVA

Faculty and Their Specializations

1. Santanu Banerjee
   Sedimentology, Basin Analysis

2. Tapas Kumar Biswal
   Structural Geology and Precambrian Geology.

3. E. Chandrasekhar
   Geo-electromagnetism and Geophysics.

4. D. Chandrasekhar
   Geochemistry, Igneous Petrology, Geothermics

5. Suryendu Dutta
   Organic Geochemistry, Petroleum Geology
6. **Gajananrao Narayanrao Jadhav**  
   Mineral Deposit Studies, Fluid Inclusions

7. **George Mathew**  
   Crystallography and Mineralogy

8. **G. Mohan**  
   Seismology, General Geophysics

9. **Soumyajit Mukherjee**  
   Structural Geology

10. **Malay Mukul**  
    Structural Geology, Neotectonics, GPS Geodesy

11. **H.S. Pandalai**  
    Ore Geology, Mining Geostatistics

12. **Kanchan Pande**  
    Isotope Geology, Geochronology, Geochemistry

13. **Suresh C. Patel**  
    Metamorphic Petrology

14. **Munukutla**  
    Exploration Seismology, Solid Earth and Exploration Geophysics

15. **D. Ramakrishnan**  
    Geomorphology and Remote Sensing

16. **Pratul K. Saraswati**  
    Micropalaeontology, Stratigraphy, Petroleum Geology

17. **Hetu. C. Sheth**  
    Igneous Petrology and Volcanology

18. **Trilok Nath Singh**  
    Engineering Geology, Rock Mechanics

19. **B.K. Sahu (Professor Emeritus)**  
    Sedimentology, Mathematical Geology, Mineral Deposit Modelling
Introduction

In the academic year 2009-2010, the Department of Electrical Engineering continued maintaining its leadership among peer institutions of its kind. With 54 dynamic faculty and research scholars on its roll, the department also continued as the largest and most active research program in the country. One of our research students won an award given by Massachusetts Institute of Technology’s (MIT) as outstanding innovator under the age of 35 and one of our faculty members was awarded the Indian Semiconductor Association (ISA), Techno Mentor Award.

The department has some of the best laboratory facilities in the country for research and teaching which have been funded generously by MHRD and other funding agencies like the Department of Information Technology and Indian Space Research Organisation (ISRO). Substantial funding has also been received for research projects of individual faculty members through government agencies, as well as many private companies, both national and international. The broad focus of graduate teaching and research is in the areas of Communications and Signal Processing, Microelectronics, Power Electronics & Power Systems, Control & Computing, and Electronic Systems. The undergraduate curriculum has been designed to broadly cover all major disciplines of Electrical Engineering, and also to give the student an opportunity to pursue a specific area of greater depth through an option to do ‘Honours’ course and through proper selection of elective courses.

Communication group of Electrical Engineering department is a part of India-UK Advanced Technology Center (IU-ATC) of Excellence in next generation networks, systems and services. The centre’s agenda is to support collaborative Ph.D., Postdoctorate projects and joint research programs, and technology transfer between UK and India. This will provide a step-change in research and education cooperation between the UK and India. Communication group has ten fully developed laboratories like Microwave, Bharati Centre and Communication, Digital Audio Processing, Fiber optic, SPANN, Information Network Lab, Multimedia Signal, SPANN, DSP and Vision. In the past year more than 50 students have completed their research projects using the facilities of Bharati Centre for Communication. Prof. Abhay Karandikar from Communication group is coordinating Tata Teleservices IITB Centre of Excellence in Telecommunication (TICET) at IIT Bombay. TICET specially focuses on the ‘Rural Applications’ to build excellence which is at par with world standards. Researchers from IIT Bombay have been participating in 4G standardization efforts and have made several contributions to the international standard (IEEE 802.16m and IEEE 802.1). The center has filed key patents in the area of Quality of Service in wireless networks. The center is also a part of ITU’s registered evaluators of 4G (IMT-A) standard. The center is focusing on developing an innovative solution for cellular backhaul based on a modified optimized version of long distance WiFi technology. Successful Field Trials of the concept have been carried out in TTSL network in Mumbai and surrounding region. The solution has also been tested in a test-bed created at IIT Bombay campus. In the rural applications space, an innovative portal (called REAP/InDRA) targeting rural education has been developed. This platform is available for both Internet as well as mobile versions. TTSL is contemplating to launch this portal as part of its corporate social responsibility. Since mobile social networking is going to be a key application driver particularly in the Indian context, the center has developed an innovative concept in mobile social networking on facilitating and analyzing social contexts for providing targeted recommendations. The center has also launched an ambitious technology development in the area of high speed optical node for the mobile backhaul network. This technology will prove helpful for future high speed backbone with several gigabit per seconds.

The control and computing group investigates the theoretical and algorithmic principles underlying modern electrical engineering in order to innovatively solve current day engineering problems faced by
academia and industry. A new High Performance Computation Lab (HPCL) has been set up to facilitate research in parallel computing and multi core applications.

The Power Electronics and Power systems Group of the Electrical Engineering Department at IIT Bombay conducts research and education in a broad range of activities. An important aspect of the group’s programme is the integration of power electronics with the study of power systems. This has enabled the group to be involved in several areas that are important to the development of the country’s electric power infrastructure. Power group has developed a laboratory which has a 100 kV ac / 140 kV dc setup.

A Centre of Excellence in Nanoelectronics (CEN) has been established and developed during this year in the department. This centre allowed the team at IIT Bombay to undertake state-of-the-art research and development in an emerging area. Members of the microelectronics group were able to set up the facilities within about 2 years of the project funding, and started using them effectively. CEN has a fully functional facility today, with 25 faculty members from 9 Departments and 130 post-graduate students using these facilities on a regular basis. CEN activities include facilities set-up, manpower training, and research and product development. CEN activities will soon be enlarged with the commissioning of a new 30,000 sq.ft. building. Through the Indian Nanoelectronics Users Programme the Centre for excellence in Nanoelectronics is open for researchers from across the country. Till date we have completed more than 20 medium term and short term research projects and provided training to around 200 researchers on different levels. As a part of this program IITB arranged a workshop to expose the audience of various state of the art facilities available at CEN during May 30-31, 2009. This workshop was inaugurated by Dr. R. Chidambaram, Principal Scientific Adviser to the Government of India.

The Electronic Instrumentation Lab was renovated and upgraded with partial support from DIT sponsored “National Programme on Perception Engineering”. Current research activities in the lab are in the areas of audio virtualization, visual displays for speech training, and impedance cardiography.

### Academic Programme

Students admitted during Academic year 2009-2010

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td><strong>Student Intake</strong></td>
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<tr>
<td>B.Tech</td>
<td>50</td>
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<tr>
<td>Dual Degree</td>
<td>52</td>
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<tr>
<td>M. Tech</td>
<td>117</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>51</td>
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</table>

| **Degree Awarded**   |       |
| B.Tech               | 41    |
| Dual Degree          | 48    |
| M. Tech              | 84    |
| Ph.D.                | 20    |
| MS                   | 02    |

### R & D Activities

<table>
<thead>
<tr>
<th><strong>Sponsored Research Projects</strong></th>
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<tbody>
<tr>
<td>Ongoing Projects</td>
<td>108</td>
</tr>
<tr>
<td>New Projects</td>
<td>35</td>
</tr>
<tr>
<td>Completed Projects</td>
<td>8</td>
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<table>
<thead>
<tr>
<th><strong>Consultancy Projects</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Jobs</td>
<td>18</td>
</tr>
<tr>
<td>No. of faculty involved</td>
<td>13</td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Project Title</td>
</tr>
<tr>
<td>--------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1.</td>
<td>Upgrading Facilities for MEMS, Design Activities at National Resource Ce</td>
</tr>
<tr>
<td>2.</td>
<td>Development of a Remote whole Body Radioactivity Detector and a procedures</td>
</tr>
<tr>
<td>3.</td>
<td>Design, development and analysis of high power switched capacitor Inductorless DC-CC converters</td>
</tr>
<tr>
<td>4.</td>
<td>Reliability prediction of electronic systems in the context of ensuring nuclear safety</td>
</tr>
<tr>
<td>5.</td>
<td>Design and development of a high frequency, high voltage supply for high field asymmetric waveform ion mobility spectrometry (FA-IMS) Application</td>
</tr>
<tr>
<td>6.</td>
<td>Indo-Swiss (ISJRP) joint research project “Advanced restoration and super-resolution techniques for 3D fluorescence microscopy</td>
</tr>
<tr>
<td>7.</td>
<td>India UK advance Technology Centre (IU –ATC) of Excellence in Next Generation Networks Systems and Services(Theme 9)</td>
</tr>
<tr>
<td>8.</td>
<td>India UK advance Technology Centre (IU –ATC) of Excellence in Next Generation Networks Systems and Services(Theme 2)</td>
</tr>
<tr>
<td>9.</td>
<td>Design &amp; development of Microfluidic Biosensor A system on Chip Platform for the detection of molecular biomarkers of myocardial infarction</td>
</tr>
<tr>
<td>10.</td>
<td>Control and Optimization of Pulsed Laser Deposition Technique for Growth of ZnO Based Materials and Devices</td>
</tr>
<tr>
<td>11.</td>
<td>Spin-Based Memory Device</td>
</tr>
<tr>
<td>12.</td>
<td>India UK advanced Technology Centre of Excellence in Next Generation Networks Systems and Services (Theme 8)</td>
</tr>
<tr>
<td>13.</td>
<td>India UK advanced Technology Centre of Excellence in Next Generation Networks Systems and Services (Theme 5)</td>
</tr>
<tr>
<td>14.</td>
<td>Silicon Compatible Spintronic devices</td>
</tr>
<tr>
<td>15.</td>
<td>Distributed function computation</td>
</tr>
<tr>
<td>16.</td>
<td>Hybrid control &amp; fault detection during re-entry of reusable Launch vehicles</td>
</tr>
<tr>
<td>17.</td>
<td>Distributed function computation</td>
</tr>
<tr>
<td>18.</td>
<td>Compact Ku-Band on chip VCO for satellite communication</td>
</tr>
<tr>
<td>19.</td>
<td>Material and Device applications</td>
</tr>
<tr>
<td>20.</td>
<td>Tunnel FETs</td>
</tr>
<tr>
<td>21.</td>
<td>Compact Ku-Band on chip VCO for satellite communication</td>
</tr>
<tr>
<td>22.</td>
<td>Tunnel FETs</td>
</tr>
<tr>
<td>23.</td>
<td>Modeling and Simulation of advance NVM Devices</td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Project Title</td>
</tr>
<tr>
<td>--------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>24.</td>
<td>Development of virtual Laboratory for power systems analysis</td>
</tr>
<tr>
<td>25.</td>
<td>National program for Technology enhanced learning</td>
</tr>
<tr>
<td>26.</td>
<td>National program for Technology enhanced learning</td>
</tr>
<tr>
<td>27.</td>
<td>Development of Virtual Laboratory for synchronous machine connected to grid</td>
</tr>
<tr>
<td>28.</td>
<td>Co-ordination of Virtual Laboratory activities at IIT Bombay</td>
</tr>
<tr>
<td>29.</td>
<td>IMAGE Virtual Laboratory for VLSI Design</td>
</tr>
<tr>
<td>30.</td>
<td>Analysis of transient loading, inverter current loading propagation to fuel cells and design of bidirectional active power network</td>
</tr>
<tr>
<td>31.</td>
<td>Development of ferroelectric and Multiferroic MEMS devices</td>
</tr>
<tr>
<td>32.</td>
<td>Reliability of HiK/MG</td>
</tr>
<tr>
<td>33.</td>
<td>Metal Nano Crystals for Nanocrystal Flash Memory Technologies</td>
</tr>
<tr>
<td>34.</td>
<td>3D Simulation of Metal Nanodot Meory</td>
</tr>
<tr>
<td>35.</td>
<td>Oscar for topics in EE</td>
</tr>
</tbody>
</table>

**Patents**

- Patent on Bluetooth Wireless LAN Interface.
- Collision Avoidance System and Method (Patent Filed).
- A channel estimation based approach to backoff strategy in correlated channels in CSMA/CA MAC. (Patent Filed).
- Templated Self-assembly for Nanomagnetic Memory (pending).
- S. Gupta and Y.-K. Huang, patent application on High Speed Signal Generation, NEC Labs.
- S. Gupta and B. Jalali, US provisional patent (non-provisional patent applied) on Time Stretch Enhanced Recording Oscilloscope, UCLA.
- S. Gupta, B. Jalali, and A. Motafakker-Fard, US provisional patent on Signal Processing in the Time-Stretch ADC, UCLA.


• **Method for facilitating and analyzing social interactions and context for targeted recommendations in a telecom service provider’s network**, Abhay Karandikar, Animesh Kumar, Prateek Kapadia, Dhanashree Parakh, Somya Sharma, and Sanjay Singh, Provisional patent has been filed.


### Awards & Distinctions

**Gadre, V.M.**
Best Teacher Award for Excellence in Teaching for the year 2009 by IIT Bombay.

**Khaparde, S.A.**
Awarded the ‘DSK Energy Award 2009’ by the Institution of Engineers (India)’s Pune local centre. The award is for outstanding contribution in the Energy Sector, and cites Prof Khaparde’s several contributions in this area.

Awarded by the European Commission with Erasmus Mundus scholarship EMIN 2008/2010 for research at Pontificia Comillas University, Madrid, Spain. The visit will be in April and May 2010.

**Narayanan H.**
Selected for “Kamal Nayan Bajaj Chair Professorship” for 3 years.

**Rao Ramgopal**
Selected for 2009 Indian Semiconductor Association’s (ISA) TechnoMentor Award.

**Vasi J. M.**
Selected for “P. K. Kelkar Chair Professorship for Nanotechnology” for 3 years.

Best Teacher Award for Excellence in Teaching for the year 2009 by IIT Bombay.

**M. P. Desai, Gautam Hazari and G. Srinivas**
Maryam Shojaei Baghini
Interview with Mumbai Mirror Newspaper, June 2009 (coordinated by PRO, IIT-Bombay) as the first woman in Iran who has received Ph.D. in Electronics from an Iranian university (an article on the same has been published in Mumbai Mirror Newspaper, June 2009).

Honorary Work

Dey Bikash Kumar

Examined two MS thesis from IIT Madras and one M. Sc. (Engg.) thesis from IISc, Bangalore.

Associate editor for “International Journal of Information and Coding Theory” from Inderscience Publishers

Chakraborty Debraj
Reviewer for DST Grants for the Electrical, Electronics and Computer Engineering Programme.

Reviewer for European Control Conference, Budapest, Hungary, August 23-26, 2009

Reviewer for International Journal of Control Reviewer for IETE Journal of Research

Baghini Maryam Shojaei
Invited sub-committee member, Emerging Applications and Technologies sub-committee, IEEE A-SSCC.

Invited sub-committee member, Low-Power Design/Circuits and Technology Track, IEEE Int. Conf. on VLSI Design.

Reviewer for many IEEE and Indian Journals and IEEE Conferences in 2009 and 2010

Invited Lectures

Dey Bikash Kumar
Tutorial on, “Distributed function computation over networks” in NCC 2010, Chennai, India with Prof. D. Manjunath

Invited lecture on “Distributed source coding” in Jadavpur University, Calcutta, India

Baghini Maryam Shojaei
Invited by DAICT, Gandhinagar, in September 2009 to deliver a talk.

Invited by Nanyang Technological University (NTU), Singapore in May 2009, (IIT-Bombay and NTU-Singapore research collaboration)

Madhu N. Belur

Chakraborti, S.
Molecular Beam epitaxial growth of In(Ga)As/GaAs Quantum Dot Heterostructures for High Temperature Infrared detection, International Workshop on Physics of Semiconductor Devices 2009 (IWPSD 2009)

Rao Ramgopal, V
MRS Fall meeting, Boston, Massachusetts, Nov 29-Dec 3, 2010 (Invited Talk).

6th International Symposium on High-Tech Polymer Materials (HTPM-VI), Xiamen City, Fujian Province, China (organized by the Institute of Chemistry, Chinese Academy of Sciences), November 7-10, 2010 (Invited Talk).


7th International Workshop on Nanomechanical Cantilever Sensors, May 26-28, 2010 Banff, Canada (Invited Talk).

International Conference on Nanoscience and Technology (ICONSAT-2010), Mumbai, INDIA February 17-20, 2010 (Invited Talk).

Global Congress on Nano Engineering for Medicine and Biology, Texas, USA February 7-10, 2010 (Invited Talk).
International conference on Instrumentation and National Symposium on Instrumentation, Pune, January 21-23, 2010 (Keynote address).

Indian Science Congress, Trivandrum (Invited Talk).

Computers and Devices for Communication (CODEC-09), Hyatt Regency Kolkata, India, December 14-16, 2009 (Keynote address).


Indo-Taiwanese Workshop on “Intelligent chip design for improvement of human life quality”, Taiwan, November 2-4, 2009 (Invited).

International Workshop on Advances in Nanoscience and Technology, organized by Anna University, Chennai, India & ICTP, Trieste, Italy, October 28-30, 2009 (Invited).

IUPAC 5th International Symposium on Novel Materials and their Synthesis (NMS-V) & 19th International Symposium on Fine Chemistry and Functional Polymers (FCFP-XIX), Shanghai, China, October 18-22, 2009 (Keynote address).

First Indo-German Frontiers of Engineering (INDOGFOE) Symposium - October 1-4, 2009, Chennai (Keynote address).


Applied Materials Corporation India, Bangalore, October 6, 2009 (Invited Lectures).

Guest lectures at the School of Materials Science & Engineering, Nanyang Technological University (NTU), Singapore August 9-12 & Sept 28- Oct 1, 2009 (Invited Lectures).


National Conference of Shanti Swarup Bhatnagar Prize Winners, organized by the Devi Ahilya University, Indore, July 17-19, 2009 (Invited Talk).


IEEE EDS Distinguished Lecture, New Jersey Institute of Technology, USA (June 8, 2009) (Hosted by the IEEE NJ Section Electron Devices, Circuits and Systems Chapters together with the New Jersey Institute of Technology).

ECE Distinguished Seminar, Georgia Institute of Technology, Atlanta, USA (June 10, 2009).

National Conference on Nanoscience and Technology (ICONSAT-2010), Mumbai, INDIA February 17-20, 2010 (Invited Talk).


International conference on Instrumentation and National Symposium on Instrumentation, Pune January 21-23, 2010 (Keynote address).

Computers and Devices for Communication (CODEC-09), Hyatt Regency Kolkata, India, December 14-16, 2009 (Keynote address).


First Indo-German Frontiers of Engineering (INDOGFOE) Symposium - October 1-4, 2009, Chennai (Keynote address).

Applied Materials Corporation India, Bangalore, October 6, 2009 (Invited Lectures).


National Conference of Shanti Swarup Bhatnagar Prize Winners, organized by the Devi Ahilya University, Indore, July 17-19, 2009 (Invited Talk).


International Workshop on Advances in Nanoscience and Technology, organized by Anna University, Chennai, India & ICTP, Trieste, Italy, October 28-30, 2009 (Invited).

**Pandey Prem**

**Significant Collaborations**

**Karandikar Abhay**
Tata Tele-Services Limited

**Chakrabarti, S.**
Prof. Colin Stanley Dept. of Electronics and Electrical Engineering University of Glasgow, UK.

Dr. Adrienne Stiff-Robert Dept. of Electrical and Computer Engineering Duke University, USA.

Dr. Sanjay Krishna Center for High Technology Material University of New Mexico, USA

Dr. Jamie D. Phillips Dept. of Electrical Engineering and Computer Science University of Michigan, USA

Prof. Nigel Browning Dept. of Chemical Engineering and Material Science University of California Davis, USA

Dr. Siddharta Ghosh Dept. of Electrical and Computer Engineering University of Illinois at Chicago, USA

Dr. Tetsuya D. Mishima Dept. of Physics and Astronomy University of Oklahoma

**Mahapatra Souvik**
Applied Materials, USA
Semiconductor Research Corporation, USA
Renesas Technology, Japan

**Rao Rangopal, V.**
Intel-(Circuit Research Lab) (high-k modeling, mixed-signal CMOS, Multi-gate MOSFETs)

Infineon, Munich, Germany (IO Circuit Optimizations using Novel Devices)

Università della Calabria, Italy (High-k characterization for CMOS/Finfets)

Tokyo Institute of Technology-Japan (Finfets)

Nanyang Technological University-Singapore (Organic Electronics)

University of Cambridge, UK (Sensors)

University of Washington, USA (MEMS)

**Pandey Prem**
National Programme on Perception Engineering”, sponsored by DIT, MCIT, Government of India.
**Extension Activities**

In order to encourage and facilitate interaction amongst practitioners and researchers, the following activities were organized:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Date</th>
<th>Title</th>
<th>Duration</th>
<th>Name of Co-ordinator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>23-7-2009</td>
<td>VLSI Technology (EE-669)</td>
<td>1 Day</td>
<td>Prof. V. R. Rao</td>
</tr>
<tr>
<td>2</td>
<td>23-7-2009</td>
<td>Computational Electromagnetics (EE-725)</td>
<td>4 Months</td>
<td>Prof. S. V. Kulkarni</td>
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<tr>
<td>3</td>
<td>23-7-2009</td>
<td>Electronic System Design (EE-616)</td>
<td>4 Months</td>
<td>Prof. Prem Pandey</td>
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<tr>
<td>4</td>
<td>23-7-2009</td>
<td>First Course in Optimization (EE-659)</td>
<td>4 Months</td>
<td>Prof. S. V. Soman</td>
</tr>
<tr>
<td>5</td>
<td>24-7-2009</td>
<td>Restructured Integrated Circuits (EE-722)</td>
<td>4 Months</td>
<td></td>
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<tr>
<td>6</td>
<td>24-7-2009</td>
<td>Microwave Integrated Circuits (EE-611)</td>
<td>4 Months</td>
<td>Prof. Jayanta Mukherjee</td>
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<tr>
<td>7</td>
<td>24-7-2009</td>
<td>VLSI Design (EE-671)</td>
<td>4 Months</td>
<td>Prof. A. N. Chandorkar</td>
</tr>
<tr>
<td>8</td>
<td>10-12-2009</td>
<td>Triz in Quality</td>
<td>1 Day</td>
<td>Prof. P. R. Apte</td>
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<tr>
<td>9</td>
<td>25-12-2009</td>
<td>Introduction to Digital Signal Processing</td>
<td>3 Days</td>
<td>Prof. Vikram Gadre</td>
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<tr>
<td>10</td>
<td>12-1-2010</td>
<td>Winter School on Speech and Audio Processing</td>
<td>4 Days</td>
<td>Prof. V. R. Rao</td>
</tr>
<tr>
<td>11</td>
<td>14-1-2010</td>
<td>IC Design and Fabrication</td>
<td>1 Day</td>
<td>Prof. V. R. Rao</td>
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<tr>
<td>12</td>
<td>4-1-2010</td>
<td>CMOS Analog VLSI Design (EE-618)</td>
<td>4 Months</td>
<td>Prof. A. N. Chandorkar</td>
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<tr>
<td>13</td>
<td>4-1-2010</td>
<td>Radiating Systems (EE-609)</td>
<td>4 Months</td>
<td>Prof. Girish Kumar</td>
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<tr>
<td>14</td>
<td>4-1-2010</td>
<td>Markov Chains and Queuing Systems (EE-621)</td>
<td>4 Months</td>
<td>Prof. Chaporkar</td>
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<tr>
<td>15</td>
<td>4-1-2010</td>
<td>Solid State Microwave Devices And (EE-614) Applications</td>
<td>4 Months</td>
<td>Prof. Jayanta Mukherjee</td>
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<tr>
<td>16</td>
<td>5-1-2010</td>
<td>Lab &amp; Computational Tech. (EE-700)</td>
<td>4 Months</td>
<td>Prof. Patkar</td>
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<tr>
<td>17</td>
<td>5-1-2010</td>
<td>Fibre Optic Communication (EE-606)</td>
<td>4 Months</td>
<td>Prof. Girish Saraf</td>
</tr>
<tr>
<td>18</td>
<td>7-1-2010</td>
<td>Radio Frequency Microcontroller Chip Design (EE-619)</td>
<td>4 Months</td>
<td>Prof. Shalabh Gupta</td>
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<tr>
<td>19</td>
<td>5-2-2010</td>
<td>Loadflow Studies</td>
<td>2 Days</td>
<td>Prof. Kulkarni Anil M</td>
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<tr>
<td>20</td>
<td>15-2-2010</td>
<td>Transformer Design</td>
<td>2 Days</td>
<td>Prof. Dr. S. V. Kulkarni</td>
</tr>
<tr>
<td>21</td>
<td>11-3-2010</td>
<td>Transient Stability Studies</td>
<td>2 Days</td>
<td>Prof. Kulkarni Anil M</td>
</tr>
<tr>
<td>22</td>
<td>24-3-2010</td>
<td>HVDC Technology</td>
<td>3 Days</td>
<td>Prof. Kulkarni Anil M</td>
</tr>
</tbody>
</table>
Conference Organised

International Conference on Nano Science and Technology (ICONSAT 2010) organized by Prof. V. R. Rao jointly with Department of Metallurgy and School of Bio-Sciences and Bio-Engineering.

Conferences, Workshops and Other Events Participation:

Dey Bikash Kumar
Attended ISIT 2009, Seoul, Korea
Attended Netcod 2009, Lausanne, Switzerland
TPC member for VTC 2009, NCC 2010, SPCOM 2010
Attended NCC 2010, Chennai, India

Belur Madhu, N.
Attended the ICCAS-SICE International Conference on Control and Instrumentation and presented a paper.

Narayanan, H. and Patkar Sachin
Both participated in the 22nd International Conference on VLSI Design 2009.

Khaparde, S. A.
V S K Murthy Balijepalli, S. A. Khaparde, Gupta, R. P.

S. A. Khaparde, and A. Mukerjee,
“Sustainable development of the indian private power industry meeting corporate, social and climate objectives” Power & Energy Society General Meeting, 2009. PES '09. IEEE 26-30 July 2009 Page(s): 1 – 4


Pandey Prem
National Conf. Virtual & Intelligent Instrumentation, BITS Pilani, November 2009.

Visitors to the Department

Dr. Cornelis Praagman, Professor, University of Groningen, Netherland visited to department for two months in mid of November, 2009.

Prof. Ivar Wangesteen, Norwegian University of Science and Technology, visited to department in end of December, 2009.

Prof. Hiroshi Iwai, Professor of Tokyo Institute of Technology, IEEE Distinguish Lecturer visited to department in month of January, 2010.

Dr. Mark R. Pinto, Executive Vice President, Applied Materials visited at CEN on June 2, 2009 for inauguration of Applied Materials Nano Manufacturing Lab.

The Secretary of DIT, Shri R. Chandrashekhar, visited at CEN on January 21, 2010


Dr. Aatre was the former head of the Defence Research and Development Organisation (DRDO) and served as the Scientific Advisor to the Defence Minister (Raksha Mantri). He is also a Padma Bhushan awardee. He visited at CEN on January 30, 2010

Faculty Members and their Specializations

1. Vivek Agarwal
   Power Conversion, Modeling and simulation of power electronic systems, EMI problems in Power Electronics, Microprocessor based control of A.C. Drives

2. Animesh Kumar
   Signal processing, integrated circuits, and communication theory

3. Ajit Kumar Verma
   Reliability in Engineering Design

4. Ashwin Tulapurkar
   Spintronics
   Physics of nano-devices
   Spin-current induced magnetization switching
   RF properties of spintronic devices
   Noise

5. Arjun Arunachalam
   Medical Imaging- Advanced MRI data acquisition and image reconstruction techniques, Advanced Image visualization algorithms development Clean energy- High concentration Photovoltaic (HCPV) concentrator design and development
6. S.D. Agashe
   Control theory, Network theory, Speech analysis and Synthesis

7. Prakash R. Apte
   MicroElectroMechanical Systems (MEMS), Quality and Reliability, Taguchi and TRIZ Methodologies

8. Madhu N. Belur
   Systems & Control theory, Behavioral theory of Systems and Control, Optimal control, Numerical aspects, Hybrid systems

9. Maryam Shojaei Baghini
   Self calibrating circuit design, Analog/Mixed-signal IC design for different applications, Circuit & system design challenges with emerging devices in nano scale, Circuit and system design with organic thin film components, RF/Microwave integrated circuit design, Circuit design optimization, Analog/mixed-signal/RF CAD tools, theory and implementation, Analog aspects of digital circuits, VLSI design and embedded systems.

10. A.N. Chandorkar

11. Mukul C. Chandorkar
    Electrical drives, Power electronic converters and control, Power system applications of power electronics, and electrical power quality for industrial and commercial installations, DSP applications in power electronics and power systems

12. Prasanna Chaporkar
    Resource allocation in wired/wireless networks, algorithms, control of queues and stochastic systems.

13. Kishore Chatterjee
    Utility friendly converter topologies, Power Factor Correction techniques, STATCOM, Switched Mode Rectifiers, Electronic Ballast, Control of Electric Drives

14. Subhasis Chaudhuri
    Multimedia, Computer Vision, Image Processing, Pattern Recognition, Biomedical Signal Processing

15. Debraj Chakraborty
    Optimal Control, Differential Games, Nonlinear Feedback Theory, Control of Biological Systems and Diseases.

16. Subhananda Chakrabarti
    Growth, Fabrication and Characterization of III-V and II-VI compound semiconductor materials and devices. Devices of interest include Infra Detectors and Arrays, Lasers, UV-VIS LEDs, Solar Cells, HEMTs and MOSFETs

17. M.P. Desai
    VLSI design and design automation, Graph theory and combinatorics, Circuits and systems

18. U.B. Desai
    Signal Processing, Wireless Communication (Multiuser Detection), Adaptive Signal Processing, Image and Video Processing Wavelets, Biomedical Signal and Image Processing, Artificial Neural Networks

19. Bikash Kumar Dey
    Error correcting codes, wireless communication, signal processing

20. Siddhartha P. Duttagupta
    Microelectronics

21. B.G. Fernandes
    Switch-Mode Rectifiers, Switch-Mode Power Supplies, Soft switching Techniques for SMPS, Permanent magnet machines and Electric Drives, Power electronic circuits and applications, Electrical machines, Solid state drives, Active filters, Microcontroller application in drives

22. V.M. Gadre
    Communications and signal processing with emphasis on multiresolution and wavelet based methods.

23. Swaroop Ganguly
    Spintronics, Spin injection, transport and detection in III-V systems, Device Reliability

24. Shalabh Gupta
    High speed/RF/mmwave integrated circuits, systems and antennas, Optical Fiber communication & microwave photonics
25. Abhay Karandikar  
Communication Network, Quality of Service Guarantees in Internet, Telecommunication switching, Digital communication

26. S.A.Khaparde  
Deregulation in Power Industry: optimal bidding, and congestion management, Object Oriented Power System Analysis, Controlled series compensation using SSSC, Harmonic Distortion in Distribution systems, Design and Operation of small tidal power plant, Modeling and Design of transformer

27. Anil Kottantharayil  
CMOS device physics, characterization, modeling and technology

28. A.M. Kulkarni  
Power System Dynamics, Flexible AC Transmission Systems, HVDC Transmission Systems

29. S.V. Kulkarni  
Transformer Design and Analysis, Electromagnetic and Coupled Field Computations, Efficient Finite Element Method Computations, Power Engineering: Distribution Automation and Distributed Generation, High Voltage Insulation Design

30. Vishwesh Kulkarni  
Nonlinear control, biosystems, sensor networks

31. Girish Kumar  
Microstrip antennas and arrays, Broadband antennas; Microwave integrated circuits; EMI/EMC; RF communication circuits.

32. Souvik Mahapatra  
Flash EEPROMs, SONOS, Nanoparticle storage, NB Ti and Hot carrier degradation in MOSFETs, High-k gate dielectrics

33. D.Manjunath  

34. S.N. Merchant  
Signal Processing, Adaptive Signal Processing

35. Jayanta Mukherjee  
RF VLSI Design, Testing, Noise Modeling, Analog VLSI

36. H.Narayanan  
Building large scale circuit simulators, combinatorial optimization including sub modular function theory, Large scale system partitioning.

37. Prem C. Pandey  
Speech & Signal Processing, Biomedical Signal Processing and Instrumentation, Electronic Instrumentation, Embedded Electronic System Design

38. M B Patil  
Semiconductor device modeling for circuit simulation, Semiconductor device simulation, Mixed-mode circuit simulation

39. Sachin Patkar  
Combinatorial optimization, Algorithms Design and Analysis, Graph Theory, Geometric Design and Graphics

40. H. K. Pillai  
Control theory; Behavioral theory of Systems; Multidimensional systems; optimal control; Coding theory; Optimization techniques.

41. Sibi Raj Pillai  

42. Richard Pinto  
Microelectronics

43. V. Ramgopal Rao  
Nanoelectronics, Circuit and System Design Considerations with Emerging CMOS Technologies (Multigate MOSFETs, Single Halo MOSFETs etc.), Physics, Technology and Characterization of Sub 100 nm CMOS devices, CMOS Reliability Characterization (plasma damage, radiation, hot-carrier), Bio-MEMS

44. Preeti S. Rao  
Speech and Audio Signal Processing, Digital Signal Processing, Coding of speech at low bit-rates

45. V. Rajbabu  
Statistical and digital signal processing, Signal processing system design, Particle filter applications, and Target tracking systems.

46. Dipankar Saha  
Spintronics, Spin injection, transport and detection in III-V systems, Device Reliability
47. **D. K. Sharma**
   MOS device modeling, VLSI design and technology. Microelectronics - technology and device characterization and mixed signal design

48. **Girish P. Saraph**
   RF Electronics & Wireless Communications, High Power Microwave Sources and Radars, Communication Networks, Fiber Optics & Optical Networks

49. **R.K. Shevgaonkar**
   Fiber Optic Communication; Photonics; Non-linear fiber optics; Antennas; Image Processing; Radio Astronomy; Wireless Communication

50. **Maryam Shojaei**
   Analog and Mixed-Signal Circuit Design, VLSI, Circuit Design Optimization, EDA/CAD for Circuit Design

51. **S. A. Soman**

52. **Shalabh Gupta**
   High speed/RF/mmwave integrated circuits, systems and antennas
   Optical Fiber communication & microwave photonics

53. **Juzer Vasi**
   Physics and technology of CMOS devices
   Nanoelectronics.

54. **Saravanan Vijayakumaran**
   Digital Communications
   Computer Networks
   Parallel Simulation Algorithms
Introduction

The Department of Energy Science and Engineering is a young department which started in 2008. It has been existing as an Interdisciplinary Programme for over the last 25 years. With the approval of the Board of Governors in 2008, the programme was upgraded to a department which now has (1) Integrated B.Tech.-M.Tech. (Dual Degree, and (2) Integrated M.Sc.-Ph.D. Dual Degree programmes, in addition to the conventional M.Tech. (Energy Systems Engineering) and 4 Ph.D. programmes.

The programme is aimed at providing high quality innovators/engineers with an understanding of energy systems, who can contribute meaningfully to the nation’s energy sector. It is expected that rapid growth of the energy sector and the challenges imposed by energy resource constraints will need specially qualified engineers with ability to understand and analyse energy systems. About 387 alumni of the programme are currently working in various positions in industry and research institutions.

The course is interdisciplinary in nature and students and faculty members are from diverse engineering (energy, mechanical, chemical, electrical, civil, etc.) and science (physics, chemistry, etc.) disciplines. During the programme the students are exposed to core areas of energy management, including energy auditing, energy systems modeling and analysis, and non-conventional energy sources. In addition, students take elective courses in their area of specialization. The programme also has an option of specialization in nuclear power in interaction with Atomic Energy Regulatory Board (AERB). The department interacts with the industry, research institutions and policy makers for developing and promoting efficient and clean technologies in the country. These interactions are in the form of consultancy and sponsored projects, seminars and workshops.

The programme is well recognized by the industry with fellowships and sponsorship from Forbes Marshall, ONGC, AERB, Cummins, and the Ministry of New and Renewable Energy. Forbes Marshall and AERB offer sponsorships attached to placement in their respective organizations. In the 2009 batch, 23 students were admitted to the M.Tech. Programme, 12 students admitted to the Ph.D. programme, 6 to the M.Sc.-Ph.D. Dual Degree programme and 22 to the B.Tech.-M.Tech. Dual Degree programme.

In this year 4 new faculty members joined the department – Dr. Shaibal Sarkar, Dr. S. Doolla, Dr. Manswita Bose, and Dr. Suneet Singh.

Academic Programmes

Dual Degree Programme (B.Tech.-M. Tech.)

Degrees Awarded:

M.Tech. - 30
Ph.D. - 5

Special Initiatives

Energy Day 2010

The 3rd of April, all the students and staff of the Department of Energy Science and Engineering were bustling with enthusiasm for that day was the Energy Day. Energy Day is the annual congregation of leading personalities from both the industry and academia to discuss and review the research and work in the field of energy that is undertaken by the department's outgoing students. Every year this day is dedicated to reaching out to people and making them aware of the new advancements that have been made in the field. This involves sessions of paper presentation and poster exhibition along with opportunities for informal interaction with leading consultants, audience from the industry and academia and experts on the subject. This year too there was an impressive turnout of 180, apart from the students and staff of the department. The event started with the welcome address by Prof. Pratibha Sharma, who was the Coordinator of the Energy Day 2010. She emphasised the point that how the Energy Day was an interface
between the Department and industry, and how this could work as an opportunity for both the students and industry to get benefited in terms of developing a linkage. This was followed by an introductory speech by Prof. Rangan Banerjee who detailed on the institute’s research initiatives in the energy area and gave a review of the relevance of performance and research and thereby ‘making a difference’. He was followed by the Head of Department, Prof. Anuradha Ganesh, who in a nutshell introduced the whole department and the panorama of our work. It included a glimpse of the research and projects undertaken, the specialisations in various fields like fuel cell, solar photovoltaic and solar thermal utilisations and our involvement in rural outreach programmes. This was followed by four technical sessions.

The first technical session includes presentations on the following topics:

- Fabrication and study of inverted organic solar cells
- Electrical simulation of defects in thin film crystalline silicon solar cells
- Performance of water in glass evacuated tube collector
- Modelling of solar radiation
- Characterization of solar cells for low level concentration

The second technical session focusing on renewable energy systems and alternative fuels which includes the following topics:

- a) Renewable-based industrial polygeneration systems
- b) Design and field implementation of renewable energy systems
- c) Sustainability analysis for alternative fuels
- d) Contact pressure distribution in polymer electrolyte membrane fuel cell
- e) Production of Fuel from plastic waste

The third technical session focused on applied power electronics and electrical machines to energy system. The topics presented includes:

- Real time control in a virtual laboratory
- Transient analysis of doubly fed induction generator
- Application of one cycle control in shunt active power filter
- Design and control of switched reluctance motor for in-wheel electric vehicle application
- Tidal in-stream power generation

The fourth and the last session concentrated on efficiency improvement in energy systems, the following topics were covered:

- Kinetic modelling of carbon nanotubes synthesis process
- Numerical analysis and experimentation of critical heat flux under oscillatory flow condition
- Simulation of external fuel reforming for fuel cell applications
- Energy and water minimization in heat integrated water systems
- Day light simulation of buildings

International Conference and Exhibition on Advances in Energy Research (ICAER 2009)

Energy is the backbone of human civilisation. The onset of the industrial revolution instigated the reckless use of fossil fuels which in effect has evoked societal concern about global warming caused due to the accumulation of greenhouse gases (GHGs) in the earth’s atmosphere. Moreover, the increasing demand for energy and the depleting fossil fuel reserves poses a severe threat to the energy security of the world. For example, in India alone, the demand for electricity is poised to increase approximately four times over the next four decades. The focus of all energy generation and utilisation has therefore shifted to alternatives employing clean and efficient means of energy production as well as conversion. The challenge to transform the world energy usage from fossil fuel-based to non-fossil fuel-based generation embodies a host of tasks which are as crucial as the transition itself. The predominant challenges include the development of cost-effective renewables, energy-efficient conversion systems, development of new materials and devices. This demands strategies and interventions which would lead to ways of producing energy which are economically, socially and environmentally sustainable.
ICAER 2009 was different from other conferences in that it had two in-house workshops one on clean coal technologies and the other on emerging energy technologies. Eminent personalities like Dr. D. M. Kale from the Ministry of Petroleum, Prof. Ajit Kolar from IIT Madras, Dr. R. Sonde from Thermax and Prof. Anand Rao from IIT Bombay debated on the right form of technological approach for the use of coal in India. The emerging energy technologies workshop also had distinguished speakers from all around the world hinting on the technologies for gen-next. On the whole, the sessions were full of enthusiasm from the audience as well as the speakers. The other highlights of the conference included an exhibition and a panel discussion. In the exhibition, apart from industries such as ONGC, Cummins, Hisden Isochema, RGB technologies, etc., various departments and centers in IIT Bombay like Chemical Engineering, Centre for Environmental Science and Engineering (CESE), Centre for Technology Alternatives in Rural Areas (CTARA), Heat-Pump Laboratory, Mechanical Engineering Department, and Department of Energy Science and Engineering showcased their research outputs. The topic of the panel discussion was ‘Global Education and Research for Sustainable Energy’. The panel discussion was mainly held to discuss and create awareness about various issues and concerns related to the energy sector.

R and D Activities

Sponsored Research Projects

<table>
<thead>
<tr>
<th>Sponsored Research Projects</th>
<th>New</th>
<th>Ongoing</th>
<th>Completed</th>
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<tr>
<td>27</td>
<td>4</td>
<td>22</td>
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</table>

List of sponsored research projects

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Sponsoring Agency</th>
<th>Status (New/Ongoing/Complete)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characterization of thin film Si for solar cell application.</td>
<td>Applied Materials Inc.,</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Research Workshop on End use Efficiency Industry</td>
<td>International Institute for Applied Systems Analysis, Austria</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Development of a Megawatt-scale Solar Thermal Power Testing, Simulation and Research Facility</td>
<td>Ministry of New And Renewable Energy</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Study on the Influence of Gasket System on contact Resistance Distribution and Sealing of the Fuel Cells</td>
<td>Naval Materials Research Laboratory</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Implementation of the Indo-South African joint project entitled” Wastewater, minimization in batch plants through on-site treatment, reuse and recycle</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Development of Efficient and Cost-effective electrocatalysts for oxygen reduction reaction (ORR) in low temperature fuel cells.</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Electrification of Village Kolha using Straight Vegetable Oil and Bio-gas</td>
<td>Cummins</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Design and development of V - Trough (2 Sun) concentrator System.</td>
<td>Ministry of New And Renewable Energy</td>
<td>Ongoing</td>
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<tr>
<td>Project Title</td>
<td>Sponsoring Agency</td>
<td>Status (New/Ongoing/Complete)</td>
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<td>--------------------------------------------------------</td>
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<tr>
<td>Pan IIT Solar Research Initiative Workshop</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
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<tr>
<td>Solar heat for drying a Na₂SO₄</td>
<td>Atomic Energy Regulatory Board</td>
<td>Ongoing</td>
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<tr>
<td>Development of Test Procedure for Solar Concentrators and its Implementation on Two Types of Dish Concentrators</td>
<td>Ministry of Petroleum and Natural Gas</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Development of Design Methodology to Optimally Integrate Solar Thermal Concentrator with industrial Process Heat Applications</td>
<td>Ministry of New and Renewable Energy</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Molecular complexity from aromatics studies on synthesis of complex bridge and ring fused ploycyclicrthers</td>
<td>Department of Science and Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Dynamic data driven model based predictive control of nuclear steam generator</td>
<td>BRNS</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Design and development of stirling engine for net 1.5KW electrical output</td>
<td>Ministry of New and Renewable Energy</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Solar Cells using poly-Si and epi-Si films</td>
<td>Applied Materials Inc., USA</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Development benefits of clean energy in India</td>
<td>Hewlett Foundation</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Development of Test Procedure for solar concentrators and its implementation on two types of dish concentrator</td>
<td>MNRE</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

**Extension activities**

The second international conference on Advances in Energy Research was held from 9-11th December 2009.

**Seminars**

- **Mr. V. P. Raja**, Chairman, MERC, delivered a lecture on “Electricity Regulation in Maharashtra – Challenges and Research Issues” (July 24, 2009)

- **Dr. M. M. Shaijumon**, CIRIMAT, University Paul Sabatier, Toulouse, France, delivered a lecture on “Carbon nanotube – based hybrid structures for Energy Applications” (August 19, 2009)
Prof. Granger Morgan, Head of the Department and Public Policy, Carnegie Mellon University, USA, delivered a lecture on “Technology – Policy Research on Energy and Climate at Carnegie Mellon University” (October 28, 2009)

Dr. Jayant Sathaye, LBNL, USA, delivered a lecture on “Economic and emissions benefits of efficiency options in India” (November 10, 2009)

Mr. Srinivas, CEO of Kotak Urja, delivered a lecture on “Application Potential for Solar Energy for Campuses” (January 27, 2010)

Dr. A. Vadivel Murugan, Materials Science and Engineering Program & Department of Mechanical Engineering, The University of Texas at Austin, TX, USA, delivered a lecture on “Challenges and Opportunities in Functional Nanostructured Materials for Energy Storage Application” (January 11, 2010)

Dr. Hari Mantripragada, CMU Pittsburgh, USA, delivered a lecture on “Performance, emissions and cost modeling of coal-to-liquids plants and their effect on resources and environment” (January 4, 2010)

Workshops

One-day National Workshop on solar thermal power generation


CEP courses


Three-day CEP course on Energy and Water Conservation through Pinch Analysis 8-10 October 2009

Three-day CEP course on Introduction to Solar Photovoltaic Technologies, 16-18 November 2009

Five-day CEP course on Energy Management, 23-27 November 2009

Conferences/Symposia/ Workshops/ Seminars (Participated/Papers Presented)

National

Bandyopadhyay S.


Banerjee Rangan


Narkhede R. S. and Ghosh P. C.

Presented in the National Conference on Renewable Energy on “Effect of Tightening Torque on Current Density Distribution in Fuel Cells”, Held on November 5-7, 2009 at Jodhpur, India


Nayak J. K.

Chaired a session on Solar Thermal on March 05, 2010 in the PV+ Solar India Conference (March 4 – 5, 2010), International Conference on Jawahar Lal Nehru National Solar Mission – the Road Ahead.

Neergat Manoj

“Nanomaterials for fuel cell application” in Nano-materials and Devices for Energy Application, (17 Feb 2010), International Conference on Nano Science


Mitra Sagar


Solanki Chetan Singh

Ghosh P. C.
Delivered Keynote Lecture in 1st Indo-German Frontiers of Engineering (INDOGFOE), October 1-4, at Chennai, India

Solanki Chetan Singh
Participated in International conference Solarcon India 2009 from 9-11th November 2009 in Hyderabad.

International

Solanki Chetan Singh

Invited to UK-India 2-day Workshop on Engineering Challenges of Deploying new Solar Energy Capacity in India Workshop 28-29 September 2009 in UK.


Invited Lectures

International

Banerjee Rangan


“Renewable Energy in India - Status and Potential,” Strathclyde University, Glasgow, June 1, 2009.


National

Bandyopadhyay S.

Banerjee Rangan
“Capacity Building for Solar Thermal Energy in India,” at a two-day Indo-German Dialogue on Accelerated Dissimination of Solar Energy Technologies in India, Rajagiri School of Engineering & Technology, Kochi Kerala, March 5, 2010.


Mitra Sagar


Sarkar S. K.
Bhaba Atomic Research Centre, Workshop on Dye Sensitized Solar Cells, 8 January 2010
Significant Awards/ Distinctions

Solanki Chetan Singh
Certificate of appreciation for participating in Film category in NKC Online Contest by National Knowledge Commission.

Certificate of appreciation for participating in Essay category in NKC Online Contest by National Knowledge Commission.

Awarded by Applied Materials for outstanding contribution to Applied Materials sponsored project “Nano Crystals for Photovoltaic Applications” on 2 June 2009.

Honorary Work

Banerjee Rangan
Associate Editor – Energy for Sustainable Development, International Journal of Sustainable Engineering and Member of Board of Editor of International Journal of Thermodynamics.

Convening Lead Analyst (CLA) and Executive Committee member of the Global Energy Assessment (GEA), International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria.

Member of the Task Force on Solar Energy Research Initiative (SERI) of the Department of Science and Technology (DST), Government of India.

Kedare S. B.
Member, Research Advisory Committee, School of Energy Studies, Department of Physics, University of Pune.

Member, Solar Thermal Energy Sub-committee: ME 04:1, Bureau of Indian Standards, New Delhi (April 2008 till date).

Nayak J. K.
Member, Expert committee for Solar Thermal Energy, MNRE Reviewers for Journals such as Solar Energy, SESI journal

Faculty Members and their Specializations

1. Santanu Bandyopadhyay
   Pinch analysis and Energy integration, Modelling and analysis

2. Rangan Banerjee
   Energy Efficiency, Energy Modelling, Hydrogen Energy

3. Manaswita Bose

4. Suryanarayana Doolla
   Smart Grid, Micro-Grid and Distributed Generation, Power quality and communication protocols for industrial and commercial power systems

5. Anuradda Ganesh
   Thermo chemical conversion of biomass, Alternate fuels in engine

6. Prakash Chandra Ghosh
   Polymer Electrolyte Fuel Cell, Hydrogen generation and storage

7. Rajesh Gupta
   Photovoltaics, Infrared Thermography

8. S.B.Kedare
   Concentrating Solar Collectors, Industrial thermal hybrid systems

9. Sagar Mitra
   Nanostructured Materials, Lithium ion Batteries, Hybrid vehicles, Electrochemical Energy storage, Electrochemistry of Nanomaterials, Electrochemistry of Semiconductors

10. J. K. Nayak
    Passive solar architecture, Solar thermal

11. Manoj Neergat
    Fuel cells, Electrocatalysis, and Bio-fuel cells

12. Shaibal K Sarkar
    Sensitized Solar cells, Photoelectrochemistry, Nanocrystalline Materials for Photovoltaic applications, Transparent Conducting Oxides, Atomic Layer Deposition

13. Pratibha Sharma
    Hydrogen Storage, Thin films, Amorphous Semiconductors, Ion Irradiation, Chalcogenides

14. Suneet Singh
    Nuclear reactor thermal hydraulics and safety, Advanced numerical methods for neutron diffusion and fluid flow, Two-phase flow modeling.
15. Chetan Singh Solanki
   Solar Photovoltaics, Thin film silicon solar cells, PV solar concentrators, Porous silicon, Carbon nano tubes (CNT’s)

   Associate Faculty

   Mechanical Engineering

16. Atul Sharma
    Computational Fluid Flow and Heat Transfer

17. S. Suryanarayanan
    Automatic Control, Mechatronics

18. A. Sridharan
    Two-phase Heat Transfer, Experimental Heat Transfer

19. S.V. Prabhu
    Flow Metering, Gas Turbine Blade Cooling, Two Phase Flow and Heat Transfer

20. R.P. Vedula
    Convective Heat Transfer for External and Internal Flows

21. A. W. Date
    Numerical Fluid flow and heat transfer, Appropriate Technology

22. J.B Doshi
    Nuclear Reactor Theory, Nuclear Reactor Safety, Analytical Methods in Engineering

23. U. N. Gaitonde
    Thermodynamics, Heat Transfer Engineering, Powerplant Engineering

24. Kannan N. Iyer
    Nuclear Reactor Safety, Thermal-Hydraulics, Applied Numerical Methods

25. M.V. Rane

26. S. P. Sukhatme
    Heat Transfer, Energy

   Electrical Engineering

27. Vivek Agarwal
    Power Conversion, Modelling and simulation of power electronic systems

28. M. C. Chandorkar
    Electrical drives, Power electronic converters and control

29. B.G. Fernandes
    Switch Mode Rectifiers & Power Supplies, Soft switching methods for SMPS

30. S.A. Khaparde
    Deregulation in Power Industry: optimal bidding & congestion management

31. K. Chatterjee
    Utility friendly converter topologies, Power Factor Correction techniques

32. A. M. Kulkarni
    Power System Dynamics, Flexible AC Transmission Systems

33. S. V. Kulkarni
    Transformer Design & Analysis, Finite element method computations

34. S. A. Soman
    Power System Analysis, Restructuring of Power Systems

   Chemical Engineering

35. Kartic Chandra Khilar
    PColloids, Interface Science and Engineering, Porous Media

36. Preeti Aghalayam
    Kinetic modelling, Catalytic oxidation, Automotive emissions control

37. Chandra Venkataraman
    Aerosols and climate; Air pollution; Toxicity / risk assessment

38. R. K. Malik
    Process modeling, simulation, energy integration

   Aerospace Engineering

39. K. Sudhakar
    Multidisciplinary Design Optimisation

   Metallurgical Engineering and Material Science

40. Rajiv O. Dusane
    Synthesis & characterization of amorphous and microcrystalline thin films

   Centre For Environmental Science And Engineering

41. Virendra Sethi
    Combustion Aerosols, Energy and Environment

   Centre For Technology Alternatives in Rural Area (CTARA)

42. N.G. Shah
    Post Harvest Process Engineering, Small Scale Renewable Energy Applications and Agro-based Industrial Development

43. Anand B. Rao
    Energy and Environment, Climate Change, Carbon Capture and Sequestration
Introduction

The Department of Humanities and Social Sciences plays a distinctive and significant role in an institute where the ethos of science and technology prevails the utmost. It is believed that science and engineering are, by their very nature, humanistic and socially derived enterprises. In other words, the world now is vehemently looking forward to establishing a proper linkage between a technologically progressive and an ethically strong society. Therefore, there is a need for relating the science and technology education to liberal arts and social sciences. Right from their inception, IITs, in the country, have striven for fulfilling the above philosophy of ideal education. The commitment to imparting a more holistic education distinguishes IITs from other institutions.

To elaborate, the Department of Humanities and Social Sciences is a facilitator, in an Institute of Technology, fostering awareness and knowledge of the nature of human inquiry, the socio-economic human conditions, and a thoughtful application of science and technology to attain sustainable development. The department pledges itself to help the institute to become a true world leader in teaching and research by nurturing an atmosphere of creativity, innovation and scholarship in its unending quest for excellence.

The department comprises faculty from five disciplines – Economics, English, Philosophy, Psychology, Sociology – and areas touching upon the Cell for Indian Science and Technology in Sanskrit (CISTS). The department, founded in 1958, has weaved the goals mentioned above into its teaching and research Programmes. In recent years it has expanded and has a faculty strength of 35.

The department has well-equipped computing facilities, which include several statistical packages. It has an adequately equipped Psychology laboratory.

Academic Programmes

The Department of Humanities and Social Sciences participates in both the undergraduate and postgraduate teaching programmes of the institute.

UG Programme

- The guiding principles for the teaching programme at the Undergraduate level are:
- To combine Technical Education with General/Liberal Education with a view to provide complete education.
- To sensitize students to broader economic, social and humane issues that affect the professional and personal lives of the engineering and science students.

To prepare the students not only for a specialized job, but also cultivate good intellectual habits, skills, and understanding that any educated person should have regardless of the kind of profession they undertake.

The department endeavours for realizing these objectives by offering the following courses at the undergraduate level: One core course in Economics in the 1st semester, four introductory courses in Humanities and Social Sciences (English Literature, Philosophy, Psychology and Sociology) in the 3rd and 4th semesters, followed by a number of electives offered by the different constituent disciplines in the 7th and 8th semesters. Specialized faculty of the department is also participating in the teaching of a compulsory course on environmental studies offered for the B. Tech. students. A two-semester course in Remedial English is offered to the students of the Preparatory Course.

PG Programme

At the postgraduate level, the department participates in teaching courses for M.Tech./Ph.D. students (at the institute level) and offers full-fledged M.Phil. and Ph.D. programmes at the department level.
Participation in M.Tech. Programme

The Department offers a large number of electives for M.Tech. students. It also offers communication skills as a compulsory course for both M.Tech. and Ph.D. students.

M.Phil. Programme in Planning and Development

A 4-semester interdisciplinary M.Phil. programme with specialization in Planning and Development was launched in July 1993. The programme with a theoretical-practical thrust provides the students with a holistic understanding of socio-economic reality and the role of technology. It also acquaints them with the various stages and levels of expertise involved in the formulation and implementation of development policies that can bring about a sustainable, stable, and desirable development. With such training that includes coursework, field visit and dissertation work, it is expected that the students completing this programme will become personnel with the requisite competence to contribute in the national, state and regional planning and developmental processes. There is a paucity of such personnel in India at present and IIT Bombay is contributing substantially to meeting this manpower requirement.

There are twenty five students pursuing the M.Phil. programme presently.

Ph.D. Programme

The Ph.D. programme in the department is generally discipline oriented and runs in five disciplines and areas related to the CISTS. There is also ample provision to do research in interdisciplinary areas. There are 58 regular, 22 external, 15 college teachers, 27 self-financing, and 1 project staff candidates, who are currently enrolled in the Ph.D. programme.

In the year under review, seven students of this department was awarded Ph.D. degree. Since the inception of the Ph.D. programme in the department, 138 students have already obtained their Ph.D. degree from the department and are well placed in institutions like Reserve Bank of India, IIM Calcutta, Mumbai University, Central University (Hyderabad), and other IITs. They have made marks as excellent academicians and professionals in their respective fields of specializations.

Degrees Awarded

<table>
<thead>
<tr>
<th>Degree</th>
<th>Quantity</th>
</tr>
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<tbody>
<tr>
<td>M.Phil.</td>
<td>11</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>12</td>
</tr>
</tbody>
</table>

R&D Activities

The department currently has ongoing sponsored research projects with a sanctioned outlay of Rs. 30,07,500/-. The department has undertaken a number of sponsored projects in the last few years, some of which are outlined below.

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Agency Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indian Language Corpora Initiative</td>
<td>Department of Information Technology</td>
</tr>
<tr>
<td>Identifying Causal Factors and Cognitive Precursors of Developmental Dyslexia: Psycholinguistic and Psychophysical Approaches</td>
<td>Department of Science &amp; Technology</td>
</tr>
<tr>
<td>Award of General Fellowship to Dr. Akoijam Thoibisana to Work On Research Project Entitled Radical Sociality and the Problem of Relational Ethics:</td>
<td>INDIAN COUNCIL OF PHILOSOPHICAL RESEARCH</td>
</tr>
<tr>
<td>Philosophical Explorations in Language, Ethics, and ‘Periphery Philosophy’</td>
<td>IRCC</td>
</tr>
<tr>
<td>Preparation of Translation &amp; Mathematical Notes of the works of Nilakantha.</td>
<td>INDIAN NATIONAL SCIENCE ACADEMY</td>
</tr>
<tr>
<td>“Development of Calculus in India : A Study on the works of Sankara Varityar”</td>
<td>National Academy of Sciences, India</td>
</tr>
</tbody>
</table>
Sponsored Research Projects

Consultancy Project

The faculty undertakes consulting jobs on various development issues. The income generated in the period under review was approximately 42.0 for four consulting jobs.

Visitors to the Department

Dr. Michael Flagenblat, PhD, Lecturer in Jewish Thought, Australian Centre for Jewish Civilization, Monash University. He delivered a lecture on “Creation without Theodicy: Postmetaphysical Views” on November 23, 2009.

Conferences/ Symposia/ Workshops/ Seminars (Participated/Papers Presented)

National

Trivedi, Pushpa

Co-chaired a session on Mainstreaming Disaster Risk Management in Urban Development and Governance at the Asia Megacities Forum 2009, held at Trident Oberoi, Mumbai, April 23, 2009.

Participated as an invited expert at the Seminar on Inflation Expectations Survey of Households, Department of Statistics and Information Management (DSIM), Reserve Bank of India, Mumbai on August 2, 2009.

Invited to give a Seminar on Capital Inflows and Challenges to Policy Makers: The Indian Context at the Department of Statistics and Information Management (DSIM), Reserve Bank of India, November 13, 2009.


Presented the paper (N.C. Pradhan, co-author) on “Exports-Growth Nexus in India: An Empirical Investigation” at the International Conference on Quantitative Applications in Money, Banking,
Subuddhi K.
Karunamay Subuddhi, was invited to present a paper entitled: ‘Social Construction of Identity and Difference: Marking of the Political Boundary’ at a National Seminar on Politics of Boundary Maintenance: Inclusion -Exclusion Dynamics in North-East India, during 16-17 November, 2009, organized by Indian Institute of Advanced Study in collaboration with Indian Council of Social Science Research, NERC, at Shimla.


Bhat P.R.
Moral Reasoning in Ethics, Language and Tradition — Essays in Philosophy of Professor Rajendra Prasad: Bijayandara Kar; Indian Council of Philosophical Research, 36, Tughlakabad Institutional Area, Mehrauli Badarpur Road (Near Batra Hospital) New Delhi-110062.


“Philosophy of Philosophical Education” in ICPR sponsored Symposium on Current status of Research and Teaching in Indian Universities 23rd to 25th October at Somaiya College, Mumbai.

“Philosophy of Democracy”, Round Table Conference on Democracy organized by ICPR 26th October at Somaiya College, Mumbai.

“Philosophy Ever Growing Discipline”, International Philosophy Day November 30, 2009. organized by Philosophy Department, University of Pune.

“Knowledge, Reality and Value: Their Objective Status” in A Perceptual Account of Nature’s Organization: Natural Philosophy to Natural Science, 18-19th January 2010, organized by Balvant Parekh Centre for General Semantics and other Human Sciences.

“Wittgenstein and Self-Ascription”, organized by Philosophy Department, Pondicherry University, a National Seminar on Consciousness and Self-Identity from 21st to 23rd Jan. 2010

Haripriya G.S.
Addressed the Senior Indian Economic Service Officers in Econometrics at University of Pondicherry, 8 – 9 February 2010

Addressed Indian Forest Service Officers on 19th November at Kerala Forest Research Institute, Peechi, Kerala.

Nath, Rajakishore

“Intelligence Without Mind”, a paper presented in the First Asian Philosophical Congress, held at JNU, New Delhi, from 6-9 March 2010.

Bairy, Ramesh
Presented paper titled “Jaanta Nahin Mera Baap Kaun Hain?!: Signposting the Karnataka Brahmin Trajectory in the 20th century”, Seminar on Social Mobility in South India organised by the Pondicherry University, Pondicherry, September 24-25, 2009.

Participated in the National Seminar on Theorizing Body: Problems and Perspectives, organised by the Department of Philosophy, University of Calicut, Calicut, January 27-29, 2010.

Ramasubramanian, K.
National Meet on History of Mathematical Sciences jointly organized by Indian Society for History of Mathematics and Delhi University, between January 7 and 9, 2010, and gave a talk on “Ganita-kaumudi of Narayana Pandita”.

Atmadarsanam for Human Harmony organized by Jana Seva Trust, Bangalore, between February 5 and 6, 2010, and presented a paper on “Impact of Atmadarsanam on life: Advatic Perspective”.

International Vedic Seminar organized by Sri Venketeswara Vedic University, Tirupati, between March 3 and 5, 2010, and delivered a talk on “Greedy Algorithm in Sulbasutras”.


“Democracy, Secularism and Modernity” in the ICPR - Sponsored National Seminar on Democracy, Secularism and Modernity, Philosophy Department, Madras University 17th to 19th March 2010.
Panda Ratikanta
Invited as a Resource Person and presented a paper entitled “Social Science Research: A Brief Discussion” in the NCERT-Case Research Writing Workshop, held at the Department of Education, M. S. University of Baroda during September 22 – 26, 2009.


George, Siby K.
Presented a paper “Education as Opening the Self to the Other: From Multicultural Facticity to Cosmopolitan Sensibility”, National Conference on Swaraj, Culture, Education, held during January 7-9, 2010, at the Department of Philosophy, Assam University, Silchar.

Presented a paper “Posthuman Dwelling on the Earth: Thinking with Heidegger”, International Philosophy Day Seminar on Environmental Thought in Phenomenological Tradition, held on December 2, 2009, at the Department of Philosophy, Sree Sankaracharya University of Sanskrit, Kalady, Kerala.

Kulkarni, Malhar
“Contribution of Dr. S.K.Belvalkar to Grammatical Studies” in a National Seminar on Contribution of Dr. S.K.Belvalkar to Indological Studies, Bhandarkar Oriental Research Institute, Pune, 8th Jan.2010.


Jung, P.G.
Invited to present a paper titled “Present, My present and Mrgratsna: Reflections on the present in the literary works of Sanu Lama”, National Seminar on Literatures and Oratures as knowledge Systems: Texts from the North-East, Department of Comparative Literature, Jadavpur University, in 2009.

Invited to present a paper titled “The Hidden Culprits: In defense of the Media”, IPCR funded National Seminar on ‘Media and Ethics’, Department of Philosophy, Rabindra Bharati University, in 2009.


Invited to present a paper titled “Theorizing Education in the context of the Loss of the Self”, National Conference on Swaraj, Culture and Education, Department of Education and Department of Philosophy, Assam University, Silchar, in 2010.

International
Ramanathan,A.
11th BIOECON Conference held at Venice, Italy, 20-21 September 2009. Presented a paper titled “Valuing Stakeholder Preferences on Improved Conservation and Management of Kol Wetland – A Contingent Valuation Study”. Also, was discussant for the paper “Social Preferences for Exploiting Commercial Wetlands”.

Haripriya G.S.
Invited Speaker at the ASEAN Conference on Biodiversity, 21st to 23rd October, 2009, Singapore.

Invited Speaker at the International Symposium on Biodiversity, Economy and Business Perspective of Biodiversity and Economics from TEEB” during 17th to 19th February 2010, organized by Institute for Global Environmental Strategies, Tokyo.

Invited speaker for the special event on Celebrating the International Year of Biodiversity 2010, as a side event to the Delhi Sustainable Development Summit on 4th February, 2010.

Trivedi, Pushpa
Represented the Asian Productivity Organization, Japan, as the leading technical expert for at the National Productivity Council, Islamic Republic of Iran at the ‘Second International Conference on Productivity’ organized during 11 to 13 October 2009 and made presentations on Productivity Measurement and Improvement; Productivity, Efficiency Competitiveness and Financial Management; Capital
productivity; and, Methods for Improvement of Productivity, Efficiency and Competitiveness.

Parthasarathy, D.


Presented a paper “Rural, Urban, Regional: Re-spatializing Capital and Politics in India”, Conference on Rural-Urban Networks and Transitions in Asia: Re-spatializing Cultural and Political Imaginaries, 25 – 26 February 2010, Asia Research Institute, National University of Singapore, Singapore.

Shastri, Sudha
“Equivocation in The Merchant of Venice and Macbeth: to keep ‘the word of promise to our ear/And break it to our hope’”, presented at the international conference on Shakespeare and the Art of Lying, organised by the Shakespeare Society of India, and the Indian Institute of Advanced Study, Shimla, 3-7 October 2009.

Nath, Rajakishore
“Supervenience and Emergentism: A Study in Philosophy of Mind”, a paper presented in the International Journal of Arts and Sciences Conference, held at Gottenheim, Germany, from 8-13 November 2009.

Ramesh, B.

Presented paper titled “Jaanta Nahin Mera Bap Kaun Hain!! Signposting the Karnataka Brahmin Trajectory in the Late Colonial Moment”, Seminar on Understanding social exclusion: South Asian context, organised by the Dr. K. R. Narayanan Centre for Dalit & Minorities Studies, Jamia Millia Islamia, New Delhi, March 3-4 2010.

Panda, Ranjan


“The Interiority of Experience: A Reflection on Searle’s theory of Intentionality,” International Conference on From Experience to Thought: Debates in Consciousness, Cognition and Agency, Centre for Philosophy, Jawaharlal Nehru University, New Delhi, 7th – 9th January 2010.

“The Concept of Skin: a reflection on the notion of person in Indian Philosophy” First Asian Philosophy Congress, organized by Indian Council of Philosophical Research New Delhi, held at Jawaharlal University, New Delhi, from 6 to 9 March 2010.


Panda, Ratikanta
Participated and presented a paper entitled “Is Anything Static About Meanings?”, A Wittgenstinian Perspective”, in the International Conference on Philosophy of Language and Linguistics held at the University Lodz from 14th to 16th May 2009.

Participated and presented a paper entitled “Language and World in Wittgenstein: The True Social Bonding” in the 32nd International Wittgenstein Symposium, held at the Kirchberga m Wechsel/Lowe Austria, from 9th to 15th August 2009.

Participated and presented a paper entitled “Gandhi and Lincoln on Slavery and Caste” In the International Conference on Lincoln without Boarders, at IIT Madras during December 18th – 20th 2009.

Pattanaik, Sarmistha


“Examining the Sociology of Development induced Displacement, Rehabilitation and State-managed Dispossession in Eastern Rural India”, at the 82nd Annual Meeting/conference of Japan Sociological Society, sponsored by International Liaison Committee of JSS, held at University of Rikkyo, Tokyo, JAPAN, 11-12 October 2009.

George, Siby K.
Participated in the International Workshop The Other in Religion, held during June 8-9, 2009, at the Arts Department of the Sunway Campus of Monash University, Kuala Lumpur, Malaysia.

Participated in the International Workshop Australia-India Research Dialogue, held during November 20-21, 2009, at the Tata Institute of Social Sciences, Mumbai.

Sirola, Vikram


Ramasubramanian,K.
Conference on History of Mathematics and Astronomy in Ancient India, held on April 24, 2009 at University of Brussels and presented a paper on Evolution of Planetary Models: Aryabhata to Nilakantha.

XXIII International Congress on History of Science, held between July 28- August 02, 2009 at Budapest, Hungary and presented a paper on Samratsiddhanta of Jagannatha Pandita

14th World Sanskrit Conference organised by the International Association for Sanskrit Studies, held between September 1–5, 2009 at University of Kyoto, Japan and presented a paper on Syenaciti.

Khan, Azizuddin
Participated in INAPIC Kickoff Workshop at International Normal Aging and Plasticity Imaging Center, University of Zurich, Switzerland from May 03 to 05, 2010.


Jung, P.G.
Invited to present a paper titled ‘Wittgenstein’s childhood in India through the writings of G.N. Mathrani’, IPCR - funded International Seminar on Philosophy in Colonial India, Department of Philosophy, Pune University, in 2009.

Kulkarni, Malhar

Some issues in editing the Ganapathas in the Kashikavrtti”, 14th World Sanskrit Conference, Kyoto University, Kyoto, Japan, August 31- September 5, 2009(Abstract published and paper accepted for publication).

Some issues in Syntax of modern Sanskrit” with Rajashree Barve, 14th World Sanskrit Conference, Kyoto University, Kyoto, Japan, August 31- September 5, 2009. (Abstract published and paper accepted for publication)

“Svarita in Panini’s Astadhyayi” with Leena Hunnargikar, 14th World Sanskrit Conference, Kyoto University, Kyoto, Japan, August 31- September 5, 2009. (Abstract published and paper accepted for publication)

“Jati, Akriti and Samanya in Vakyapadiya” with Chaitali Dangarikar, 14th World Sanskrit Conference, Kyoto University, Kyoto, Japan, August 31- September 5, 2009. (Abstract published and paper accepted for publication)
K. Narayanan
Presented a paper titled “Technology Sourcing and Internationalisation of IT firms in India” at the 2nd Annual International Conference for the Academic Network for Development in Asia, organised by Nagoya University, Japan at Phnom Penh during January 2010.

Workshops

Ramanathan, A.
Workshop on Economics, Engineering and Technology, organized by Mechanical Engineering Department, National Institute of Technology, Calicut. Topic of Key Note address: “Evolution of Cost Concepts”.

Haripriya, G.S.
Invited Participant at the Fourth Meeting of the United Nations Committee on Environmental-Economic Accounting (UNCEEA), New York, 24-26 June 2009

Invited to participate and present a paper on “GDP of the poor” in the Fifth Bengal Tiger Consultation workshop on Ecosystems, Climate Change and National Development, 28th to 29th July, New Delhi

Invited speaker on “Whether economics would help conserve tiger habitats” at the Global Tiger Initiative Workshop, held in Kathmandu from October 27th to October 30th 2009.

Invited to participate at the Second International Expert Meeting on Classification of Ecosystem Services and the Special meeting on ecosystem capital accounting, held during 2nd to 4th December, at EEA Premises in Copenhagen.

Officially selected to attend the International Workshop on Innovative Financial Mechanisms to be held in Bonn, Germany, from 27th to 29th January 2010.

Conducted the workshop on the Economics of ecosystems and biodiversity (TEEB) for local and regional policy in collaboration with Ashoka Trust for Research in Ecological Economics (ATREE), BANGALORE 12th MARCH 2010.

Conducted the workshop on the Economics of ecosystems and biodiversity (TEEB) for local and regional policy in collaboration with BNHS, CAT and GIST), Mumbai, 13th April, 2010.

Jung P.G.


Invited to deliver a series of three lectures on Technocracy and the Scientific Ideology – for a National Workshop on General Semantics: Reflections on an Enlightened Living, Department of English, Bangalore University, February, 2010.

Invited to deliver a series of three lectures on The story of the self through the narrative of Enlightenment- for a National Workshop on Critical thinking and the Modernist Way, Department of Humanities and Social Sciences, Indian Institute of Technology, Kharagpur, February-March, 2010

Kulkarni Malhar
“Sanskrit WordNet”, in a 7 day workshop on Sanskrit Computational Linguistics, University of Hyderabad, 16th December 2009.

Invited to participate in the National Workshop on Indo-Wordnet at Koimbatore, 11-14 June 2009.
Invited to participate in the National Workshop on Indian Language Corpora Development at Dravidian University, Kuppam, 28-29 August 2009.

Invited Lectures

National

Ramanathan, A.
“FDP on Research Methods in Sciences, Engineering and Management”, June 8-9, 2009, organised jointly by Department of Mechanical Engineering and Centre for Continuing Education, National Institute of Technology, Calicut, Kerala

Refresher course programme on “Current Development in Economics”, organized by UGC Staff College & Department of Economics, Goa University, Feb. 27 & March 1, 2010.

Bhat, P.R.
“Relativism, Pluralism, Objective Values” Invited Lecture at HBESE, Tata Institute of Fundamental Research, Mankhurd, Mumbai 24th September. 2009

Invited Lectures on (1) Philosophy of Language, (2) Wittgenstein’s Philosophy of Language, (3) Bhartrahari’s Philosophy of Language as part of UGC’s Special Assistance Programme at North Bengal University, Silliguri from 29th to 31st March 2010.
Trivedi, Pushpa
Invited to make presentation on Macroeconomic themes by the Department of Statistics and Information Management (DSIM), Reserve Bank of India, Mumbai on following themes: (i) Monetary targeting, inflation targeting, multiple indicator approaches; (ii) Exchange rates: Arrangements and determinants; (iii) International monetary systems; (iv) Financial integration and its implications for the conduct of monetary policy in a small open economy during Feb-Mar., 2009.

Bairy, Ramesh
“Research Practices”, Centre for Women’s Studies, Tata Institute of Social Sciences, Mumbai, August 20, 2009.

“Making Sense of ‘Merit’ as Reservation”, Consultation on the Reservations Policy, SNDT University, Mumbai organised jointly by the Centre for Study of Social Exclusion and Inclusive Policy, SNDT University and YUVA, Mumbai, December 2009.

George, Siby K.


Ramasubramanian, K.
Lecture on Calculus in Prose and Poetry: Invention of the Kerala School organized by the Kerala School of Mathematics, Kozhikode, on December 5, 2010.

Talk on Nilakantha Somayaji: A Versatile figure in the Kerala School organized by Marathi Vigyan Parishad, Mumbai on December 12, 2009.

Kulkarni, Malhar

“Grantha Script”, Department of Sanskrit, University of Mumbai, 9th Jan.2010.

“Sanskrit WordNet”, University of Hyderabad, 16th December 2009.

“Computer aided research in Sanskrit Phonetics” at the University of Rajasthan, Jaipur, 19th July, 2009.

Khan, Azizuddin

Jung, P.G.
Invited to deliver a talk titled “Awe: Speculations into its evolution” in Centre for General Semantics and Other Human Sciences, Varodara, 2009

International

Sebastian, C.D.
Key-note Paper on “The Fall of the Self and Rise of Mom-Self in Indian Thought: An Exploration of the Buddhist Conception of Anatman” in International Conference on ‘Category of Subject in Philosophy of the East and West’ held at Lodz, Poland during 11-12 May 2009.

“Sunya and Complementarity: Linguistic Extrapolation in Madhyamika Buddhism and Quantum Physics” in the International Conference of the First Asian Philosophy Congress organized by MHRD, UNESCO, and Indian Council of Philosophical Research (ICPR) to be held on 6-9 March 2010, at Jawaharlal Nehru University, New Delhi.

Parthasarathy, D.

Kulkarni, Malhar


Significant Awards/ Distinctions

Trivedi, Pushpa
Member of the Jury for the Exim Bank’s International Economics Development Research Annual (IEDRA) Award

Sebastian, C.D.
Sebastian, C. D., Editor, Journal of Sacred Scriptures, ISSN: 0974-0090
DAAD Forschungsaufenthalt Fellowship for the research project on “Myth and Logos in Indian and European Traditions” 2010.

Parthasarathy D.
Member, Task Force on Microfinance in Maharashtra, Government of Maharashtra
Visiting Senior Research Fellowship, Asia Research Institute, National University of Singapore, Singapore, 2008-09
Convener, Research Committee 03 on “Economy, Polity, and Society”, Indian Sociological Society.

Nath, Rajakishore
Recipient of the Best Conference Paper Award-2009 on “Supervenience and Emergentism: A Study in Philosophy of Mind” from International Journal Arts and Sciences Conference, which was organized from 8th to 13th November 2009 at Germany.

Pattanaik, Sarmistha
Recipient of “Japan Sociological Society (JSS/ILC) Grant” Award for Non-Japanese Young Sociologists in the 82nd Annual Meeting of JSS, University of Rikkyo, Tokyo, (International Sociological Association) and supported by International Liaison Committee of JSS, 2009 “Japan Sociological Society” , University of Tokyo, Tokyo, Japan. October 2009.

Kulkarni, Malhar
“Maharshi Badarayana Vyasa Samman” An award bestowed by the President of India for the contribution to the interdisciplinary field for the year 2009. The award carries a shawl, a citation and Rs. One lakh.
Invited as a Visiting Professor, at the University of Lausanne, Switzerland for the period of three months-September 2009 to December 2009.
Invited to chair two sessions in the Vyakarana section proceedings at the 14th World Sanskrit Conference, Kyoto, Japan, 31st August-5th September 2009.

K. Narayanan
Was nominated by the Government of India to represent India at the United National Conference Convention on Climate Change [UNFCCC] organised meeting on Vulnerabilities to Climate Change, held at Cairo, Egypt during April 2009.
Invited as a resource person for a Workshop on Climate Change organised by the Global Development Network, held during their annual international conference at Prague, Checz Republic during January 2010.

Honorary Work

Pushpa Trivedi
Reviewed papers for Indian Economic Review and Indian Economic Journal

Parthasarathy. D.

Nath, Rajakishore
Reviewed papers for Philosophical Papers and Reviews March 2010, published by Academic Journals

Ghadially, R.
Expert: Selection Committee for Faculty IIT Hyderabad August 6-7, 2009.

Referee for a doctoral thesis. *SNDT University*, Mumbai, October 22, 2009


**Kulkarni, Malhar**
Member of the Regulating Council of the Bhandarkar Oriental Research Institute, Pune.

Honorary Professor, M.M. Abhyankarshastri Pathashala, Pune.

Member, Examination Council, Vedashastrottejaka Sabha, Pune.

Member of the Steering Committee, 4th International Sanskrit Computational Linguistics Symposium proposed to be held at JNU, Dec. 2010.

**Kulkarni, Malhar**
Member of the Regulating Council of the Bhandarkar Oriental Research Institute, Pune.

Honorary Professor, M.M. Abhyankarshastri Pathashala, Pune.

Member, Examination Council, Vedashastrottejaka Sabha, Pune.

Member of the Steering Committee, 4th International Sanskrit Computational Linguistics Symposium proposed to be held at JNU, Dec. 2010.

**Faculty Members and their Specializations**

**Economics**

1. **L.M. Bhole**

2. **A. Ramanathan**
   Managerial Economics, Applied Econometrics, Monetary Economics.

3. **P.L. Trivedi**
   Open Economy Macroeconomics, International Trade and Finance, Indian Economy, Environmental Economics.

4. **K. Narayanam**

5. **Haripriya G.S.**
   Natural resource and environmental economics, Water resource Economics, Green Accounting, Environmental Policy.

6. **Puja Padhi**
   Financial Economics, Monetary Economics

7. **Surajit Bhattacharyya**
   Macro Economics, Industrial Economics, and Corporate Investment

**English**

1. **M.S. Malshe**
   Modern Critical Theory, Aesthetics, Linguistics and English Language Teaching.

2. **Neelima Talwar**
   Indian and Western Drama, Modern Literature, Creative Writing, Literature/Drama and Contemporary Media, Conscientization method for Language Teaching.

3. **Sudha Shastri**
   Novel, Victorian Studies, Postmodern Literature and Intertextual theory

4. **Vaijayanthi Sarma**
   Syntactic theory, First language acquisition, Linguistic deficits, Language processing, Conservation of endangered languages (especially Dravidian minority languages)

5. **Sharmila**
   Women’s Studies, Autobiography Studies, “Crisis” in English Studies, African American Writing

6. **Ratheesh Radhakrishnan**
   Masculinity studies, gender, Feminist Theory, Film History and Theory, Cultural Studies, 19th and 20th Century Literatures

**Philosophy**

1. **P.R. Bhat**
   Philosophy of Language, Contemporary Western Philosophy, Meta-Ethics.

2. **C.D. Sebastian**
   Buddhism, Classical Indian Philosophy, Comparative Religion, Comparative Philosophy, Vedanta Philosophy

3. **Vikram Singh Sirola**
   Analytic Philosophy, Contemporary Western Philosophy

4. **Ranjan K. Panda**
   Philosophy of Mind, Analytic Philosophy
5. **Ratikanta Panda**  
Wittgenstein's Private Language, Argument: A Re-examination Argument in Philosophy of Language

6. **Siby K. George**  
Twentieth Century Continental Philosophy, Development Ethics

7. **Rajakishore Nath**  
Philosophy of Artificial Intelligence, Philosophy of Mind, Cognitive Science

8. **Jung P.G.**  
Contemporary Western Philosophy

**Psychology**

1. **Rehana Ghadially**  
Stress Management, Women’s Studies/Psychology, Gender Roles

2. **Meenakshi Gupta**  
Social Psychology, Organizational Behaviour, Human Resource Development

3. **T. Bhattacharya**  
Health and Clinical Psychology, Psychosomatic disorders, Stress & Coping, subjective well-being, ergonomics, cross-cultural personality

4. **Pooja Purang**  
Organizational Behaviour, Culture and Ethics in Organizations, HR issues, Personality

5. **Azizuddin Khan**  
Cognitive Psychology, Clinical Psychology, Neuro Psychology, Ergonomics, Event Related Potential

6. **Mrimoyi Kulkarni**  
Social Psychology, Fertility, Health Behaviours, Role of Psychology in Development

**Sociology**

1. **Subuddhi K.**  
Technology and Developent; Political Sociology; Environmental Sociology; Rural Sociology; International and Global Sociology.

2. **R. Robinson**  
Religion and Social Movements, Sociology of Contemporary India, Social Change, Family and Kinship.

3. **D.Parthasarathy**  
Development Studies, Agricultural Sociology, Law and Governance, Urban sociology, Socioeconomic impact assessment, Vulnerability and Adaptation to Climate Change, Caste and Ethnic Conflicts.

4. **Kushal Deb**  
Urban Sociology, Ethnicity and Multiculturalism Sociological Theory, Sociology of Development.

5. **Sarmistha Pattanaik**  
Political ecology, environmental politics with a focus on social inequality and natural resource conflicts, marginalization, environmental and indigenous social movements in India, sustainable development and climate change ethics.

6. **Ramesh Bairy**  
Social Stratification; Contemporary Caste; Religious Institutions

**Cell for Indian Science and Technology in Sanskrit (CISTS):**

1. **Malhar Kulkarni**  
Sanskrit language, Paninian Grammar, Philosophy of language, Aesthetics in Sanskrit Texts

2. **K. Ramasubramanian**  
Astronomy (Jyotisha), Mathematics (Ganita), Logic (Nyaya-sastra), Philosophy (Advaita-Vedanta), Meta-Physics, Self-development, Application of Non-linear Dynamics.
Introduction

The year witnessed excellent contributions and achievements of faculty and students in research; interaction with industry and noted national and international institutes, universities and organizations; and extended educational activities beyond the departmental academic programs.

Some of the notable events are:

Prof. U. K. Anandavardhanan being awarded NASI Young Scientist Platinum Jubilee award (2009); Prof. Murali K. Srinivasan being awarded Excellence in Teaching award (2008); Prof. Ravi S. Kulkarni and Prof. Vishnu D. Sharma being selected as Chair Professors of the institute (2009).

As a part of Golden Jubilee celebrations, many distinguished visitors like Manjul Bhargava, F. Coulouvrat, R. Jeltsch, M. Ram Murty, I.B.S. Passi, T. Ruggeri visited the department and delivered several lectures.

The department organized Dr. P.V. Sukhatme Award Lecture Series during January 26-28, 2010. Prof. J. K. Ghosh (ex-director of ISI, Kolkata) delivered Dr. P.V. Sukhatme Memorial Lecture on “Two Groups and One Group Model for Multiple Tests for Microarrays and other Examples – A Survey and New Results”. Prof. R.B. Bapat (ISI Delhi), Dr. A.D. Dharmadhikari (Tata Motors), Prof. B.K. Kale (ex-faculty of Pune University), Prof. J.V. Deshpande (Pune University), and Dr. Chitra Lele (Sciformix India Ltd.) also gave talks during this week.

Academic Programs

<table>
<thead>
<tr>
<th>Student Intake</th>
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<tbody>
<tr>
<td>Ph.D : 15</td>
</tr>
<tr>
<td>M.Sc. (MA) : 22</td>
</tr>
<tr>
<td>M.Sc. (ASI) : 22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Degree Awarded</th>
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</thead>
<tbody>
<tr>
<td>Ph.D. : 04</td>
</tr>
<tr>
<td>M.Sc.(MA) : 11</td>
</tr>
<tr>
<td>M.Sc. (ASI) : 19</td>
</tr>
</tbody>
</table>

Besides the teaching of B. Tech. courses, the department offers M.Sc. and Ph.D. programs. It has two distinct M.Sc. programs: M.Sc. in Mathematics and M.Sc. in Applied Statistics and Informatics (ASI). In addition, the department has a vibrant research programme leading to Ph.D. degree.

R & D Activities

Continuing with its tradition, the department has further augmented its basic research, focusing in contemporary areas of fundamental, developmental and strategic importance, applied and interdisciplinary research and productive collaboration with industries and reputed R & D departments. The collaborating R & D institutions/organizations include: TIFR, IISc, ISI, ONGC, Institute of Mathematical Sciences and foreign universities like Brunei University (U.K), Florida Technical University (USA), Colorado School of Mines (US), Humboldt University (Germany), CNRS-IML, Marseille (France), INSA, Toulouse (France), Univ. St-Etienne (France), l’Université Pierre et Marie Curie, Paris (France), Vilnius University, Lithuania, Emory University, US, French Naval Academy, Universität Bielefeld, Germany, and nodal organizations such as CSIR, DAE, DBT, DST, for scientific exchange of ideas of national importance. In order to fulfill the broad objectives of research activities, steps are taken to ensure that, the theoretical bases in emerging areas are strengthened, interdisciplinary problems requiring mathematical
solutions are identified, interaction between Indian and overseas scientists are facilitated, local talents are well nurtured through lecture series and instructional workshops by evolving a pool of trained manpower in thrust areas. During this year, the department organized two advanced instructional schools, a seminar meeting in Hyperbolic and Parabolic PDEs, a CEP course, a national conference. A weekly seminar in Number Theory was also organised which ran for almost full year. This year the Department has witnessed a steady increase in the number of quality publications.

**Sponsored Research Projects**

<table>
<thead>
<tr>
<th>Sponsored Projects</th>
<th>Sponsoring Agency</th>
<th>Status (New/Ongoing/Complete)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ongoing</td>
<td>DST</td>
<td>New</td>
</tr>
<tr>
<td>New</td>
<td>IRCC</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Completed</td>
<td>IRCC, IIT Bombay</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Faculty Involved</td>
<td>Department of Biotechnology (DBT)</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Jobs</td>
<td>Ministry of Information Technology (MoIT)</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Faculty Involved</td>
<td>IFCPAR/CEFIPRA (Indo-French Centre for Advanced Research)</td>
<td>New</td>
</tr>
<tr>
<td>Consultancy Jobs</td>
<td>DST (Indo-Brazil)</td>
<td>New</td>
</tr>
<tr>
<td>Contact with UK</td>
<td>Tata Motors Finance Ltd.</td>
<td>Complete</td>
</tr>
</tbody>
</table>

**Consultancy Projects**

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Sponsoring Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Validation of Application Credit Scoring Models</td>
<td>Tata Motors Finance Ltd.</td>
</tr>
</tbody>
</table>
Extension Activities

Workshops and Conferences


**Advanced Instructional School** on “Atiyah-Singer Index Theorem”, IIT Bombay, 6 July – 1 August, 2009.


**Annual Foundation School-I** at Bhaskaracharya Prathisthana June, 2009.


Seminars

Number Theory Seminar (Dipendra Prasad)

CEP Courses

Third PD & TO, Professional Development and Technology Orientation for school teachers, April 26-June 28, 2009.

Visitors to the Department

**R. B. Bapat**, ISI, Delhi. He delivered lectures in the department Combinatorics seminar.

**Manjul Bhargava**, Princeton University, USA. He delivered a Colloquium talk.

**F. Coulouvrat**, University of Paris 6, Paris, France. He gave two seminar talks.

**Kalyan Das**, University of Calcutta, Kolkata. He gave lectures in the Statistics and Probability seminar.

**S. Gadgil**, IISc, Bangalore.

**Arnaldo Garcia**, IMPA, Rio de Janeiro, Brazil. He gave lectures in the Geometry and Topology seminar.

**R. Jettsch**, Swiss Federal Institute of Technology, Zurich. He gave an institute colloquium on “Leonhard Euler- His life, personality, discoveries and their impact today”. He gave two lectures in the department.

**Dany Leviatan**, Tel Aviv University, Israel. He gave a lecture in the Analysis seminar.

**M. Ram Murty**, Queen’s University, Canada. He delivered many lectures including an Institute Distinguished lecture.

**I. B. S. Passi**, IISER, Mohali.

**Mainak Poddar**, ISI, Kolkata. He gave a lecture in the Geometry and Topology seminar.

**T. Ruggeri**, University of Bologna. He delivered a series of five lectures on “Entropy Principle and Hyperbolic Dissipative Systems”.

Conferences /Symposia /Workshops / Seminars (Participated / Paper presented)

National

**Anandavardhanan, U. K.**


Attended the 79th Annual Session of the National Academy of Sciences India, Kolkata, 14-16 December 2009.

**Das, Ashish**

“Eis(s^2)-optimal supersaturated designs”, in the 12th Conference of the Society of Statistics, Computer and Applications held at Viswa Bharti University, Santiniketan, during February 24-26, 2010.

**Garge, Shripad M.**


**Ghorpade, S. R.**


A series of five lectures on “Linear recurrence equations over finite fields”, Discussion Meeting on Finite Fields and Coding Theory, Harish-Chandra Research Institute, Allahabad, November 2009.
“Generalized Reed-Muller codes”, *Discussion Meeting on Finite Fields and Coding Theory*, Harish-Chandra Research Institute, Allahabad, November 2009.

A series of two lectures on “Fundamental theorem of calculus and its generalizations”, *Refresher Course for College Teachers of Mathematics*, University of Pune, Pune, November 2009.

“Gaussian binomial coefficients in geometry and coding theory”, *Symposium on Recent Trends in Discrete Mathematics, 97th Indian Science Congress*, University of Kerala, Thiruvananthapuram, January 2010.


**Joshi R.R.**
Two invited talks on “Scientific Validation of Ancient Medical Sciences and New Paradigms for Gene Therapy” and on “Computational Pulse Diagnostics” at *National Symposia on Ancient Medical Therapies*; for Indian Medical Association, Surat and Vadodara Chapters on 5 & 6 Sept., 2009.


Two invited talks at *National Workshop on Data Mining and Data Warehousing*, National Institute of Technology (SVNIT), Surat, 29, Dec. 2009.

**Ranjan, Akhil**
A course of Seven lectures and 10 tutorials in the Advanced instructional school on Atiyah-Singer Index Theorem.

**Raghunathan, Ravi**

**Shastri, A. R.**

Gave 10 lectures in AFS-1 Complex Analysis and five lectures in Algebraic topology. In Bhaskaracharya Pratishthan, Pune.

Gave lectures and conducted tutorials at Advanced Training in Mathematics for Lecturers in ‘Complex Analysis with Modern Perspective’, organized at Department of Mathematics, Delhi University, 16th March to 4th April 2009.

Gave seven lectures on Topological Aspect of the Index Theorem. In Advanced Instructional School on Atiyah-Singer Index Theorem organized at Department of Mathematics, IITB during July 2009.


**Sharma, V. D.**
*Lecture “on resonantly interacting waves”* delivered at the *Seminar meeting of Hyperbolic Systems of PDEs*, held at IIT Bombay from 20-23 Nov. 2009.


**Verma, J. K.**
“Normal Hilbert polynomials”, *97th Indian Science Congress*, Thiruvananthapuram, 3-7 Jan, 2010.

“Normal Hilbert polynomials”, *Colloquium on Recent Trends in Algebra and Algebraic Number Theory* (in honour of Professor Passi) November 25th-27th, 2009, Panjab University, Chandigarh.


**International**

**Das, Ashish**
“Optimal supersaturated designs”, in the *DAE2009 Conference* held at Department of Statistics, University of Missouri, Columbia, USA, during October 14-17, 2009.

**Garge, Shripad M.**
Attended conference on arithmetic and algebraic geometry, Bielefeld, Germany, June 2009.

“Subfields of quaternion algebras” *A colloquium* in the honour of Prof. Passi, Chandigarh, November 2009.
Ghorpade, S. R.

“Determinantal hyperplanes over finite fields”, II Indo-Brazilian Symposium in Mathematics, Tata Institute of Fundamental Research-Centre for Applicable Mathematics, Bangalore, December 2009.

“Matrices, polynomials, and sequences over finite fields”, International Conference on Algebra and its Applications, Aligarh Muslim University, Aligarh (UP), February 2010.

Joshi R.R.
One invited talk at 1st IFIP International Conference on Bioinformatics, SVNIT, Surat, March 25-28, 2100

Mukhopadhyay, S.
Co-authored a paper “Selecting a Stroke Risk Model using Parallel Genetic Algorithm”, presented in 1st IIMA International Conference on Advanced Data Analysis, Business Analytics and Intelligence, held at IIM Ahmedabad, June 2009.

Presented a poster “Robust Parameter Design for GLMs,” 2009 Design and Analysis of Experiments during October 14 – 17, 2009 in University of Missouri, Columbia, USA.


Raghu Nathan, Ravi


Sabnis, Sanjeev
Gave invited talk in an International Conference on Recent Developments in Probability and Statistics held at Department of Statistics at University of Pune during December 21-23, 2009.

Verma, J. K.

Invited Lectures

National

Ghorpade, S. R.

“Stories from the theory of equations”, PRAGYAA-2010 (A National Intercollegiate Festival), Shri Guru Gobind Singhji Institute of Engineering and Technology, Nanded, March 2010.


Joshi R.R.

Invited 8 Lecture-Series on Advanced Applications of Neural Networks in Protein Structure Function Modeling. Centre of Excellence in Bioinformatics, at Pune Univ. Campus, Pune. 4-5 March, 2010.

Invited talk on “Classification & Regression Tress in Clinical Trials” at Bioinformatics Centre, MG Institute of Medical Sciences Sevagram, Wardha. March 31, 2010.

Raghu Nathan, Ravi

Sabnis, Sanjeev
Gave three lectures on “Survival Analysis” in a short-term course entitled Statistics & Pattern Recognition for Automated Diagnostics held at School of Medical
Shastri, A. R.
Gave two 90 minutes talks on 16th December 2009 to School Children under the INSPIRE programme of DST organized at NEHU Shillong.

Visited ISI Kolkata on 18th December 2009 and gave a Colloquium talk on “Mapping degree and Euler’s proof of Fundamental Theorem of Algebra”.

Visited IIT Guwahati on 25th March 2010 and gave a colloquium talk on “Linear Algebra Proof of Fundamental Theorem of Algebra”.

Gave an invited colloquium talk on “Linear Morse functions” at TIFR Bangalore centre, 19th May 2009.

Verma, J. K.
“Solving polynomial equations”, S. P. College, Pune and Pune University, Jan 9, 2010.

“Polynomial equations and volumes of polytopes”, BITS Pilani, 7 March, 2010.

Significant Awards and Distinctions
Anandavardhanan, U. K.
NASI-Young Scientist Platinum Jubilee Award, National Academy of Sciences India, Allahabad, 2009.

Das, Ashish
5th M.R. Pai Memorial Award 2009.

Keshari, Manoj Kumar
BOYSCAST Fellowship 2008-09.

Kulkarni, Ravi
Institute Chair Professor (2009).

Keshari, Manoj Kumar
Visiting fellow, OCCAM, Oxford University, Oxford (UK) (2009).

Sharma, V. D.
Institute Chair Professor (2009).

Shastri, A. R.
Visiting Professor at NEHU Shillong.

Honorary Work
Anandavardhanan, U. K.
Reviewer for AMS MathSciNet
Reviewer for Zentralblatt MATH
Refereed Ph.D. Thesis for Université Paris VII
Refereed research papers for:
(i) American Journal of Mathematics
(ii) International Journal of Number Theory
Garge, Shripad M.
Reviewer for Zentralblatt.

Ghorpade, S. R.
Member, Council of Editors, Resonance.
Member, Editorial Board, International Journal of Information and Coding Theory.
Expert Member, Board of Studies in Mathematics and the Faculty of Science, The M.S. University of Baroda, Vadodara, Gujarat, 2009-10.
Member, Selection Committee for Mathematics Faculty, SGGGS Institute of Engineering & Technology, Nanded, May 2009.
Referee for the journals: Finite Fields and Their Applications (Elsevier) and Mathematics Student (Ind Math Soc), July-August 2009.
Member, Selection Committee for Mathematics Faculty, Sambalpur University, Orissa, October 2009.
Advisory Editor, Course Material in algebra, Indira Gandhi National Open University, New Delhi, July-October 2009.
Member, Selection Committee for Mathematics Faculty, Indian Institute of Science Education and Research, Mohali, October 2009.
Member, Selection Committee for Mathematics Faculty, St. John College of Engineering and Technology, Palghar, November 2009.
Member, Undergraduate Curriculum Development Committee, Indian Institute of Technology Gandhinagar, January 2010.
Member, Selection Committee for Mathematics Faculty, Rajiv Gandhi University of Knowledge Technologies, Hyderabad, March 2010.

Joshi, R.R.
Reviewer for “Proteins: Structure, Function, Bioinformatics” and “Journal of Biological Systems”. Statistics expert for review of projects submitted to DST and DBT.

Kulkarni, Rekha P.
Refereed papers for international journals

Limaye, B. V.
Reviewed papers for Applied Mathematics Letters, August 2009, January 2010

Mukhopadhyay, S.
Reviewed papers for Statistical Methodology.

Pani, Amiya K.
Editorial board member of 3 international journals and one national journal.
Refereed 6 Ph.D. theses
Reviewer for the journals
* SIAM Journal of Numerical Analysis
* IMA Journal of Numerical Analysis
* Numerical methods in PDE
Reviewer for several National and International projects.

Raghunathan, Ravi
Reviewer for Mathscinet.

Sabnis, Sanjeev

Sharma, V. D.
Reviewed papers for Zentralblatt (Germany) and Maths Reviews (USA).
Served as a member of the Selection committee at IIT Bhubaneswar, IIT Roorkee, and UPSC, New Delhi

S. Sivaji Ganesh
Refereed a paper for an international journal.

Verma, J. K.
Convener, NBHM Committee, Advanced Training in Mathematics Schools, 2010-2013.
Reviewer for Mathematical Reviews.
Member, Editorial Board, Ramanujan Mathematical Society Lecture Notes Series.
Member, Board of Trustees, Bhakaracharya Pratishthana, Pune.

Faculty Members and their Specializations

1. Anandavardhanan, U. K.
   Number Theory
2. Athavale, Ameer
   Functional Analysis
3. Baskar, S.
   Hyperbolic Conservation Laws: Theory, Numeric and Applications
4. Das, Ashish
   Design of Experiments
5. Dey, Santanu
Number Theory, Linear Algebraic Groups

6. Garge, Shripad M.
Algebraic Geometry, Combinatorics

7. Ghorpade, Sudhir R.
Algebraic Geometry, Combinatorics

8. Joshi, Kapil D.
Topology, Discrete Mathematics

9. Joshi, Rajani R.
Computational Biology, Biostatistics and Bioinformatics

10. Kaipa, Krishna

11. Keshari, Manoj Kumar
Commutative Algebra (Projective modules)

12. Kulkarni, Ravi S.
Differential Geometry

13. Kulkarni, Rekha P.
Numerical Functional Analysis, Spline Theory

14. Limaye, Balmohan V.
Functional Analysis, Numerical Analysis, Spectral Approximation

15. Mahajan, Swapneel
Geometry and Topology

16. Mukhopadhyay, Siuli
Statistics

17. Nataraj, Neela
Finite Element Methods

18. Pai, Devidas V.
Functional Analysis, Approximation Theory, Set-valued Analysis

19. Pani, Amiya K.
Numerical Analysis, Partial Differential Equations, Industrial Mathematics

20. Puthenpurakal, Tony J.
Commutative Algebra

21. Raghunathan, Ravi
Automorphic forms, Number Theory

22. Raman, Preeti
Number Theory

23. Rana, Inder K.
Harmonic Analysis, Mathematics Education

24. Ranjan, Akhil
Differential Geometry

25. Sabnis, Sanjeev
Reliability Theory, Industrial Statistics

26. Sharma, Vishnu D.
Quasilinear Hyperbolic Systems of PDEs/Nonlinear Waves

27. Shastri, Anant R.
Algebraic Geometry, Algebraic Topology

28. Sista, Sivaji Ganesh
Partial Differential Equations

29. Sivasubramanian, S.
Combinatorics

30. Srinivasan, Gopal K.
Partial Differential Equations

31. Srinivasan, Murali K.
Combinatorics

32. Subramanyam, A.
Statistical Inference, Geostatistics

33. Suresh Kumar, K.
Stochastic Differential Game Theory, Mathematical Finance.

34. Vellaisamy, P.
Applied Probability, Statistical Inference, Industrial Statistics

35. Verma, Jugal K.
Commutative Algebra

Adjunct Faculty

1. Balwant Singh
Commutative Algebra

2. Dipendra Prasad
Number Theory

Distinguished Guest Professor

3. Manjunal Bargava
Number Theory

4. M. Ram Murthy
Number Theory
Introduction

The Department of Mechanical Engineering is the second largest in terms of number of faculty (42) and students. The department has been constantly striving to improve its achievements in both manpower training and research and resetting its goals keeping in view up-to-date national needs. During the year under review, actions have been taken to further upgrade some of the existing laboratories, e.g., Strength of Material, Refrigeration and Air Conditioning, Heat Transfer, I.C. Engine, Workshop Practice Lab, etc. Further, initiatives have been taken to set up laboratories on rapid prototyping and CFD.

The department annual function, Radiance 2010, was organized on 13-14 March, 2010, under the banner of Mechanical Engineering Association, to foster fellowship amongst the members of the mechanical engineering fraternity, to bring experts from industry and academia on a common platform for exchanging thoughts and ideas, to provide a window for presentation of creative abilities of students, enable entertainment and learning through arrangement of invited lectures and workshops, and bring out challenges and opportunities in mechanical engineering. About 1100 students and faculty from within and outside the institute participated.

Research activities have been encouraging in the areas of thermal hydraulics, refrigeration, air conditioning, cryogenics, heat and mass transfer, CAD/CAM, modeling of manufacturing process, mechatronics, MEMS, Nanotechnology, smart structure and materials, structural health monitoring, fracture mechanics, etc. Prof. A.W.Date was awarded Rahul Bajaj Chair Professorship, IIT Bombay. Prof. S.K.Maiti was awarded G.K.Devarajulu Chair Professorship in Mechanical Engineering. The whole faculty have contributed as before to national R & D programs of DAE, ARDB, ISRO, DRDO, AERB, DIT, DST, BARC and ONGC, industrial consultancy activities, continuing education programs (CEP), national and international journals, and conferences. The department offers formal degree programmes leading to B.Tech., M.Tech., and Ph.D. It also offers the dual-degree programme.

At the M.Tech. level, there are three specialisations:

- Thermal and Fluids Engineering
- Design Engineering
- Manufacturing Engineering

At the Dual-Degree level also there are three specialisations:

- Computer-Aided Design and Automation
- Computer-Integrated Manufacturing
- Thermal and Fluids Engineering

Academic Programmes

<table>
<thead>
<tr>
<th>Students admitted in 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Tech. : 81</td>
</tr>
<tr>
<td>Dual Degree : 37</td>
</tr>
<tr>
<td>M.Tech. : 95</td>
</tr>
<tr>
<td>Ph.D. : 22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Degrees Awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Tech. : 44</td>
</tr>
<tr>
<td>Dual Degree : 43</td>
</tr>
<tr>
<td>M.Tech. : 56</td>
</tr>
<tr>
<td>Ph.D. : 10</td>
</tr>
</tbody>
</table>

R and D Activities

Main areas of R & D activity

- Development of computational model for large water cooled nuclear reactors and analysis of transients using the model developed.
- Gas Dynamics, Electronics Cooling, Heat Transfer Enhancement
• Research activities in the area of Gas Dynamics include development/implementation of numerical schemes for the simulation of a variety of compressible flow phenomena including shock-structure interactions, hypersonic flow over re-entry vehicles, shock-density interface interactions, shock wave and related phenomena at rarefied conditions/microscales, etc. The activities in the area of Electronics Cooling include design and development of novel cooling solutions for the next generation high heat flux processors using traditional approaches, investigation of two-phase flow and heat transfer in microchannel heat sinks, and a fundamental study of synthetic-jet based electronics cooling. A sponsored project from MHRD is completed in the area of Electronics Cooling dealing with some of the techniques mentioned above, while one project sponsored by DIT is ongoing. A new project, sponsored by ISRO, is initiated to investigate behavior of kerosene-based nanofluid for internal convective heat transfer enhancement.

• Two phase flow and heat transfer

• Simulation of Flows with Interfaces, Thermo-Chemical Modeling of Wood Burning Stove, Heat Transfer enhancement in rotating pipe with a twisted tape insert

• Fire dynamics, Jet impingment heat transfer, Flow metering, Gas turbine blade cooling, melting of low and high Pr fluids

• Welding Science and Technology, Process Modeling

• Refrigeration & Cryogenic Engineering

• Particle based simulation of fluids and plasmas, generation of particles in IC Engines and plasma based methods, using particles to develop novel fluids

• MEMS, Mechatronics, Microstereolithography, Nonlinear control

• Crack propagation through elastic-plastic materials

• Dynamic fracture and component health monitoring

• OrthoCAD project: A novel modular rotating-hinge total knee prosthesis has been developed, suitable for limb-saving surgery of young patients affected by bone cancer. 3D visualization and surgery planning software has also been developed.

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Sponsoring Agency</th>
<th>Status (New/Ongoing/Complete)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Evaluation Of The Capability Of Moderator To Act As A Heat Sink To Remove The Decay Heat Of AHWR Fuel Bundles During An Accident Condition”</td>
<td>BRNS</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Surface-Induced Mechanical Energy Dissipation in MEMS Resonators”</td>
<td>IRCC</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Modeling and Measurement of Contact Conductance Between Two Structural Components”</td>
<td>BRNS</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Finite Element Modeling &amp; Simulation of Spherical-Indentation Test”</td>
<td>IGCAR</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Development Of A 3-D Space-Time Kinetics Model For The Analysis Of Light Water Reactors”</td>
<td>AERB</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Synthetic Jet Based Cooling for High Heat Flux Electronic Components: A Novel Approach</td>
<td>DIT</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Project Title</td>
<td>Sponsoring Agency</td>
<td>Status (New/Ongoing/Complete)</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>“Experimental Optimization of confined air Multiple Jet Impingement on a smooth and Rough Flat Plate”</td>
<td>ISRO</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Experimental and numerical investigation into fatigue ratcheting behavior of pressurized piping components”</td>
<td>BRNS</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Development of Two Stage Pulse Tube Cryocooler for 20K using linear Compressor”</td>
<td>BRNS</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Design and Development of Moving Magnet Type of Linear Compressor for Cryocoolers”</td>
<td>I.I.T., Bombay</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“ Development of a Mixed Refrigerant J-T Type Cryocoolers”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Hybrid Layered Manufacturing – Phase II”</td>
<td>DIT</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Lattice Boltzmann Method based simulation for a row of fixed and moving cylinders”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Design and Development of a Process for Nano-Engineered Particles”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Demonstration and assessment of economic viability of new energy efficient and less polluting brick making technology (vertical shaft brick kiln)”</td>
<td>Government of Maharashtra</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Level Set Method Based 3D Transient Simulation Of Steam Water Stratified Developing Flow And Conjugate Heat Transfer In A Horizontal Pipe With A Nuclear Fuel Rod”</td>
<td>BRNS</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Lattice boltzmann method based simulations for a row of stationary and moving cylinders”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Study of Fluid Dynamics Of Interfaces With And Without Mass Transfer”</td>
<td>BRNS</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Numerical Investigation Of Fluid Flow And Heat Transfer Characteristivs In Wavy Channels”</td>
<td>IRCC</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Study and Development of Technology for Nanopolishing of Single Crystal Semi-spherical Cavity and Fabrication of Micro-metallic Fluidic Structures”</td>
<td>BARC</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Analysis of machined surface quality of Inconel 718 in milling operation”</td>
<td>ARDB</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Design and Development of Stirling Engine for Net 1.5 kW Electrical Output”</td>
<td>MNRE</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Project Title</td>
<td>Sponsoring Agency</td>
<td>Status (New/ Ongoing/ Complete)</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>“Identification of Chaos in Slosh and Sliding Mode Control of Slosh using 2DOF Slosh Rig”</td>
<td>ISRO</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Development of Micro-Cantilever-based Sensors for the Detection of Vapours of Explosive Chemicals”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Study and Optimization of DI Engine performance running on Jatropha bio-diesel blend and straight vegetable oil (SVO)”</td>
<td>VRDE(DRDO)</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Development of Kerosene based nano fluid for enhancement of internal flow forced convective heat transfer”</td>
<td>ISRO</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“A Level Set Based Cartesian Grid Method For Moving Boundary Computations And Its Application To Bio-Fluid Simulation Of Fish-Like Locomotion”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Generation of 3D Microstructures on Metallic Surfaces using Excimer Laser Micromachining”</td>
<td>ISRO</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Modeling and Development of Novel EDM Variants for Micromachining”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Development of High Aspect Ratio Micro-components at High Speeds using Microstereolithography System for 3D Microfabrication”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Computational Modeling of Laser-Assisted Mechanical Machining at Micro and Macro Scales”</td>
<td>IRCC</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Engineered Surfaces for Biomedical Applications”</td>
<td>ISRO</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Design for Manufacture of ELR Mechanism of Safety Belts, Bond Safety Belt “</td>
<td>IITB</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Validation of experimental investigation on simulated transportation packages using CFD codes”</td>
<td>IITB</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Flexible Reconfigurable Fiber Laser Systems for Micro-scale Materials Processing”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Design, Simulation and Testing of Micro heat exchanger for JT Cryocooler”</td>
<td>BRNS</td>
<td>New</td>
</tr>
<tr>
<td>“Investigation on Sorption Compressor based J-T Cryocooler “</td>
<td>BARC, Bombay</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Development of Two Stage Pulse Tube Cryocooler for 20K using linear Compressor”</td>
<td>BRNS Bombay</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Project Title</td>
<td>Sponsoring Agency</td>
<td>Status (New/Ongoing/Complete)</td>
</tr>
<tr>
<td>---------------</td>
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</tr>
<tr>
<td>‘Fracture and and Fatigue Failure in Nanocrystalline Thin Film Materials for MEMS/NEMS’</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Development of Kerosene Based Nanofluid for Enhancement of Internal Forced Convection Heat Transfer”</td>
<td>ISRO</td>
<td>New</td>
</tr>
<tr>
<td>“Yarn Fault Classification With Artificial Neural Network”</td>
<td>IRCC, IIT Bombay</td>
<td>Ongoing</td>
</tr>
<tr>
<td>WebCNC - Internet based Virtual CNC Laboratory</td>
<td>MHRD</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Study and Optimization of DI Engine performance running on Jatropha bio-diesel blend and straight vegetable oil (SVO)”</td>
<td>VRDE(DRDO)</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Demonstration and assessment of economic viability of new energy efficient and less polluting brick making technology (vertical shaft brick kiln)”</td>
<td>Rajiv Gandhi Science and Technology Mission, GoM</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“National Centre for Aerospace Innovation and Research (faculty involved are mainly from Mechanical in addition, faculty involved are from Aerospace and Metallurgy)”</td>
<td>DST/Boeing</td>
<td>New</td>
</tr>
<tr>
<td>“Design and Development of a Process for Nano-Engineered Particles”</td>
<td>DST</td>
<td>Completed</td>
</tr>
<tr>
<td>“Experimental investigations on transient CHF”</td>
<td>AERB</td>
<td>Completed</td>
</tr>
</tbody>
</table>

**Consultancy Projects**

The department undertook five jobs generating Rs. 18,00,000. The total number of faculty involved was five.

**Patents**

A synthetic jet actuator and a semiconductor module comprising the same, Indian Patent Filed, Authors: Mangesh Chaushari, Amit Agrawal, Bhalchandra Puranik

Patent on “Decoupling of approximate horizontal and vertical movement of end effector of robotic arm while maintaining its orientation using only revolute joints.” filed through IIT-B patent attorney. Co-Inventors: C. Amarnath, B. Seth and Abhay Kharade

Patent on “Mechanism for Producing Woven (Interlaced) and Noobed (Non-interlaced) Three Dimensional Fabrics” being discussed with IIT Bombay patent attorney. Co-inventors: C. Amarnath, Himanshu Dave

**Extension Activities**

**Ravi, B.**

Continuing Education Programme on “Casting Design and Simulation,” IIT Bombay, 14-18 September 2009 (50 participants)


**Date, A.W.**


Seminars – Invited Talk – Mech engg dept IITK ‘ Use of Stokes’s Continuum Condition in CFD Workshops Invited Faculty, ‘ Research Vision’ – IIT Gandhinagar
Atrey, M.D.

Subash Babu, A.
Three day CEP on Production Management, at IIT Bombay on April 24, 25 and 262009 (Coordinator Prof A.Subash Babu)

Two day CEP on Business Process Management, at IIT Bombay on August 21 and 22, 2009 (Coordinator Prof A.Subash Babu)

Three day CEP on Management of Cost, Inventory, Quality and Throughput at IIT Bombay on February 18, 19 and 20, 2010 (Coordinator Prof A.Subash Babu)

Delivered about 15 hours of lecture to complete the module on Quality Engineering and Management for the Certificate Programme on Management organized for the executives of Godrej Industries during November 2009 (Coordinator Prof S.Narayan Rao of KJSOM)

Guha Anirban
Conducted a 5 day CEP course titled “Computer Aided Engineering” along with Prof. Atul Sharma and Prof. P. Seshu

Bhandarkar,U.V.
Was part of the Organizing Committee for holding the 20th National and 9th ISHMT-ASME International Conference on Heat and Mass Transfer. IITB and NPCIL were the organizing institutes. The Organizing Secretary for this Conference was Prof. Kannan Iyer

Was part of the Organizing Committee for holding a DST sponsored workshop on “Process Engineering Applications of Plasma Technologies” held in IISc, Bangalore. The chief convener was Prof. S. Venugopal from IISc, Bangalore

Prabhu, S.V.
Was part of the Organizing Committee for holding the 20th National and 9th ISHMT-ASME International Conference on Heat and Mass Transfer. IITB and NPCIL were the organizing institutes. The Organizing Secretary for this Conference was Prof. Kannan Iyer

Visitors to the Department

The following visited the department during the year.

Mr. Neerav Abani, Ph. D. student in the Department of Mechanical Engineering

University of Wisconsin-Madison, delivered a lecture on “Investigation of Unsteady Turbulent Sprays and Two stage combustion in Low Emissions Diesel Engines” on May 5, 2009


Prof. Brian Falzon, Dept. of Mechanical and Aerospace Engg., Monash University, Australia, delivered a lecture on "Towards A Virtual Testing Environment For Composite Aerostructures” on June 17, 2009

Mr. Fabian Lange, Institute of Metal Forming and Metal Forming Machines, Leibniz Universitaet Hanover, Germany, delivered a lecture on “Processes for the storage of information inside PM components” on January 27, 2010.

Conferences/ Symposia/ Workshops/ Seminars (Participated/Papers Presented)

National

Date, A.W.


Subash Babu, A.
Delivered Key note address at the Seminar on Quality and Reliability organized at Goa Chamber of Commerce on January 9, 2010

Delivered Key note address on Reliability at the CGL corporate seminar organized at Global R&D Centre of Crompton Greaves on February 6, 2010

Participated as a special invitee in CII Conference on INNOVISION 2010 held at Chennai Trade Centre, Chennai on March 27, 2010

Delivered a seminar on Supply Chain Management – Interesting Issues at the seminar organized for PhD students of the Industrial Engineering Programme of NIT Calicut on March 30, 2010
Bhandarkar, U.V.
Presented a talk on “Introduction to Low Pressure Plasmas”, *Process Engineering Applications of Plasma Technologies*, held on August 14, 2009 at IISc, Bangalore.

International

Maiti, S.K.


Bhandarkar, U.V.; Honkalaskar, V.; Date, A.W.
Presented an invited talk on “Livelihood Generation in a Tribal Village By Enabling Local Natural Resources”, *UK-India Sustainable Energy Technologies Network*, held during September 9-10, 2009 at Trent Bridge, Nottingham, U.K.

Invited Lectures

National

Date, A.W.
Keynote lecture: National Symposium on BARC technologies for Development of Rural Areas – Nov 20, 2009


Atrey, M.D.
“Cryogenics applications and Introduction to Cryocoolers”, Key Note address in *3rd National Conference on Trendz in Mechanical Engineering (TIME)*, A. G Awate College of Engineering, Pune, March 5-7, (2010).

Maiti, S.K.
Keynote Lecture in “Simulation Techniques in Automobile Engineering”, 24-28 August, 2009, VRDE, Ministry of Defence, Ahmednagar 414006, India

Guest Lecture in Excellence in Maintenance Engineering, 29-31 May, 2009, College of Engineering, Pune 411005, India.

Subash Babu, A.
Delivered an invited lecture on “Manufacturing Management – Perspectives, Applications and Research”, Government College of Engineering, Trivandrum on October 7, 2009

Delivered an invited lecture on Enterprise Management –Interesting Issues; College of Engineering, Trivandrum on October 8, 2009

International

Atrey, M.D.

Honorary Work

Sridharan Arunkumar
Panel member for selection of candidates for Kishore Vaigyanik Pratshahen Yojana (KVPY).

Date A.W.

Reviewed Research Proposal for DST (2), Reviewed Ph D Thesis – Univ of Delaware – USA

Atrey, M.D.
Worked as “Member of Selection Committee”, March, 2010, IISc Bangalore

Worked as Reviewer for ISHMT Conference, *IIT Bombay, 2010*

Maiti, S.K.
Served as a faculty selection committee member for IIT Bhubaneswar, Orissa, (May, 2009), IIT Ropar, Punjab, (June, 2009), IITDM Jabalpur, MP (Decomer, 2009), and IIT Guwahati (January, 2009).

Technical Committee Member for Prime Minister Shram Awards (2009 to date).

Reviewed 4 papers for Engineering Fracture Mechanics (Elsevier Publication), and one each for Journal of Sound and Vibration (Elsevier Publication), Structural Engineering Mechanics (Elsevier Publication), Engineering Structures (Techno Press,
S. Korea) and Advances in Mechanical Engineering (Hindawi)

Subash Babu, A
Member of Editorial Advisory Board - International Journal of Advanced Operations Management (Inderscience)

Member of Editorial Advisory Board- International Journal of Business Performance and Supply Chain Modelling (Inderscience)

Member of Editorial Advisory Board - International Journal of Management Research (Emerald)

Member of Editorial Advisory Board - International Journal of Indian Culture and Business Management (Inderscience)

Member of Editorial Advisory Board - International Journal of Agile Manufacturing Systems

Member of Editorial Advisory Board - International Journal of Information and Operations Management Education

Served as the Chairman of the team for evaluating Technical Colleges for the Uttar Pradesh Technical University Excellence Award March/April 2009

Reviewed paper for International Journal of Production Research

Reviewed paper for Benchmarking - International Journal

Guha Anirban

Pande, S.S.
Invited to be a member of the Development Council on Machine Tools, Ministry of Heavy Industries and Public Enterprises, Govt of India, Sept. 2009-2012

Gaitonde, U.N.
Served as a member on the Expert Committee for Environmental Appraisal of Nuclear Power Plants, Ministry of Environment and Forests, Govt. of India

Served as a member on the Advisory Committee for Project Safety Review of Light-Water Reactors, Atomic Energy Regulatory Board (AERB), Govt. of India

Faculty Members and their Specializations

1. S. L. Bapat
   - Multi-layer cryogenic insulation, Stirling cycle miniature cryocoolers & liquifiers. Use of gas mixtures in Stirling Coolers, Food Freezing, Vapour Absorption Refrigeration System, Sterling engine

2. A. Agarwal, Room
   - Turbulent flows, Interaction of bluff-body wakes, Flow in microchannels, Experimental and numerical techniques

3. C. Amarnath
   - Robotics, Synthesis and Analysis of Mechanisms, Computer Aided Design

4. M. D. Atrey
   - Cryogenics, Refrigeration, Pulse Tube, Stirling Coolers

5. P. G. Awate
   - Modelling and Optimizing in Flexible Manufacturing Systems, Industrial Scheduling and Knowledge Based Systems, Management of Inventories and Capacities in MRP, JIT and Related Systems

6. A. S. Babu
   - Modelling and analysis for optimization and simulation of business processes and MRP, JIT, FMS and GT related manufacturing systems; Quality and assurance technology; ERP, Supply chain management; Productivity management and Entrepreneurship

7. U. V. Bhandarkar
   - Heat Transfer & Thermodynamics, Low Pressure Plasmas

8. M. S. C. Bose
   - Mechanical Metallurgy, Fatigue and Failure Analysis, Design Engineering, Automobile Engineering

9. A. W. Date
   - Numeric Fluid Flow and heat transfer, Appropriate Technology

10. P. P. Date

11. A. De
    - Welding and other joining processes, Finite Element Method, Numerical Modelling of Manufacturing Processes, CAD/CAM

12. J. B. Doshi
    - Nuclear Reactor Theory, Nuclear Reactor Safety, Analytical Methods in Engineering

13. P. S. Gandhi

14. Non-linear Dynamical Systems and Control, Micro Electro Mechanical Systems

15. U. N. Gaitonde
    - Thermodynamics, Heat Transfer, Thermal Engineering, Cooling of Equipment, Power Plant Engineering
16. A. Guha
Neural Networks in Textiles

17. H. Hirani
Lubrication, Friction, Wearing, Bearing Design, Design Methodology, Bearing Dynamics, Active Magnetic Bearing

18. K. K. Issac
Synthesis of Mechanisms, Dynamics of Machines, Optimal Design of Mechanical Systems, Robotics

19. K. N. Iyer
Nuclear Reactor Safety, Thermal-Hydraulics, Applied Numerical Methods

20. S. D. Jog
Political economy, General Management, Finance, Engineering Basic Practice and Communications

21. S. S. Joshi
Machining of Composite Materials, Computer-aided Modelling Machining and Nanomachining, Surface integrity and mechanical characterization

22. K. P. Karunakaran
CNC, Computer Graphics, Genetic Algorithms, Manufacturing Automation, Rapid Prototyping and Tooling

23. S. Kulkarni
Computational Mechanics

24. D. N. Manik
Vibration, Noise Control and Mechatronics

25. S. K. Maiti
Stress Analysis, Fracture Mechanics, FEM, BEM, Smart Structures, NDT

26. K. G. Narayankhedkar
Refrigeration, Air Conditioning, Cryogenics, Food Preservation

27. S. S. Pande

28. D. N. Pawaskar
Solid Mechanics, MEMS, Fatigue, Fracture in Solids, Optimization & Design

29. Mrs. U. S. Powle
Fluid Mechanics, Fluid Machinery, Vacuum Engineering

30. S. V. Prabhu
Fire Dynamics, Two phase flow and heat transfer, Flowmetering, Gas turbine blade cooling, Jet Impingement cooling, Vertical Axis Wind/water Turbines, Heat exchangers, Melting of lead

31. B. P. Puranik
Experimental Fluid Mechanics, Gas Dynamics, Thermal Hydraulics

32. N. Ramakrishnan
Low Cost Automation, Computer Integrated Manufacturing, Manufacturing Automation, Tool Engineering, Non-Traditional Manufacturing Processes

33. M. V. Rane

34. B. Ravi
Intelligent CAD/CAM/CAE/PDM Technologies for Metal Casting including Design for Manufacture, Concurrent Engineering, Process Simulation, Rapid Prototyping and Tooling, Web based Engineering and Continuing Education

35. P. Seshu
Stress and Aibration Analysis, FEM, Computer-Aided Simulation, Smart Structures, Active Vibration Control

36. B. Seth
Multi-domain Dynamic System Modelling and Control, Robotics, Energy Regeneration

37. A. Sharma
Computational Fluid Flow & Heat Transfer

38. A. K. Sridharan
Two Phase Heat Transfer & Fluid Mechanics

39. H. R. Srirangarajan
Non Linear Vibration, Machine Dynamics, Strength of Materials

40. S. Suryanarayanan
Automatic Control, Mechatronics, Wind Energy, Intelligent Transportation Systems, Active Flow Control

41. R. Singh
Laser assisted mechanical micromachining, Functional characterization of precision finished surfaces, Development and modeling of precision and hybrid machining processes, Manufacturing of biomedical implants and devices

42. V. G. Ukadgonker
Solid Mechanics, Elasticity, Fracture Mechanics, Computer Aided Solutions, Pressure Vessel Design

43. R. P. Vedula
Convective Heat Transfer for External and Internal Flows
Introduction

Materials development has always been the backbone of overall growth of any society. The most obvious examples of this are: steels, ceramic & composite materials for space vehicles; electronic materials for high performance computers; optical fibers for communication technology. A new paradigm today from the ecology point of view is new materials and technologies for green energy. In order to fulfill the societal and national needs, the research activities of the Department of Metallurgical Engineering and Materials Science span the whole spectrum of materials such as iron and steel, advanced ceramics, electronic materials and polymers. Semiconductor thin films, magnetic materials, composites, advanced ceramics, polymers and blends, metal forming and joining, physical metallurgy are some of the areas where we have made significant contributions. A new dimension has been added to these activities with research on ‘Nanomaterials’ and ‘Biomaterials’. The department has several projects in all these areas sponsored both by national and international agencies. Also activities to develop materials and devices for non-conventional energy have been initiated on a large scale.

The department has a total of 30 faculty members with sufficient support staff to perform teaching and research activities. The department runs both undergraduate (B.Tech.) and graduate (M.Tech. and Ph.D.) programs, including a Dual Degree program which gives B.Tech. & M.Tech. degrees after five years. Currently the department has a total of 160 postgraduate students (M.Tech. & Ph.D.) and 16 research staff working on various projects.

Execution of the research plans requires both personnel and facilities. The department has made considerable progress in acquiring as well as developing state of the art facilities for both materials processing and characterization. Some of the materials processing facilities include:

1. Multichamber cluster tool unit for Semiconductor thin film processing
2. Electro-slag Refining
3. MOCVD
4. Microcompounder & extraction
5. Plasma spray
6. Tape casting
7. Horizontal continuous casting
8. Pulsed laser deposition

and some of the materials characterization facilities are:

1. SEM/EDAX
2. XRD with high temperature
3. DSC/DTA
4. OIM/SEM/XRD (National facility)
5. Mechanical Testing systems
6. FTIR, UV-Visible, AAS
7. Surface area analyzer
8. Microscopes
9. Magnetic measurements unit
10. Dynamic Nano-indentor
11. Broad band dielectric spectrometer

and various others.

In addition to these, access to institute facilities such as TEM, E-SEM, FTIR, NMR, ESCA is also available.

During the Golden Jubilee Year the department took steps to enhance its academic activities – both in teaching and research. To facilitate high quality research various highly sophisticated tools have been installed and commissioned. One of the most desired equipment namely the Rolling Mill has also been installed.

The Research Scholars Symposium saw a participation of more than 180 research scholars from all over the country.
**Academic Programme**

The new M.Tech. programme in Steel Technology was successfully launched and the first batch of sponsored students from the Steel Industry have completed their first year at the institute. The department also forms an important part of the new cross departmental M.Tech. course in Materials, Manufacturing and Modelling – the other departments being Mechanical Engineering and Mathematics. This course will have 25 industry sponsored candidates and five from the open category students.

Overall the department is marching ahead with full vigour forwards achieving excellence in education, research & technology developments.

**Degrees Awarded**

<table>
<thead>
<tr>
<th>Degree</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Tech.</td>
<td>41</td>
</tr>
<tr>
<td>Dual Degree</td>
<td>24</td>
</tr>
<tr>
<td>M.Tech.</td>
<td>27</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>9</td>
</tr>
</tbody>
</table>

**R & D Activities**

The department has been successful in attracting new funds to the extent of Rs.10 crores over the last five years. Additionally, the faculty members are involved in giving consultancy to various industries which concern improvement in industrial processes and production. Technology transfer to the industry in different areas has also taken place over the years.

On the Research and development front, the department has received various research grants from the Government of India funding agencies. Also, more than a dozen global industries visited the department for collaborative research. These include Dow Chemicals, Corning, Bosch, Siemens, Tata Steels, Sterlite, Applied Materials, among many others. A few visits have culminated in sponsored research such as those from Applied Materials, Corning, Dow Chemicals, etc., while a few others are in the pipeline. A number of papers have been published in international and national journals as well as a large number have been presented at various conferences. A few patents have been accepted as well. An amount of Rs.4,35,19,100/- was received towards sponsored projects.

**Sponsored Research Projects (Ongoing)**

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Sponsoring Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>To develop HWCVD based Thin film silicon Micro-morph Solar Cells</td>
<td>Applied Materials Inc.,</td>
</tr>
<tr>
<td>Plastic deformation in Zr binary alloys : Multiscale modeling and experimental validation</td>
<td>Board of Research in Nuclear Sciences</td>
</tr>
<tr>
<td>Nano Structured Multifunctional Magnetic Nanoparticulates</td>
<td>Department of Science &amp; Technology</td>
</tr>
<tr>
<td>Development of technology to fabricate a-Si:H based thin film multi-junction solar cells on steel substrates</td>
<td>TATA STEEL LTD., JAMESHEDPUR</td>
</tr>
<tr>
<td>DST/ Controlled Drug Delivery using Layer-by-Layer Self-Assembly with Antibody Conjugated Magnetic PLGA Nanoparticles using Dual Drug Regimen for Brea</td>
<td>Department of Science &amp; Technology</td>
</tr>
<tr>
<td>Project Title</td>
<td>Sponsoring Agency</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------</td>
</tr>
<tr>
<td>DST/ Design and Study of High Thermal Cycle Life Thermal Barrier Coatings</td>
<td>Department of Science &amp; Technology</td>
</tr>
<tr>
<td>DST Postdoctoral Fellowship in Nano Science &amp; Technology- 3rd Series.</td>
<td>Jawaharlal Nehru Centre for Advanced Scientific Research</td>
</tr>
<tr>
<td>“Nano World - A Programme for School and College Students</td>
<td>Department of Science &amp; Technology</td>
</tr>
<tr>
<td>Microstructural Origin of lower YS/UTS in selected Al samples</td>
<td>ISPAT INDUSTRIES</td>
</tr>
<tr>
<td>DST/ Controlled Drug Delivery using Layer-by-Layer Self-Assembly with Antibody</td>
<td>Department of Science &amp; Technology</td>
</tr>
<tr>
<td>Conjugated Magnetic PLGA Nanoparticles using Dual Drug Regimen for Brea</td>
<td>Department of Science &amp; Technology</td>
</tr>
<tr>
<td>DST/ Design and Study of High Thermal Cycle Life Thermal Barrier Coatings</td>
<td>Consortium for Clean Coal Utilization, Mc Donnel Academy, St. Louis, USA.</td>
</tr>
<tr>
<td>Fracture Toughness and Environmental degradation of Al alloy – fly ash and epoxy cenosphere –glass fiber laminate composites for Aerospace Applications.</td>
<td></td>
</tr>
</tbody>
</table>

### Consultancy Projects

The department undertook 18 jobs generating Rs. 26,24,793/-. The total number of faculty involved was six.

### Extension activities

**Dusane R.O.**
Member, Institute Stationery Committee  
Member, Institute Chemical Rate Contract Committee  
Coordinator, Program Committee for M.Tech. in Materials Manufacturing and Modeling

**Prabhu N.**
Professor (on deputation) at IIT Gandhinagar for one semester starting July 2009.

### Departmental Seminars

**Dr. Surekha Krishnan**, “Corrosion studies of surface treated AA 2219 aluminium alloy”.

**Dr. Manish Dubey**, Princeton University, “Surface functionalization of silicon-based detectors for sensor applications”.

**Dr. Vijay K. Varma**, “Aeronautical materials and their characterization”.

**Dr. A.K. Singh**, “Model based optimization of industrial processes”.

**Dr. Subrata Bandhu Ghosh**, Univ. of Toronto, “From glass to nano-cellulose – the future is here”.

**Dr. Sanchita Bandhyopadhyay-Ghosh**, “Frontiers in next generation materials – bioceramics and bio-based foams”.

**Dr. Suhash Ranjan Dey**, Institute for Structure Physics, Technical University, Dresden, Germany, “Importance of microstructure characterization (2D/3D) in phase transformation and deformation studies”.
Dr. Nirmalya Kumar Chaki, Department of Chemistry, The Pennsylvania State University, “Chemistry of Nanoclusters: Building-Blocks for Advanced Functional Materials”.

Dr. Pavan Kumar Shukla, Southwest Research Institute, Texas, “Determining Susceptibility of Alloy 22 to Crevice Corrosion through Physico-Chemical Process Models”.

Dr. Praveen Kumar, Washington State University, “Multiphysics Phenomena in Multicomponent Systems: A Few Examples”.

Dr. G.S. Lodha, “Indian Synchrotron Sources : An Overview (Recent Research Activities Using Indus-1 and Indus-2)”.

Dr. T. Venugopalan, “Production of Clean Steels”.

Prof. Ashok Kumar Gabnguli, “Controlling the size and shape of nanostructure using microemulsions”.

Visitors to Department

EADS delegation from Airbus, US & Europe for possible collaboration in research work.

Dr. Sascha Dietrich, Technical University Chemnitz, Germany for collaborative work.

Prof. Roland Oltra, University de Bourgogne, France. He delivered a talk on “From local probing to predictive models in localized corrosion”.

Dr. Reliang Xu, USA gave a seminar on “Zeta Pot., DLS, particle size measurement”.

Prof. Tetsuo Shoji, Japan interacted with faculty members.

Dr. Petra Pötschke, Sven Pegel, Leibniz Institute of Polymer Research Dresden, Dresden, Germany, gave a seminar on “Use of multiwalled carbon nanotubes predispersed in polyethylene for incorporation of nanotubes into thermoplastic polymers”.

Prof. J.H. Driver, Ecole de Mines, St. Etienne, France. He delivered a talk on “Boundary mobilities during recovery of binary Al-Mn alloys”.

Conferences/ Symposia/ Workshops/ Seminars(Organized/Participated/Papers Presented)

National

Mishra, S.
Participated and presented a paper in the 4th International Conference on Solidification Science and Processing, held in November, 2009 at Chennai, India. (G. Vih, A. Gokhale, S. Mishra, V. Singh and N. N. Viswanathan, “Solid freeform fabrication of aluminum alloy components: Numerical simulations”)


Prasad, R.C.

Narasimhan, K.


Bhargava, P.

Bhargava,P.; Ajay Jena.; Pragyensh.; Preeti Bajpai.; Patil, S.B.
“Ceramic Processing: From powder synthesis to components and devices”, at the Third Indo-American Frontiers of Engineering Symposium, March 11-13, 2010, Jaypee Palace Hotel, Agra, India
International

Salame, P.; Om Prakash.; Ajit Kulkarni.
“Dielectric studies of layered cuprate Nd2CuO4”, Int. Conf. on Electroceramics (ICE-09), Dec. 8-10, 2009, Delhi University, Delhi, India.

Ramya Hariraran.; Prakash Gopalan.

Venkatasubramanian,A.; Gopalan, P.; Prasanna, T.R.S.
“Electrical conductivity of composite electrolytes based on BaO-CeO2-GdO1.5 system in different atmospheres”, 34th International Conference on Advanced Ceramics & Composites (ICACC).

Bhanage, M.; Birajdar, N.; Narasimhan, K.

Preeti Bajpai.; Parag Bhargava.

Pankaj Kumar.; Tiwari, A.N.; Parag Bhargava.

Ajay Kumar Jena.; Parag Bhargava.


Patil, S.B.; Parag Bhargava.


Invited Lectures

National

Om Prakash

Raja, V.S.
“Stainless Steel: Factors in design and Applications”, INDINOX, Ahmedabad, January 17-19, 2010

“Corrosion Monitoring, MICMEP-2009”, Vadodara, 06 to 08, December 2009

“Development of Multifunctional Coatings”, SMT-23, Mallapuram, November 02-05, 2009

Bhargava, P.
“Engineering porosity in ceramics through controlled processing”; National symposium on advanced ceramics and composites, 7th and 8th May 2009, Jamshedpur

“Effect of precursor concentration and aging on characteristics of coprecipitated nano zirconia (3YSZ) powders”, Shruti Jain and Parag Bhargava, at the Sol-gel processing of advanced ceramics (SGPAC-09), 11 – 13th October 2009, IGCAR, Kalpakkam, Tamil Nadu.
International

Raja, V.S.
Panel Member to address “International Corrosion Education” 17th International Corrosion Congress, Las Vegas, Nevada, United States, October 06-10, 2008


Raja, V.S.; Saravanan.

Raja, V.S.; Bobby Kannan, M
“Localized Corrosion Behavior of High Strength 7010Aluminum Alloy”, Monash University, February 04, 2010

Prasad, R.C.

Bahadur, D.
“Simultaneous heat and chemotherapy for cancer using nano structured magnetic materials” during the Second Iran-India Joint Conference on Nanotechnology, Isfahan, Iran, 5-7 May, 2009

“Nanostructured ceramics for biological applications” during the Workshop on Instrumental Analysis and Imaging Nanosized Materials as part of second Iran-India joint conference on nanotechnology, Isfahan, Iran, 5-7 May, 2009.


“ZnO nanostructures: Synthesis, microstrutural and physical properties” during the Theme Meeting on Quantum Strutures at Anushaktinagar, Mumbai held during Nov 2-3, 2009.


Keynote lecture on “Magnetic Liposomes/Suspension for Cancer Therapy” during 63rd Annual Technical Meeting (ATM) of Indian Institute of Metals(IIM) at Kolkata held during Nov 16-17, 2009.


“On the interface chemistry and biology in nanomaterials: Indian Perspective” during Plenary sessions of 97th Indian Science Congress at Trivandrum held during January 3-7, 2010.

Significant Awards/ Distinctions

Dusane R.O.
Recognition for Significant Contributions for PV Technology from Applied Materials,USA.

Raja, V.S.
Meritorious Contribution Award, NACE International India Section, 2009

Bhargava, P.

• Member, Editorial Board, Journal of Materials Engineering Innovation
• Member, Editorial Board, Transactions of Indian ceramic Society

Honorary Work

Dusane R.O.
Ph.D. examiner

Member Programme Advisor Committee, 18th International Photovoltaic Science and Engineering Conference, Jan 2009

Mishra, S.
Reviewed paper for the journal - Science and Technology of Welding and Joining.
Reviewed paper for the journal - Tata Search.
Reviewed paper for the journal - Transactions of the Indian Institute of Metals

Raja, V.S.
Key Reader (Member, Review Board), Metallurgical and Materials Transactions-A, 2010
Member, Editorial Board, Corrosion Engineering, Science and Technology, Maney Publishing, UK
Member, NACE International Research committee

Bahadur, D.
Invited by nanomission of DST, Government of India, to organize the fourth International Conference on Nano Science and Technology (ICONSAT 2010), which was held between Feb. 17th and 20th at IIT Bombay. In line with this we also organized six workshops on 17th Feb, 2010.

Invited member of Bureau of Indian Standards for its sectional committee on nanotechnologies, 2010-

One of the guest editors for a special issue of International Journal of Nanoscience, (published by World Scientific). Will include invited and contributed papers presented during ICONSAT2010 during Feb.17-20, 2010 at Mumbai.

One of the guest editors for a special issue of Advanced Drug Delivery Reviews (published by Elsevier B.V; Impact factor~ 9). This will contain invited reviews and the theme of this issue will be “Hybrid nanomaterials for biological applications”.

Bhargava, P.
Reviewed papers for Transactions of the Indian Ceramic Society, Advances in Applied Ceramics.

Coordinator, Nanoworld 2010 (part of ICONSAT 2010), An awareness program on Nano Science and Technology for school / college students, held at IIT Bombay, Mumbai, 17th February 2010.

Faculty Members and their Specializations

1. D. Bahadur
Magnetic materials, Electronic ceramics, Glass ceramics, Bioceramics.

2. N.B. Ballal

3. Bhargava P
Near Net Shape forming of ceramics, Ceramic foams, Gel casting, Rheology of suspensions, Industrial ceramics.

4. Arup R. Bhattacharyya
Polymer blends, carbon nano-tubes, polymer composites

5. R.O. Dusane

6. P. Gopalan
Magnetoresistor materials, High temperature fast-ion conducting phases, Materials in energy storage.

7. Gururajan P.
Phase transformations, modeling of micro structural evolution, phase field modeling materials mechanics, materials thermodynamics.

8. B.P. Kashyap
Deformation behaviour and microstructural evolution in materials during creep and superplasticity.

9. N.K. Khosla
Instrumentation and control, Mineral processing, Extractive metallurgy, Materials preparation and characterization.

10. A.R. Kulkarni
Ionically conducting materials, Dielectrics & multilayers, Glass and Glass ceramics, Impedance spectroscopy, Electrical composites.

11. A.S. Khanna
High temperature corrosion, High temperature coatings, Paint coatings, Rebar & concrete coatings, Oil & gas corrosion.

12. S.N. Malhotra
Thermodynamics, Corrosion of metals and alloys, Corrosion/erosion related failures, Paint and electrodeposited coatings, electro-metallurgy.
13. **Sudhanshu Mallick**  
High temperature piezoelectric ceramics, dielectrics, powder metallurgy

14. **Mishra Saurabh**  
Computational materials science, Transport phenomena, Welding, Grain growth, Optimization.

15. **K. Narasimhan**  
Metal forming, Mechanical behaviour, Simulation and validation.

16. **Prita Pant**  
Mechanical behaviour of thin films, Dislocation dynamics simulations. Modelling and experiments to study novel shape memory materials.

17. **A.S. Panwar**  
Computational behaviour of thin films, dislocation dynamics simulations, modeling and experiments to study novel shape memory materials.

18. **N. Prabhu**  
Physical metallurgy, Phase transformation, Electron microscopy, Structure-property relationships.

19. **G.V. Prabhugaonkar**  
Design and selection of materials, Fracture mechanics, Non-destructive testing and evaluation, Corrosion prevention, nano-composites.

20. **Om Prakash**  
Electronic ceramics and laves alloys design, Processing and characterization.

21. **R.C. Prasad**  
Fatigue, Fracture, Failure analysis of materials, Environment assisted corrosion, NDE, fracture mechanics & integrity assessment.

22. **T.R.S. Prasanna**  
Synthesis and Processing of Oxide and Sodium Ion Conductors, Materials for energy generation and storage, Superconductors.

23. **I. Samajdar**  
Thermomechanical Processing, Texture Analysis, Microscopy.

24. **R.S. Srinivasa**  
Semiconductor heterostructures and devices, Sensors, Surface engineering, Chemical vapour deposition.

25. **R. Raman**  

26. **Raja V.S.**  
Aqueous corrosion, Failure analysis, Protective coatings, Metallurgy of corrosion.

27. **A.N. Tiwari**  

28. **S. Vitta**  
Solidification, Artificial structures, Superconductors, Structure Property Correlation

29. **N.N. Viswanathan**  
Modelling and simulation, Transport phenomena, Process metallurgy and iron and steelmaking.

30. **N. Venkataramani**  
Magnetic materials, Thin films structure property correlations in nanocrystalline systems, Scanning probe microscopy.
Introduction

The Department of Physics offers a four-year B.Tech. program in Engineering Physics and a two-year post-B.Sc. program leading to Master’s degree in Physics. Keeping in line with the national science initiative on nanomaterials and nanotechnology, the department had started a five-year dual degree program leading to B.Tech. and M.Tech. degrees in Engineering Physics with specialization in Nanotechnology and Nanomaterials in the year 2005. This year the first batch of the dual degree students would be completing and passing out. To strengthen our scientific manpower, the department has also started a post-B.Sc Dual Degree program leading to a Master of Science degree in Physics as well as a Ph.D. This program has helped in catching young and motivated college students and prompted them to take up challenging research in the department. The department has revamped its curriculum in view of the new institute programme offering honours and minor studies to more ambitious students admitted through the Joint Entrance Examination (JEE). The minor program offered by the department is also picking up with increasing number of students opting for a minor in physics.

Academic Activities

The department offers a wide range of courses (from Bio Physics to Theoretical Physics) in all the above mentioned programs of the department. This helps the students to find their aptitude. This is a boon especially for a young student who after qualifying JEE is unsure as to where to go.

Degrees Awarded

<table>
<thead>
<tr>
<th>Degree</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Tech.</td>
<td>17</td>
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<tr>
<td>Ph.D.</td>
<td>5</td>
</tr>
<tr>
<td>M.Sc.</td>
<td>28</td>
</tr>
<tr>
<td>B. Tech/M.Tech (Dual Degree)</td>
<td>7</td>
</tr>
</tbody>
</table>

All the programs run by the department are highly successful and attract the best students from all over the country. In addition, the department has a very vibrant research programme primarily in the areas of Experimental and Theoretical Condensed Matter Physics, Theoretical High Energy Physics, Laser and Atomic Physics and Experimental Nuclear Physics. Annually, the department offers admissions to 30 students in B.Tech. (EP) program, seven in the B.Tech-M.Tech. Dual Degree program. About 30 students are admitted every year for the Master’s degree, while about eight students are taken for M.Sc. - Ph.D. Dual Degree program. In addition, there are about 52 students pursuing research in various areas and working for their Ph.D. in the department.

New Academic Initiatives this year

To broaden the perspectives of the students in the department as well as in the institute, the Student Association of the Physics Department (SAPD) has been inviting eminent scientists in the country as well as abroad to give lectures. Last year the department had invited Prof. Mustansir Burma, Director, Tata Institute of Fundamental Research; Prof. Sreerup Raychoudhury, Theoretical Physicist from Tata Institute of Fundamental Research; and Dr. Ajay Gupta, Principal Scientist, National Center for Astrophysics, Pune, to give lectures to the institute community. This year, along with Indian Physics Association, the SAPD organized the Cockcroft-Walton lecture by Prof. Peter Littlewood, Director, Cavendish Laboratory, University of Cambridge. Prof. Littlewood enthralled the institute audience by giving an account of “The Physics of Synchrony: From Huygens to Higgs via Onnes, Bose and Einstein”. The SAPD also organized the DAE-CV Raman lecture, again with Indian Physics Association, by Dr. Srikumar Banerjee, Chairman, Atomic Energy Commission on Technological Challenges for Meeting the Energy Demands of India. Dr. Banerjee presented the efforts being made by DAE institutes to meet the growing energy demands of our nation and how students and faculty of IIT Bombay can contribute towards nation building. The SAPD organized two popular lectures by Prof. Rohini Godbole from Center for Theoretical Physics, IISc., Bangalore, on the road.
taken by mankind to understand the basic building blocks of nature culminating in successful operation of the Large Hadron Collider, at CERN, Geneva. She elaborated on how it will further our understanding of nature. Both the lectures were attended by a wide cross section of people across the institute. For the Physics students, Prof. Godbole gave a set of six lectures on “Deep-inelastic scattering” on Saturdays and Sundays. Prof. S.M. Roy, retired senior professor from TIFR, gave a set of four lectures on the basics of Quantum Computing.

**R and D Activities**

The research potential of the department has expanded tremendously during the last few years. The number of papers published in refereed journals (national and international) has been steadily increasing. This year there are 81 research papers published in refereed journals and several of the faculty members gave invited lectures both in the country as well as abroad. The department had sponsored projects running during this period of about Rs. 3.0 crores. The notable additions to the research facility have been the installation of the liquid helium plant. All the major laboratories requiring measurements at low temperature are linked to the refrigeration plant through a recovery line. This would enhance the research capability of the department tremendously. The NMR magnet set-up has been completely set up and would expand the research horizon of the department considerably.

**New Projects**

Details about Sponsored Projects and Consultancy jobs undertaken in the year 2009-10 in Physics Department

<table>
<thead>
<tr>
<th>Sponsored Projects</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ongoing Projects (No.) : 48</td>
<td>Council of Scientific and Industrial Research</td>
<td>Ongoing</td>
</tr>
<tr>
<td>New Projects (No.) : 8</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Completed Projects (No.) : 5</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

| Consultancy | No. of Jobs : 2 |

**Patents**


**New Sponsored Research Projects initiated in 2009-10 in Physics Department**

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structurally Engineered Magnetic Nanoparticles: Gram Scale Synthesis Charactrization and Surface Functionalization Leading to Colloidal suspensions</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Functional polymeric semiconductor and metallic nanostructures for nano-photonics</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Financial assistance for organizing 3rd Discussion Meeting on India-FAIR Project at Indian Institute of Technology-Bombay-IIT during August 31-Sept.,09</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Linear and Nonlinear Optical Properties of Semiconductor Clusters- Women Scientist Scheme (WOS)</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Role of surface and organic matrix on the vibrational and electronic properties of nanocrystals synthesizes by Langmuir Blodgett technique.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>New symmetries beyond the electroweak scale.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Workshop on Imaging at Nanoscale on February 17, 2010 by IITB</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Goa Common Entrance Test-2010 (GCET-2010)</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>
**Conferences/Symposia/Workshops/Seminars (Participated/Papers Presented)**

**National**

**Gupta Nayantara**  
Gave a talk on “Data Analysis of the Fermi Gamma Ray Space Telescope” February 8 -19, 2010 at the 11th Cospar Capacity Building Workshop at Bangalore.

**Yajnik, U.**  
Gave an invited talk on “Dark Energy : a conventional solution with some unconventional particles”, on April 5, 2009 at the workshop on Neutrinos in Particle Physics and Cosmology, at Mahabalipuram, April 5 -7, 2009 organised by Institute of Mathematical Sciences, Chennai.

**Mukhopadhyya, G**  
Presented a poster on “First Principle Study of SiC doped with B, Al and Ga”, in the DAE Solid State Physics Symposium-2009, December 14 -18, 2009, MS University of Baroda, Vadodara. The other authors of the paper were Padmaja Patnaik, and Prabhakar P. Singh.

**Ghosh Aditi**  
Presented a poster in National Laser Symposium (NLS-2009), Mumbai, from Jan 13-16, 2010, titled “Spectral Narrowing of emission from ZnO inverse photonic crystals”.

**International**

**Shah Neha K.**  
Presented a poster, titled, “Luminosity Measurements for the p-p run for WASA at COSY” at the International Conference in Nuclear Physics, held at Bhabha Atomic Research Center, from December 6 to December 11, 2009.

“Study of production mechanism of the h0 meson in fo p-p run near eta production threshold with the WASA detector at COSY” at the International Conference in Nuclear Physics, held at Bhabha Atomic Research Center, from December 6 - 11, 2009.

**Lalwani Kavita**  
Presented a poster titled, “Measurement of the branching ratio of the rare decay h0→p0gg with WASA — at —COSY” at the International Conference in Nuclear Physics, held at Bhabha Atomic Research Center, from December 6 - 11, 2009.

**Bhatt Himani**  
Presented a poster titled, “Measurement of Transition Form Factor of the hmeson with WASA-at-COSY” at the International Conference in Nuclear Physics, held at Bhabha Atomic Research Center, from December 6 to December 11, 2009.
A paper in which **Prof. G Mukhopadhyay** is a co-author was presented in the *47th International Reliability Physics Symposium*, from April 26-30, 2009, in Montreal, Canada. The title of the paper was “Reliability of Single and Dual Layer Pt Nanocrystal Devices for NAND Flash Applications: A 2-Region Model for Endurance Defect Generation” and the authors were Pawan Singh, Gaurav Bisht, Siva Theja M, Sandhya C, Ralf Hofmann, Kaushal Singh, Gautam Mukhopadhyay, Nety Krishna, and Souvik Mahapatra.


**Yajnik, U.**

Invited talk on “Spontaneous parity violation and leptogenesis” on April 14, 2009 at the *International conference on Aspects of Neutrinos*, at the International Centre, Goa. The conference was organised by the Tata Institute of Fundamental Research, Mumbai.

Presented a talk titled “Topological objects and metastable vacua” September 02, 2009 at the *International conference on Challenges in Cosmology at the Tufts University Center*, Talloires, France, organised by Institute of Cosmology, Tufts University, USA, during September 2 to 5, 2009.

Attended the International Conference on *Particle Physics and Cosmology “Cosmo09”* at CERN (European Centre for Nuclear Research), Geneva, Switzerland, during September 7 to 11, 2009.

**Vijaya, R.**

Attended the *International Conference on Optics and Photonics (ICOP)*, Chandigarh from Oct.30-Nov.1, 2009, and gave a talk titled “Laser-induced emission studies on dye-doped photonic crystals”

**Ghosh Aditi**

Presented a paper at the International Conference on *Optics and Photonics (ICOP)*, Chandigarh, Oct.30-Nov.1, 2009, titled “Continuous wave broadband generation in fiber laser”

**Makwani Diksha**

Presented a paper at the International Conference on *Optics and Photonics (ICOP)*, Chandigarh, from Oct.30-Nov.1, 2009, titled “Fabrication of waveguide structures on polymeric thin films”.

Presented a poster at the International conference on *Advanced Nanomaterials and Nanotechnology* (ICANN 2009), Guwahati, from Dec 9-11, 2009, titled “Frequency-dependent polarizability of small silicon clusters”.

Presented a poster at the International Conference on *Nanoscience and Technology (ICONSAT)*, Mumbai, Feb 17-20 2010, titled, “Fabrication of SU-8 ridge waveguides by optical lithography and their Characterization”.

**Kedia Sunita**

Presented a poster at the International conference on *Advanced Nanomaterials and Nanotechnology (ICANN 2009)*, Guwahati, from Dec 9-11, 2009, titled “Photoluminescence of ZnO inverse photonic Crystal”. This poster was selected for the Best Poster award.

**Mukherjee,A.; Manohar, R.; Chakrabarti, D.**


**Invited Lectures**

**National**

The following lectures were presented by the faculty at various academic institutions

**Vijaya, R.**


Filter-less, tunable fiber lasers, *EMMP Summer School*, Ghent, Belgium (June 30, 2009).

Multi-wavelength and broadband optical sources for fiber-optic communication, EE department IIT Kanpur (Oct 29, 2009).

**Mukhopadhyay, G.**


**Mahajan, A.V.**

Invited talk at the *RACES conference*, IIT Guwahati, Jan 18-20, 2010.

Yajnik, U.

Popular Lecture “Chandra : a pursuit of science, truth and beauty” at Indian Planetary Society’s annual meeting, June 29, 2009, Sheth Mangaldas Town Hall, Ahmedabad.


Public Lecture “Advances into the Quantum World”, August 14, 2009, Mahatma Gandhi University, Kottayam, Kerala.

Popular lecture “Elementary Particles, Cosmology and unification”. August 14, 2009 at St Thomas College, Pala, Kerala.

Gupta Nayantara
“Ultrahigh Energy Cosmic Rays in the Light of Pierre Auger Data” 20th October, 2009 at Raman Research Institute, Bangalore

International
Yajnik, U.
Visited Feza Gursey Institute for Fundamental Sciences, Istanbul, Turkey during September 14 to 16. Gave a seminar titled “Topological objects and metastable vacua”
Delivered seminar “Is the world left-right symmetric?” at McGill University, January 11, 2010

Ramadevi, P.

I got invitation to visit ICTP, Trieste as I hold Junior associateship. I visited them for research discussion from May 5th to July 4th 2009. During this visit, I learnt new research areas through interaction with people at ICTP. I gave also a seminar on ‘dimer models and quiver gauge theories.’

Honorary Work
Yajnik, U.
Honorary member of the Governing Body, “Eklavya” Bhopal
Ramadevi, P.
Review work: Refereed one Ph.D. and one M.Phil. Thesis.
Mahajan, A. V.
Review work: Referee for PRL and PRB
Rustagi Kailash
Elected a member of the commission on Quantum Electronics of IUPAP.
M. Senthil Kumar
Member, BRNS Basic Science Subcommittee.
Nayantara Gupta
Referee of Astrophysical Journal Letters

Faculty Members and Their Specializations
1. S.N. Bhatia
Magnetic phase transitions in Oxides and other low dimensional systems. He is interested in thermal fluctuations in high Tc superconductors and thermoelectric devices for energy conversions.
2. Mrs. Pragya Das
Experimental Nuclear Physics. She performs experiments at the Pelletrons at Tata Institute of Fundamental Research, Mumbai and the Inter University Accelerator Center, New Delhi.
3. Dibyendu Das
Statistical models for both systems in equilibrium as well as out of equilibrium. Currently, He is currently working in Freely cooling granular gases. Polymer motion in random and shear flow fields. Critical properties of the loop model in 2d and on fractals.
4. Indra Dasgupta
Theoretical and Computational Condensed Matter Physics.
5. Yogendra Kumar Gambhir
Conventional Nuclear Physics, mainly in Relativistic Mean Field Theory and its ability to calculate High Spin States and Super-deformations, Exotic Nuclei and Neutron Halos.
6. Dipan K. Ghosh
Area of theoretical aspects of magnetism with emphasis on exactly solvable models. Currently he is working on application of Monte Carlo techniques to integer spin systems which show Haldane gap.
7. S.S. Jha
Condensed matter theor of Many-particle systems. His other interests are Optoelectronics, Raman Spectroscopy and quantum computing.
8. **Subhabrata Dhar**
Magnetic Semiconductors, Spintronics. His other interests are Optical and transport properties of wide band gap semiconductors such as GaN and ZnO.

9. **T. Kundu**
Laser Spectroscopy, Non Linear Spectroscopy, Photoacoustic Spectroscopy, Non Linear Optics.

10. **Avinash V. Mahajan**
Experimental Condensed Matter Physics Currently working on Quantum Spin Chains.

11. **S.S. Major**

12. **D. S. Misra**
Interests lies in Carbon based materials, diamond and its derivative materials Carbonnanotubes, Carbon clusters, magnetic. He is interested in diamond research and has developed facilities to grow these fascinating materials artificially in his laboratory.

13. **Asmita Mukherjee**

14. **Gautam Mukhopadhyay**
actively involved in research and worked on various topics of condensed matter physics involving Calculations of electronic energy band structure, density of states, electron-phonon mass enhancement factor and the Fermi surface for a and g - Cerium, using the Augmented Plane Wave method. He has varied interests and has dabbled in all areas of theoretical condensed matter physics.

15. **N. Nambudripad**
Experimental condensed matter physicists concentrating in Calorimetry

16. **Basant K. Nandi**
is an experimental nuclear physicist working on physics at Ultra Relativistic Heavy Ion Collisions. He is a software coordinator for the photon multiplicity detector that the Indian group has put in the ALICE collaboration at CERN.

17. **S.H. Patil**
Theoretical physics, elementary particles, quantum mechanics and applications to atoms, molecules, and nuclei.

18. **Shiva Prasad**

19. **P. Ramadevi**
Toplogical Field Theories, Knot theory and connections to Topological String Theories. String Theory and its application to Black Hole Physics, her interests lies in Non-Supersymmetric States in String Theory, Matrix models, Supersymmetric gauge theories, quiver gauge theories

20. **K.C. Rustagi**
Semiconductor Physics, Nonlinear Optics, Lasers, Nanomaterials.

21. **Anirban Sain**
Biophysics of bacterial cell division, concentrating on Kinetics of FtsZ polymers & contractile dynamics of Z-ring, Min oscillations, Hydrodynamic interaction in biopolymers. His interests also lies in grain growth and recrystallization in metals, using phase field model.

22. **Pradeep Sarin**
Works in experimental nuclear physics. He is an hardware expert and brings with him expertise related to electronics and data acquisition associated with silicon detectors. He has worked in the LIGO collaboration.

23. **M. Senthil Kumar**
works in Magnetic thin films and multilayers, Magnetic nanocrystalline films Spintronics films Magnetic nanomaterials Multilayers/thin films for Neutron scattering.

24. **Prabhakar P. Singh**
works in Theoretical study of electronic structure of ordered and disordered alloys, clusters and nanoparticles; study of phase stability and ab initio calculations of alloy phase diagrams, magnetic properties of bulk and surfaces of solids; ab initio calculations of electronic structure using molecular dynamics simulations and order-N method.
Introduction

Since its establishment in 1995, the Shailesh J Mehta School of Management has emerged as a significant player in management education in the country. The school functions as a self-funding entity, and also contributes a significant and growing addition to the institute corpus. This year was marked by a further strengthening and consolidation of the academic programmes of the school. The school started a General Management Program for Technical Professional in the Fall Semester with the Hughes Net Global Education.

The school currently has 21 full-time faculties and 3 adjunct faculties. Three new faculties joined the school this year. The names of these new faculties are as follows:

- Prof. Ashish Pandey
- Prof. Anand Kusre
- Prof. Kirankumar Momaya

This year the school infrastructure in the form of computing facilities and library and information resources was augmented considerably. Three new faculty offices were added. The school received a special grant from Dean (RM) to upgrade the school infrastructure. Computed-aided classroom (for 40 students) with thin-client technology was developed while video conferencing facility was added to the seminar room.

Academic Programme

The school runs a full-time Master of Management programme to develop professionals who manage the business activities in a dynamic environment in which technology is a key determinant of organizational success. The school also offers both full-time as well as external Ph.D. programs to develop future cutting edge researchers. The school has started B.Tech Minor in Management from this year. In the 2009-10, the school awarded both Master of Management and Ph.D. degrees as shown in the following table.

<table>
<thead>
<tr>
<th>Degrees Awarded</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>M.Mgt.</td>
<td>86</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>09</td>
</tr>
</tbody>
</table>

The total number of scholarships awarded in 2009-2010 for Master of Management Programme is 30 + 20. The total number of scholarships awarded in 2009-2010 for the Ph.D. Programme is 17 including 4 Shailesh J Mehta Endowment Scholarship and 1 AICTE National Doctoral Fellowship, 1 QIP Research Scholarship, 2 IRCC Partial Financial Support, 1 UGC Junior Research Fellowship.

Mr. Maximilian Lechner, University of Bremen, joined as a visiting student for course work in Spring semester.

Campus placement for the batch 2008–2010 was conducted in the Spring 2010 semester and all the students have now been placed. The Table below summarizes this year’s placement statistics for the Master of Management programme.

<table>
<thead>
<tr>
<th>R&amp;D Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sponsored Research Projects</td>
</tr>
<tr>
<td>New</td>
</tr>
<tr>
<td>Ongoing</td>
</tr>
</tbody>
</table>

Consultancy Projects

SJMSOM has undertaken 6 consultancy projects during April 2009 – March 2010 wherein 1 faculty member is involved and revenue generated out of these projects is Rs.1634334/-

Extension Activities

SJMSOM conducted Case Writing and Case Teaching Workshop for faculties from various universities during October 1-4, 2009 jointly with Indian School of Business, Hyderabad, Wellingkers Institute, Mumbai, and the Richard Ivey School of Business.

CONTINUUM, the rolling seminar series, is a premier event at the Shailesh J. Mehta School of Management, IIT Bombay. The seminars aim to cover the latest trends in management by inviting eminent speakers from (contd. on page 148)
<table>
<thead>
<tr>
<th>Project Title</th>
<th>Sponsoring Agency</th>
<th>Status (New/Ongoing/Completed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Financial Inclusion - Status and its Impact on Human Development: A Special Focus on North East India”</td>
<td>IRCC, IITB</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Fuzzy decision-making approach to production-inventory problems in the context of supply chain management”</td>
<td>IRCC</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“An agent-based approach to network competition and sustainable growth in Indian Air Transport”</td>
<td>IRCC</td>
<td>Ongoing (HH)</td>
</tr>
<tr>
<td>“Technopreneurship”</td>
<td>NEN</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“SISL For Activities In The Area Of Supply Chain Management”</td>
<td>SISL</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Support For Undertaking Activities Of Phase-III On Technology Management Under MOU Between Technology Management Division, DSIR and IIT Bombay”</td>
<td>DSIR</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Capacity Creation In IP Education and Research (Operationalization Of IP Chair)”</td>
<td>MHRD</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Development of Decision Support System for Project Scheduling using Meta Heuristics”</td>
<td>MHRD</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“NEN”</td>
<td>Wadhwani Foundation</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Technology-gap in Indian Industries – Analysis in the post-1991 era”</td>
<td>IRCC</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Simultaneous Optimization of Mean and Variances of Multi-stage and Multi-response Manufacturing Process”</td>
<td>Department of Science &amp; Technology (DST)</td>
<td>New</td>
</tr>
<tr>
<td>“Spiritual climate and its impact on organization learning”</td>
<td>IRCC (Under new faculty seed grant scheme)</td>
<td>New</td>
</tr>
<tr>
<td>“An Empirical Study Of Marketing Strategy, Organization Performance Relationship In Business Firms In India.”</td>
<td>IRCC</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Occurrence and impacts of climate-related natural hazards”</td>
<td>Ministry of Environment &amp; Forests</td>
<td>New</td>
</tr>
<tr>
<td>“Global Energy Assessment”</td>
<td>International Institute for Applied Systems Analysis</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Launch and development of creative commons-India”</td>
<td>Red Hat India Pvt. Ltd., Google, Novell, Geodesic, &amp; etc</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Comparative Study of Statistical Models and Neural Network Models: A Systematic Approach”</td>
<td>CSIR</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>
business and academia. Each of these seminars focuses on the issues and challenges faced by a specific management function and aims at drawing insights from the knowledge and experience of the speakers. The seminars are well attended by delegates from different organizations, our distinguished alumni, and students from various Business Schools and from other departments of IIT Bombay. The Continuum series also feature various competitions among students, like case study contests, paper presentations and business games.

One of the important co-curricular activities in SJMSOM is Continuum - a series of one-day seminars on topical issues in business and management. These seminars are addressed by leading industry experts and professionals and provide an excellent opportunity for students not only to learn about issues and solutions, but also for networking with senior executives.

The Systems Continuum held on March 15, 2009, explored different aspects of Information Technology and Information Systems in business by initiating discussions on cutting-edge topics. The Systems Continuum 2009 witnessed a series of lectures and a panel discussion on the theme “IT: Driving the next generation business processes”. The theme signifies how existing business processes would be modified through the latest developments in IT.

Finance Continuum was held at Shailesh J Mehta School of Management on July 18th, 2009. The theme of the event was kept to resonate with the challenges faced by finance sector, and an attempt to look at the opportunities that may arise out of it. The theme was “Changing Global Financial Landscape: Opportunities and challenges in India”.

The Marketing Continuum was held on 19th July 2009 with a theme reflecting the current trends and challenges in the business. The Marketing Continuum 2009 saw a series of lectures and a panel discussion on the theme “New Age Marketing - Challenges and Strategies”.

HR Continuum was held at Shailesh J Mehta School of Management on September 27, 2009. Today companies are trying to explore new markets, while consolidating the existing ones. The development and preservation of high caliber people is a source of competitive advantage for any business and the HR personnel can be viewed as the axle in the moving machinery of any organization. Thus, the field of human resources is of great importance in today’s environment. An array of eminent speakers expounded on the theme “Managing talent for Strategic advantage” in the context of their individual domains of expertise.

The Consulting Continuum was organized on 20th March 2010 with a theme reflecting the current trends and challenges facing the consultants. The Consulting Continuum 2010 saw a series of lectures and panel discussions on the theme “Handling Market Optimism with Caution: A Consultant’s Approach”.

The Operations Continuum was held on 21st March 2010 and was based on a very contemporary and relevant theme “Towards creating a sustainable green supply chain”.

Visitors to the Department

1. SJMSOM Seminar Series
   - Dr. Jitesh Thakkar from ADIT, Anand, Gujaratm, on “Issues In Supply Chain Performance Measurement” on July 24, 2009.
   - Prof. Rob Raven from the Eindhoven University of Technology, on “Multi-level perspectives on technology transitions and technology change” on November 16, 2009.
   - Dr. Sreelata Jonnalagedda, Ph.D., Dept of IROM, McCombs School of Business, on “Durable Products, Time Inconsistency and Lock-in” on February 26, 2010.

2. Mr. Rakesh Bhutoria, MD Local Corporate (Wholesale Banking), Standard Chartered Bank
3. Mr. Alok Bharadwaj, Senior Vice President, Canon India
4. Dr. Santosh Khanolkar, Director Platform Strategies, Microsoft
5. Mr. Awdhesh Krishna, MD, Nomura
6. Mr. Jagannadham Thuguntla, Equity Head SMC capital Ltd
7. Mr. Ajay Kapur, Head Marketing for Ambuja Cement
8. Mr. Naren Ambwani, Ex-CEO, J&J
9. Mr. Rahul Krishna, Head, TAS
10. Mr. Shanka Banerjee, Global Marketing Manager, Castrol
11. Mr. Michael Brinker, Partner, Deloitte Consulting

Conferences/Symposia/ Workshops/ Seminars(Participated/Papers Presented)

National
Dutta, P.
Participated in the Workshop on Case Writing and Case Teaching Workshop, held during October 1-4, 2009 at SJMSOM, IIT Bombay, India

Huber, H.
Participated in the Workshop with delegation from Germany around visit of MP Oettinger as workshop lead
Management Development Programmes through Continuing Education and Quality Improvement Programme

<table>
<thead>
<tr>
<th>Title of the programme</th>
<th>Coordinator</th>
<th>No. of days/Weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic Management Accounting - A Tool For Competitive Advantage</td>
<td>Prof. Varadraj Bapat</td>
<td>2 days</td>
</tr>
<tr>
<td>Supply Chain Management</td>
<td>Prof. Karuna Jain</td>
<td>20 days</td>
</tr>
<tr>
<td>Certificate Programme In Management [For Godrej Group Of Companies (Batch - Iii, Term - Iii)]</td>
<td>Prof. S.N. Rao</td>
<td>14 days</td>
</tr>
<tr>
<td>Management Of Technology &amp; Innovation</td>
<td>Prof. Karuna Jain</td>
<td>5 days</td>
</tr>
<tr>
<td>6Th Batch Certificate Programme In Marketing And Human Resource Management</td>
<td>Prof. S. Bhargava / Prof. Dinehs Sharma</td>
<td>40 days</td>
</tr>
<tr>
<td>6Th Batch Certificate Programme In Marketing And Human Resource Management</td>
<td>Prof. S. Bhargava / Prof. Dinehs Sharma</td>
<td>40 days</td>
</tr>
<tr>
<td>R &amp; D Management</td>
<td>Prof. Karuna Jain</td>
<td>3 days</td>
</tr>
<tr>
<td>Finance For Engineers</td>
<td>Prof. S.N. Rao</td>
<td>8 days</td>
</tr>
<tr>
<td>Entrepreneurship : The What, The When And How</td>
<td>Prof. Karuna Jain</td>
<td>3 days</td>
</tr>
<tr>
<td>General Management Programme For Technical Professionals (Batch-2)</td>
<td>Prof. Karuna Jain</td>
<td>40 days</td>
</tr>
<tr>
<td>Certificate Programme In Management [For Godrej Group Of Companies (Batch - Iii, Term - Iii)]</td>
<td>Prof. Karuna Jain</td>
<td>14 days</td>
</tr>
<tr>
<td>Executive Programme In General Management</td>
<td>Prof. Varadraj Bapat</td>
<td>6 days</td>
</tr>
<tr>
<td>Certificate Programme In Business Management</td>
<td>Prof. Varadraj Bapat</td>
<td>12 days</td>
</tr>
<tr>
<td>R &amp; D Management &amp; Innovation</td>
<td><a href="mailto:kjain@iitb.ac.in">kjain@iitb.ac.in</a></td>
<td>4 days</td>
</tr>
<tr>
<td>Certificate Programme In Business Management</td>
<td><a href="mailto:varadraj@som.iitb.ac.in">varadraj@som.iitb.ac.in</a></td>
<td>40 days</td>
</tr>
<tr>
<td>Excellence Programme In General Management</td>
<td><a href="mailto:varadraj@som.iitb.ac.in">varadraj@som.iitb.ac.in</a></td>
<td>6 days</td>
</tr>
</tbody>
</table>

Kathuria, V. K.

“Vehicular pollution control in developing Countries - Need for an integrated approach”, Green Economy: Challenges and responses to changing conditions, organized by NISTADS Delhi, December 14-15, 2009

Kathuria, V. K., Mukandan R.
“Catching-up or falling behind - Role of S&T in growth of emerging economies” International Conference on ‘Science, Technology and Economy: Emerging and Developed Countries” organized jointly by Forum for Global Knowledge Sharing and Tata Institute of Social Sciences (TISS) during October 9-10, 2009 at TISS Mumbai

Kathuria, V. K., SN Rajesh Raj, Sen, K.
“State Business Relations and Manufacturing Productivity Growth in India” (with), 46th The Indian Econometric Society Conference (TIES) held at University of Jammu, J&K during March 4-6, 2010.

Kathuria, V. K., SN Rajesh Raj
“Manufacturing an engine of growth in India – Analysis in the post-nineties”, for Conference on “Frontier Issues in Technology, Development and Environment” held during March 19-21, 2010 at Madras School of Economics, Chennai

Mukherjee, I.
Participated in Case Writing and Case Teaching Workshop from October 1-4, 2009, ISB, Richard Ivey School of Business
Rao, S.N.
Presented paper “Earnings Management by Indian Initial Public Offerings (IPOs) and their post-listing performance”, International Finance Conference, organized by Indian Institute of Management Calcutta (IMC), held during December 3-5, 2009, at Kolkata, India

Presented paper “Earnings Management: Study of Indian Equity Rights Issues”, The 5th International Conference on Asian Financial Markets, organized by Faculty of Economics Nagasaki University, held during December 12-13, 2009, at Nagasaki, Japan


Sharma, D.
Presented a paper “Integrating Perspectives on Service Conveniences: Antecedents and Consequences,” at 5th SIMSR – Asia Marketing conference held on 2nd-3rd January, 2010 at K.J. Somaiya Institute of Management Studies & Research, Vidyanagar, Vidivahi (E), Mumbai

Presented a paper “Culture and marketing organizations in India”. 2nd Conference - Cross Cultural Management : Research and Practice” during 24-25 Feb, 2009, International Centre for Cross Cultural Research and Human Resource Management (ICCCR & HRM), The Business School, University of Jammu

International

Ananthakumar, U. and Mittal, D.
Presented a paper “An application of Cluster analysis to identify countries with similar medical facilities”, International Conference on Retailing Excellence, held during December 22-24, 2009 at SRM University, Kattankulathur, Tamilnadu.

Ranganathan, T. and Ananthakumar, U.
Presented a paper “Testing weak form market efficiency in presence of a structural break: An application to cotton spot prices in the NCDEX” The Indian Econometric Society, held during March 4-6, 2010 at the Jammu University, Jammu

Bapat, V. B.

Presented a paper “A Panel Data Analysis of Corporate Attributes and Stock Prices for Indian Manufacturing Sector” at International Finance Conference 2009 held during December 3-5, 2009 at Indian Institute of Management, Calcutta.

Participated in 18th International Conference on Frontiers in Yoga Research and Applications held during December 19-22, 2009 at SVYASA University, Prashanti Kutiram, Bengluru

Dutta, P., Jain, K., Suresh, M.

Huber, H.
Presented a paper “Statistical mechanics for analytic planning: An application to domestic air traffic in China”, 11th International Conference on Advanced Systems for Public Transport, Hong Kong University of Science & Technology (July 2009)

Jain, K., Dutta, P., Suresh, M.
Participated in the 3rd International Conference on Global Interdependence in Decision Sciences, December 28-30, 2009, Administrative Staff College of India, Hyderabad, India.

Joshi K., Jain, K.
Participated in the 3rd International Conference on Global Interdependence in Decision Sciences, December 28-30, 2009, Administrative Staff College of India, Hyderabad, India.

Jain, K.

Jain, K., Raghavan, M., Jha, S.K.
Presented a paper in the PICMET 2009, Portland International Conference on Management of Engineering & Technology, August 2009

Pandey, A.

Sonar, R.M., Chandrasekhar, M.

Invited Lectures

National

Huber, H.
Press interview conducted on Corporate strategy: Air India, Interview with The Analyst (Magazine), IUP India Press, pp.66-67, September 2009

Speech on “ATM - Strategies for safety, economic & environmental challenges” International Day of Air Traffic Controllers, India Habitat Center, New Delhi, October 2009 during the Indian Air Traffic Controller’s conference in New Delhi

Jain, K.
“Value Build up model for Technology Commercialization”, ASCI, Hyderabad, March 2009

Kathuria, V. K.
“Regressions with Panel Data”, for IES Officers at Pondicherry Central University, Pondicherry on Feb. 8, 2010.
Mukherjee, I.
Quality Improvement by using Designed Experimentation, Short Term Course on “Advances in Rubber Technology from Micro to Nano” (ART-2010), January, Rubber Technology Centre, IIT Kharagpur

Pandey, A.
Indo German Tool Room, Indore on leadership development, 19 Nov. 2009

Rao, S.N.
“Options and Futures” at Indian Institute of Capital Markets, Vashi, Navi Mumbai on October 27, 2009
“Recent Developments in the Indian Capital Markets”, at T A Pai management Institute, Manipal, February 18, 2010
“Recent Developments in the Indian Capital Markets”, at Manipal Institute of Management, Manipal, March 18, 2010
“Recent Developments in the Indian Capital Markets”, at National Institute of Technology Karnataka, Suratkal, March 18, 2010
“Innovative Financial Instruments” at T A Pai Management Institute, Manipal on March 18, 2010

Sharma, D.

Sonar, R.M.
Invited talk on “Business Intelligence at State Level,” Seminar on Strategic Business Processes at Sinhgad Institute of Management Studies, January 9, 2010.

International

Sonar, R.M.
Presented tutorial on “Business Intelligence for Personalised Services” at 3rd International Conference on Global Interdependence and Decision Sciences (ICGIDS), December 28-30 2009, Hyderabad

Honorary Work

Ananthakumar, U.
Reviewed papers for International Conference on Management of Innovation and Technology to be held in Singapore during 02-05, June 2010.

Dutta, P.

Huber, H.
Assisted as volunteer member to doctoral jury at IDC

Jain, K.
Reviewed research paper titled “On the dynamic use of project performance and schedule risk information during project tracking” for Omega, The International Journal of Management Science, February 2010
Reviewed thesis “Management of Technical Education in West Bengal”, Gopal Chandra Debnath, Business Management, University of Cutacut, July 2009
Reviewed thesis “Service Quality Perceptions of Patients and Attendants in Indian Hospitals”, Ms. P. Padma, Dept. of Management Studies, IIT Madras, July 2009

Kathuria, V. K.
Reviewed papers for Transnational Corporations
Reviewed Urban & Regional Development Studies (RURDS)
Wrote a concept note on “Ecosystem Services – A concept Note”, Dissemination Paper – 9, Centre of Excellence in Environmental Economics, Madras School of Economics.

Kusre, A.
Reviewing projects for Technology Development Board, DST, Delhi
Reviewing projects for New Millenium Indian Technology Leadership Initiative, CSIR, Delhi

Momaya, K.
Member, Editorial Board, Journal of Advances in Management Research (JAMR).
Served as Editor for the first India-Japan collaborative issue of the e-Journal International Journal of Global Business and Competitiveness (IJGBC), including Editorial Reviews.

Mukherjee, I.
Reviewer of “Intl Journal of Adv Manufacturing Technology”
Reviewer of “ASME 2010 10th Biennial Conference on Engineering Systems Design and Analysis (ESDA 2010)”
Session Chair for “International Conference on Industrial Engineering (ICINDE’10), Hongkong”

Pandey, A.
Reviewed paper for 1st meeting of Indian Academy of Management

Rao, S.N.
Ph D thesis examiner, Multimedia University, Kualalumpur, Malaysia
M S thesis examiner, IIT Madras
Paper reviewer for 59th Midwest Finance Association Conference
Sharma, D.  
Appointed as Reviewer for proposal assessment by National Project Implementation Unit (NPIU), Ministry of Human Resource Development, Govt. of India

Sonar, R.M.  
Curriculum Evaluation of various courses: M.Sc (Computer Applications), MBA(Networking & IT Infrastructure), MBA(IT), BBA(IT), BCA, MBA(ISS), MBA(ITBM, SYS & SSM) of Symbiosis Institute of Computer Studies & Research (SICSR), Symbiosis International (Deemed University), Pune. 
Reviewed paper for National Journal of Construction Management  
Reviews papers for National Journal Of System And Information Technology

Faculty Members and their Specializations

1. Anand Kusre  
Management of New Ventures

2. Anand Patwardhan  
Vulnerability and adaptation to global change, Technology policy, Economics and regulation of information and communication technology

3. Ashish Pandey  
Organization Development, Organization Behavior (Macro)

4. Atanu Ghosh  
Strategic management, Services Marketing, Relationship Marketing, Supply Chain Management Product Launch and Brand Building

5. Dinesh Sharma  
Marketing Strategy, Market Research

6. Gajendra K. Adil  
Operations Management and Decisions Sciences

7. Hans Huber  
Network competition and policy, Regional Air Traffic, Aviation Business Strategies

8. Indrajit Mukherjee  
Operations Management, Quality Management

9. Karuna Jain  

10. Kirankumar Momaya  
Competitiveness, Strategic / Technology Management

11. Pankaj Dutta  
Operations Research, Retail Inventory Management, Supply Chain Modeling, Project Management, Fuzzy Optimization

12. Rahul Patil  
Operations Management, Supply Chain Management, Stochastic Optimization, Innovation Diffusion

13. Rajendra Sonar  
Business Intelligence for Personalised Services, Hybrid Intelligent Systems, Knowledge-based Systems, Information Systems and Technology

14. Shivganesh Bhargava  
Prediction of Performance, Organizational Wrongdoing, Reward Preference in Indian Organizations, Managing of Human resources in Technical Institutes

15. Sapar Narayan Rao  
Corporate finance, Investment Management, Valuation, Mergers & Acquisitions, Capital Markets

16. S.V.D. Nageswara Rao  
Corporate Finance and Capital Markets

17. Shishir Kumar Jha  
Copyright, Digital Economy, International Business

18. Trupti Mishra  
Environmental Economics, Productivity and Efficiency Studies

19. Usha Ananthakumar  

20. Varadraj Bapat  
Financial Accounting and Reporting, Cost and Managerial Accounting

21. Vinish Kathuria  
Industrial organization, Environmental management

Distinguished Guest Professors

1. Dr. Jahar Saha  
Operations Research

Adjunct Faculty

1. Dr. S.A. Kelkar  
Industrial and Operations Engineering, Software Engineering And Quality Assurance (Testing and Matrices)

2. Dr. Kamal Sharma  
Managerial Effectiveness Skills, Technology Forecasting and Assessment

3. Dr. Raj Hirwani  

4. Mr. Kamlesh Pande  
Innovation Management, Knowledge Management
Introduction

The Centre for Environmental Science and Engineering (CESE) was established in 1985. The centre has a core group of faculty members with multidisciplinary background and diversifying research interests. The centre is currently expanding its academic activities by starting two new programmes (B.Tech.-M.Tech. dual degree and M.Sc-Ph.D programmes), in addition to the existing M.Tech. and Ph.D. programmes in Environmental Science and Engineering. CESE has made adequate provisions for admitting students for the M.Sc–Ph.D programme from the upcoming semester (July-November) in 2010. The post-B.Sc. students for the above programme will be selected though the JAM examination. The centre also plans to implement the integrated B.Tech.-M.Tech. dual degree programme within the next two years. In addition to the above listed programmes, CESE offers institute core courses such as “Environmental Studies” (compulsory course for undergraduate students in response to the Supreme Court directive) and “Environmental Science and Engineering” (elective course for postgraduate students) for sensitizing students across all disciplines towards the urgent need for protection and restoration of environment by adapting environment-friendly life styles.

The on-going research activities of the centre are focused towards addressing the priority areas (local and global) set by major national agencies like MHRD, CPCB, SPCB, MNRE, DBT, MoEF, CSIR, DST, AICTE. In addition, the centre has already established strong links and collaborations with leading industries, academic institutions and national/international agencies by conducting sponsored research and offering consultancy and technical services. The research activities of CESE are supported by excellent experimental and computational facilities, competent and dedicated technical staff and high quality students. The centre is also actively engaged in organizing workshops and CEP courses for benefiting the professionals from other academic institutions, industries and governmental sectors.

Recently, a “Joint-IIT Environmental Energy and Climate Change Education & Research Meet” was organized by CESE in collaboration with other related departments at IIT Bombay during March 12-13, 2010. Faculty members from other IITs (like IIT-Delhi, IIT-Guwahati, IIT-Kanpur, IIT-Kharagpur, IIT-Madras, IIT-Roorkee) and NITIE participated in the event. The Honourable Minister of Environment and Forests, Mr. Jairam Ramesh, participated in the meeting. In addition, professionals from MoEF, NEERI, NITIE and state government also participated in the event and presented their views on the action plans and initiatives for the Joint-IIT collaborations.

MoUs and Collaborations

CESE, IIT Bombay, and Gujarat Maritime Board (GMB) for “Green Alang Initiative”, involving consultation projects and allied activities.

Collaborations
- Professor Pratim Biswas, Washington University in St.Louis
- Professor Rudolf Husar, CAPITA, Washington University in St.Louis
- Professor T. Majozi, University of Pretoria, South Africa and Professor S. Bandyopadhyay, Department of Energy Science and Engineering, IIT Bombay under Indo-South African Science & Technology Cooperation scheme.
- Professor C. Trois, University of Kwa-Julu Natal, Durban, South Africa under Indo-South African Science & Technology Cooperation.
- Professor P. Ramachandran, University of Washington at St. Louis, Under MAGEEP Programme

Infrastructure development

Various equipment for research on treatment, disposal, and leaching of hazardous pollutants from contaminated soils, sludges, asbestos and glass wool and hazardous wastes – especially solidification and stabilization and preparation of alternate building materials made from waste solid matrices.

Micro plate Reader with WINKQCK 3.0 Version Software
Academic Programmes

CESE currently offers M.Tech. and Ph.D. programmes in Environmental Science and Engineering with a strong focus in teaching and research.

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of Students Admitted Under Each Programme in 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. Tech</td>
<td>Ph.D</td>
</tr>
<tr>
<td>Institute Teaching Assistance (TA)</td>
<td>13</td>
</tr>
<tr>
<td>External sponsored College Teacher (CT)</td>
<td>-</td>
</tr>
<tr>
<td>Industry Project sponsored (PS)</td>
<td>2</td>
</tr>
<tr>
<td>UGC/CSIR/DBT/QIP/CPHEO fellowship holders</td>
<td>4</td>
</tr>
</tbody>
</table>

Scholarships: Information is provided in the table given below.

R&D Activities

Nine new projects have been awarded in 2009-2010. The details of the projects are given below.

Sponsored Research Projects

Sponsored Research Projects : 23
New : 9
Ongoing : 11
Completed : 3

Below given is the list of sponsored research projects:

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Sponsoring Agency</th>
<th>Status (New/ Ongoing/ Complete)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Sampling and Analysis Techniques for Bioaerosols”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Collaborative Research and Technical Advice on Effluent Management”</td>
<td>Agave Industries (India) Pvt. Ltd</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Life Cycles of Metals in Coal Combustion: Speciation in Fly Ash, and Transformations during Ash Reuse and Storage”</td>
<td>McDonnell Academy, Washington University, St. Louis, USA</td>
<td>New</td>
</tr>
<tr>
<td>“Energy Recovery Options from Municipal Solid Waste and Control Treatment Measures of Carbon Emissions from Landfills”</td>
<td>DST</td>
<td>New</td>
</tr>
<tr>
<td>Project Title</td>
<td>Sponsoring Agency</td>
<td>Status (New/Ongoing/Complete)</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>---------------------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>“Surfactant Aided Biodegradation of Model NAPLs”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Sampling and Analysis Techniques for Bioaerosol Standardization and Field Evaluation of Airborne Endotoxins”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Measurement and Characterization of Airborne Biological Particles”</td>
<td>DST</td>
<td>New</td>
</tr>
<tr>
<td>“Development of two-step Treatment Strategy for Effluent Generated from Agro Based Pulp and Paper Mills”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Wastewater Minimization in Batch Plants through On-site Treatment, Reuse and Recycle Processes”</td>
<td>DST</td>
<td>New</td>
</tr>
<tr>
<td>“Oxidative Treatment of Industrial Wastewater: Development of Novel Catalysts and Technology Evaluation”</td>
<td>McDonnell Academy, Washington University, St. Louis, USA</td>
<td>New</td>
</tr>
<tr>
<td>“Continuous Arsenic Removal Using Zerovalent Iron Filter” (ARUZIF)</td>
<td>DST</td>
<td>New</td>
</tr>
<tr>
<td>“Zero-Valent Metal Based Catalysts for Dehalogenation of AOX (adsorbable organic halides) Compounds in Pulp and Paper Industrial Effluents”</td>
<td>CSIR</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Sustainable Technology for Removal of Arsenic from Drinking Water: Principles and performance of Electrocoagulation”</td>
<td>McDonnell Academy, Washington University, St. Louis, USA</td>
<td>New</td>
</tr>
<tr>
<td>“Development of Reactors Using Palladium Immobilized on Bacterial Cellulose for Remediation of Water Contaminated with Pentachlorophenol and Lower Chlorinated Phenols”</td>
<td>DST</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Preventive technological interventions for improving environmental attributes of ship recycling in Alang”</td>
<td>Gujarat Maritime Board, Gandhinagar</td>
<td>New</td>
</tr>
<tr>
<td>Project Title</td>
<td>Sponsoring Agency</td>
<td>Status (New/Ongoing/Complete)</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>----------------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>“Development of wastewater treatment technology to achieve total reuse of treated sewage”</td>
<td>Jamunalal Bajaj Foundation, Pune</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Dismantling of Vessels with Enhanced Safety and Technology”</td>
<td>European Union</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Cost Effective and Environmentally Sound Dismantling of Obsolete Vessels”</td>
<td>European Union</td>
<td>Completed</td>
</tr>
<tr>
<td>“High Temperature Gas Phase Synthesis and Characterization of Tailored Ultra fine Powders”</td>
<td>DST</td>
<td>Complete</td>
</tr>
<tr>
<td>“High-temperature aerosol routes for nanoparticle synthesis: Preparation, characterization and applications”</td>
<td>Indo-US S&amp;TF</td>
<td>Complete</td>
</tr>
<tr>
<td>“Studies for Design of Systems for Removal of Tar and Particulate Matter from Producer Gas for IC Engine and Gas Turbine Applications”</td>
<td>MNRE</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Study and Optimization of DI Engine performance running on Jatropha bio-diesel blend and straight vegetable oil (SVO)”</td>
<td>VRDE</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Atmospheric Aerosol Characterization using Integrated Multi-Sensor Earth Observations”</td>
<td>Lloyd’s Register</td>
<td>New</td>
</tr>
</tbody>
</table>

**Consultancy Projects**

A total of 11 consultancy jobs were undertaken by four faculty members. Total income generated from consultancy work was Rs. 90,54,627/-.

**Patents**

P. Asokan, Mohini Saxena and Shyam R. Asolekar and Council of Scientific & Industrial Research, New Delhi
Patent application number: 0346NF2005
Entitled: “A process for recycling and utilizing hazardous jarosite released from zinc industries in developing non-hazardous building bricks”; Status: Scrutiny is completed and it is at the advanced stage of awarding

Sumathi Suresh and Upendra D. Patel

Sumathi Suresh and Upendra D. Patel
Patent application number: PCT/IN2008/000213
Entitled: “Reactor for Reductive Conversion Reactions Using Palladized Bacterial Cellulose” filed for PCT (international) and US patent through financial assistance provided by Department of Biotechnology, Govt. of India, favourable international search report received.

**Extension Activities**

Sethi, V.
Three-week visit to Washington University in St. Louis as part of Indo-US Joint Centre on Nanoparticle Aerosol Science and Technology in October 2009.

Asolekar, S.R.
Nine user workshops conducted from February 2009 to present for the safety officers and environmental managers working in the various ship dismantling
yards in Alang on different topics covering various aspects of environmental and health risk management.

“Green Academic Campus” development plan for Mahindra United World College, Paud, Pune campus in collaboration with the faculty of MUWCI and Inheritance India, Ltd, Mumbai.

Field work related to testing risk assessment method was carried out at Gothenburg, Sweden ship repairing yard, during May 2010.

Dikshit, A.K.

Visited the Department of Civil Engineering, University of KwaZulu-Natal (UKZN), Howard College Campus, Durban from December 13 to 20, 2009 for the project “Energy Recovery Options from Municipal Solid Waste and Control / Treatment Measures of Carbon Emissions from Landfills” sponsored jointly by the Department of Science and Technology, India and the National Research Foundation, South Africa under the Indo-South Africa Cooperation.

Garg, A.
Visited the Department of Civil Engineering, University of KwaZulu-Natal (UKZN), Howard College Campus, Durban, South Africa from December 13 to 20, 2009 for the project “Energy Recovery Options from Municipal Solid Waste and Control / Treatment Measures of Carbon Emissions from Landfills” sponsored jointly by the Department of Science and Technology, India and the National Research Foundation, South Africa under the Indo-South Africa Cooperation.

Visited the Department of Chemical Engineering, University of Pretoria, Pretoria, South Africa from December 9 to 12, 2009 for the project “Wastewater minimization in batch plants through on-site treatment, reuse and recycle processes” sponsored jointly by the Department of Science and Technology, India and the National Research Foundation, South Africa under the Indo-South Africa Cooperation.

Visitors to the Department

Dr. R. Gopichandran from Gujarat Energy Research and Management Institute, Ahmedabad has visited CESE to deliver lecture on “Montreal and Kyoto Protocol – Two sides of the same coin” on 4th Oct, 2009.

Prof. Purendaru Das, Professor of Marine Structures, University of Strathclyde, Glasgow visited CESE to discuss the issues related to ship dismantling in India on 10th February, 2010.


Conferences/ Symposia/ Workshops/ Seminars (Participations/Papers Presented)

National

Murali, C.P. and Patil, R.S.

Dikshit, A.K.

Mukherji, S. and Mohanty, S.
Presented a paper on “Challenges in Surfactant Aided Bioremediation of Oil” in the 97th Indian Science Congress, Environmental Science Session, Organized by: Indian Science Congress Association, held on Jan 3-7, 2010 at University of Kerala, Kariavathom campus, Thiruvananthapuram, Kerala.

Mukherji, S. and Mohanty, S.

Karmakar, S.

International

Menon, R., Shah, M.K., Patil, R.S., and Sethi, V.
Presented a paper on “Contemporary Source Profiles for Non-Vehicular Emissions in 6 Indian Cities” in

Tiwari, V., Menon, R., Shah, M. K., Sethi, V. and Biswas, P.

Dikshit, A.K.
Presented a paper on “Treatment of Distillery Wastewater Using Anaerobic Baffled Reactors” in the Technical Session III in the International Conference on Chemical, Biological and Environmental Engineering (CBEE 2000) held during October 9-11, 2009 at the Nanyang Executive Centre, Nanyang Technological University, Singapore.


Presented a paper on “Interactive Water Quality Modelling of Mahanadi River” in the Indo-French Workshop on Anthropogenic Impacts on Water Resources and Soils: An Indo-French Perspective sponsored by the Indo-French Center for Promotion of Advanced Research (IFCPAR-CEFIPRA) and French Institute for Development (IRD, France) from November 23-27, 2009 at IISc Bangalore.

Karmakar, S.
Presented a paper on “Risk Management” in Puri, Orissa, India, organized by Monash University through AUSAID funding 21-22 November 2009.

Karmakar, S.
Presented a paper in Division of Environmental and Water Resources Engineering, School of Civil & Environmental Engineering (CEE) under the GlobalTECH programme on “Systems Techniques and Uncertainty Modeling in Water Resources Management”, 6-8 April 2009, Nanyang Technological University, Singapore.

Tyagi, N.S. and Karmakar, S.

Bardhan, K. and Karmakar, S.

Garg, A.

Mishra, A., Yadav, B.R. and Garg, A.
Presented a paper on “Treatment of Leachate Using Wet Oxidation Process – An Experimental Study” in Twelfth International Waste Management and Landfill Symposium, 5-9 October 2009, S. Margherita di Pula (Cagliari), Italy.

Garg, A.
Presented a paper on “Characteristics and Options for Municipal Solid Waste Derived Combustible Stream” in International Conference on Advances in Energy Research (ICAER) organized by Department of Energy Science and Engineering, IIT Bombay held during 9-11 December, 2009. (Poster presentation)

Garg, A. and Yadav B.R.
Presented a paper on “Applications of Wet Air Oxidation Process in Wastewater Treatment” in International Conference on Advances in Energy Research (ICAER) organized by Department of Energy Science and Engineering, IIT Bombay held during 9-11 December, 2009. (Poster presentation)

Garg, A.

Invited Lectures

National

Sethi, V.
“Atmospheric Aerosols” at the Seminar on Atmospheric Environment organized by IIEM, on December 16, 2009.
Patil, R.S.

Dikshit, A.K.
“Advances in Treatment of Distillery Wastewater”, at the Department of Civil Engineering, IIT Delhi, April 6, 2009.

“Basics of Solid Waste Management, Solid Waste Management Plan for an Urban Area and Planning and Design of Solid Waste Management in a Mega City” in the short term training programme on “Role of Technology in Environmental Conservation” sponsored by ISTE on January 8, 2010 at SIES Graduate School of Technology, Navi Mumbai.

“Application of LCA in India: A Case Study of Refinery” in the International symposium on a Sustainable Future (ISFS-2010) sponsored by the Institute for Global Environmental Strategies, Japan; the Centre de Sciences Humaines, India; the UNEP-SETAC Life Cycle Initiative, France; PE International, GmBH, Germany on January 11-13, 2010 at Indira Gandhi Institute of Developmental Research, Mumbai.

Garg, A.
Delivered two lectures in a short term course on “Sustainable Water and Wastewater Techniques” at SVNIT, Surat, India held during 27-31 July, 2009.

International

Karmakar, S.
Invited presentation on “Flood Management” in Monash University, 1-2 September 2009, Melbourne, Australia.

Honorary Work

Asolekar, S.R.
Member of the “Expert Committee” constituted by the Director General (Shipping), Govt. of India in February 2010; entrusted with a development of time bound medium and long-term action plans for minimization of Green House Gas (GHG) emissions from ships, under Chairmanship of Director General (Shipping) (Feb 2010 to present).

Member of the quasi-judicial Supreme Court Authority entitled “Dahanu Taluka Environmental Protection Authority” entrusted with the conservation of the eco-fragile region of Dahanu Taluka and surroundings constituted by the Honorable Supreme Court of India since its inception. (March 1997 to present)

Appointed as an “expert in the amicus curiae capacity” by the Hon. Bombay High Court in December, 2009, to furnish opinion and recommendations on environmental impacts of sand dredging and related issues (Dec 2009 to Jan 2010).

Patil, R.S.
Reviewed papers for the Journal: Atmospheric Environment and Environmental Monitoring and Assessment.

Dikshit, A.K.

Sumathi, S.

Mukherji, S.

Karmakar, S.

Member, International Society of Ecotoxicology and Environmental Safety, Germany.

Member, Technical committee, National Conference on Sustainable Water, Environmental Planning and Management (SWEPM-2010), BITS-Pilani, Hyderabad campus, March 5-6th, 2010

Garg, A
Reviewer of Project Proposals submitted to DST and MoEF.

Significant Awards/ Distinctions

Awards

Sethi, V
Excellence in Teaching, IIT-Bombay, 2009

Mukherji, S.

Distinctions

Patil, R.S.
Member, Program Advisory committee on Atmospheric Sciences under SERC, DST.
Visitor’s Nominee, Garhwal University, Srinagar, Uttarkand, 2009.
Member, Editorial Board, Asian Journal of Chemical and Industrial Research.
Member, Editorial Board, Jnl. of Scientific & Industrial Research, Published by NISCAIR, New Delhi.

Sumathi, S.
Associate editor for Journals published under Asian Network for Scientific Communication (since February 2007)
Editorial board member of the following journals: Journal of Disaster Advances, Journal of Pediatric Biochemistry, Advanced Material Letters, The Open Waste Management Journal; The Open Colloid Science Journal.

Asolekar, S.R.


Dikshit, A.K.
Member, Editorial Advisory Board, Journal of Environmental Science and Engineering, (Publishers: NEERI, Nagpur, India)
Member, Editorial Board, Journal of Environmental Science and Health, Part A (Publishers: Taylor and Francis Group)
Member, Editorial Board, Journal of Clean Technology and Environmental Policy (Publishers: Springer Verlag)
Member, State Advisory Committee on Biomedical Waste Rules, Environment Department, Government of Maharashtra since 2009.
Member, Academic Advisory Committee, Nirma University, Ahmedabad, since 2010.

Karmakar, S.
Awarded the BOYSCAST fellowship 2009-2010, DST, for conducting research in the area of Ecological Engineering for a duration of six months at the Nicholas School of Environmental, Duke University, Durham, NC 27708, USA.

Garg, A.

Faculty Members and their Specializations

1. **Virendra Sethi**
   Aerosol Science and Engineering
   Air Quality Engineering

2. **Shyam R. Asolekar**
   Hazardous Waste Treatment and Disposal Technologies
   Treatment of Leachates and Industrial Wastewaters
   Modeling of Environmental Systems (Lake, River, Ocean, Atmosphere)
   Monitoring of Marine Pollution using Remote Sensing
   Cleaner Production and Preventive Environmental Management

3. **Rashmi S. Patil**
   Air Pollution Dispersion and Receptor Modelling
   Indoor Air Quality and Exposure Assessment
   Air Quality Monitoring and Management; Environmental Impact Assessment
4. **Anil Kumar Dikshit**
Water and Wastewater Treatment Technologies
Urban Solid Waste Management
Environmental Systems Modelling and Optimization
Environmental Management and Impact Assessment
GIS Applications for Environment.

5. **Sumathi Suresh**
Remediation of Chlorinated Organic Compounds (pesticides), Textile Dyes, Heavy Metals using Bimetallic Systems, Immobilized Metals and Zero-valent Metals

Microbiological Processes for Treatment of Industrial Pollutants (textile dyes, pulp and paper mill wastes, heavy metals, tannery wastes): Elucidation of the Mechanism of Pollutant Removal and Design of Bioreactors

Microbial Remediation of Metabolites Formed from Chemical and Biological Treatment of Chlorinated Pesticides in Soil and Water

Application of Biological Processes (whole cell and enzyme based) for Developing Cleaner Technologies (for example pulp biobleaching using microbial xylanases and ligninases)

Microbial Toxicity Testing Assays for Biomonitoring Pollutants and Industrial Wastewaters

Enzyme Catalyzed Bioremediation Reactions (Characterization of active site, inhibition of enzyme activity, structure-function relationship in enzyme catalysis)

6. **Suparna Mukherji**
Biodegradation and Bioremediation of Complex Organic Pollutants
Toxicity Evaluation of Complex Mixtures
Environmental Application of Nanomaterials
Sorption Phenomena
Sampling and Analysis of Bioaerosols

7. **Sanjeev Chaudhari**
Water and Wastewater Treatment

8. **Subhankar Karmarkar**
Water Resources and Environmental Engineering
Environmental and Water Resources Systems - development of optimization models for surface water quality control
Irrigation water management
Floodplain planning and management
Solid waste management
Uncertainty Modeling in Environmental Systems - probabilistic approach

Fuzzy sets theory and interval optimization
Water Conveyance Systems and Hydraulic Designs - optimal design of water & waste water conveyance systems and hydraulic structures
Flood Risk Management - flood vulnerability analysis using GIS
Multivariate flood frequency analysis
Environometrics

9. **Anurag Garg**
Solid, Hazardous and Biomedical Waste Management
Energy and Environment
Cleaner Technologies
Wastewater Treatment
Introduction

The Industrial Design Centre (IDC) offers a two-year programme leading to Master of Design (M.Des) degree in the areas of Product Design, Visual Communication, Interaction Design and Animation. The programme is meant to develop skills, knowledge and aptitude among students to become creative problem-solvers who can bring about innovation in the manufacturing and communication industries. At the end of their education they are expected to make a meaningful contribution to the industry and set new future directions.

Academic Programme

M.Des. in Product Design, Visual Communication, Interaction Design and Animation

New Sponsored Research Projects initiated in 2009-10

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Sponsoring Agency</th>
<th>Status (New/Ongoing/Complete)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internship project for M Des Students from HP Labs</td>
<td>HP Labs., Bangalore</td>
<td>Ongoing</td>
</tr>
<tr>
<td>INDIA-NORWAY project initiative on designing for Children.</td>
<td>India-Norway Project</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Project UNITE</td>
<td>Johnson &amp; Johson</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Sewn Narratives</td>
<td>Kala Raksha Trust</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Combat vehicle styling</td>
<td>Larsen and Toubro</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Creating Digital-learning Environment for Design in India (e-kalpa)</td>
<td>Ministry of Human Resource Development</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Creative Learning Materials for children.</td>
<td>Sir Navajbai Ratan Tata Trust</td>
<td></td>
</tr>
</tbody>
</table>

Degrees Awarded

M.Des. : 47

R&D Activities

Sponsored Research Projects

<table>
<thead>
<tr>
<th>Sponsored Research Projects</th>
<th>: 37</th>
</tr>
</thead>
<tbody>
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<td>New</td>
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<tr>
<td>Ongoing</td>
<td>: 28</td>
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<tr>
<td>Completed</td>
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</table>

Internship project for M Des Students from HP Labs

INDIA-NORWAY project initiative on designing for Children.

Project UNITE

Sewn Narratives

Combat vehicle styling

Creating Digital-learning Environment for Design in India (e-kalpa)

Creative Learning Materials for children.
### Sponsored Research Projects initiated in 2008 – 2009

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating awareness among the students and their strategic involvement in product concept development.</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Internet Applications on Mobile Phones in Developing Countries.</td>
<td>Nokia</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Design for the Elderly : Development of Residential Standards for the Elderly.</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Design for Improving Slum Businesses(Honeywell Technology Solutions Lab Pvt.Ltd.)</td>
<td>Honeywell Technology Solutions Lab Pvt.Ltd., Bangalore</td>
<td>Ongoing</td>
</tr>
<tr>
<td>User Studies for Media and Entertainment (Nokia India Pvt. Ltd., Bangalore)</td>
<td>Nokia</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Kaavad Tradition of Rajasthan</td>
<td>Ministry Of Textiles</td>
<td>Ongoing</td>
</tr>
<tr>
<td>ReDesign Of interaction of Air defence system (Larsen &amp; Toubro Ltd., Mumbai)</td>
<td>Larsen and Tubro</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Combat vehicle styling (M/s. Larsen &amp; Toubro Ltd., Mumbai)</td>
<td>Larsen and Tubro</td>
<td>Ongoing</td>
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</tbody>
</table>

### Sponsored Research Projects initiated in 2007 – 2008

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design and development of a vestibulator for cerebral palsy therapy</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Design Expo 2007.</td>
<td>Microsoft Corporation</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Yahoo! University Design Expo 2007</td>
<td>Yahoo Inc.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Increasing footprint of public health system.</td>
<td>Honeywell Technology Solutions Lab Pvt.Ltd., Bangalore</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Microsoft research/ research on games for learning.</td>
<td>Microsoft Research</td>
<td>Ongoing</td>
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</tbody>
</table>
## Inter-departmental Projects

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Galla - low cost retail management system.</td>
<td>Media Lab Asia.</td>
<td>Ongoing</td>
</tr>
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</table>

## Sponsored Research Projects initiated in 2006-2007

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrative Structures for Digital Media</td>
<td>Il&amp;FS Education &amp; Technology Services Ltd</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Multi-Purpose composite modular housing system</td>
<td>Technology Info. Forecasting &amp; Assessment Council</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“Ortho-CAD Network Centre for Endo-prosthetic Skeletal Reconstruction Systems”</td>
<td>Department of Science &amp; Technology</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

## Sponsored Research Projects initiated in 2005-2006

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<thead>
<tr>
<th>Project Title</th>
<th>Agency Name</th>
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</thead>
<tbody>
<tr>
<td>Development of Computer Workstation for Cerebral Palsy.</td>
<td>MHRD</td>
<td>Closed</td>
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</table>

## Inter-department project

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
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</thead>
<tbody>
<tr>
<td>Interfaces for all</td>
<td>Sponsored by Private Organisations</td>
<td>Closed</td>
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</table>

## Sponsored Research Projects initiated in 2004-2005

<table>
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<tr>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Media-Microsoft Research</td>
<td>Microsoft Research</td>
<td>Ongoing</td>
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</tbody>
</table>

## Sponsored Research Projects initiated in 2003-2004

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Sharing Personal Media”, 03IU003</td>
<td>Indo-US Collaboration</td>
<td>Ongoing</td>
</tr>
<tr>
<td>“People to People, 03IU017”</td>
<td>Indo-US Collaboration</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

## Sponsored Research Projects in 1997-98

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Agency Name</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creation of rapid prototyping cell at IDC</td>
<td>Industry 97SP002</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>
Consultancy Projects

The department undertook 15 jobs generating Rs.36,67,624/-.
The total number of faculty involved was 10.

Extension Activities

CEP courses

The following CEP courses were conducted during the year:

Ergonomics and Kinesiology for SNDT University
Art, Design and Society, Mahindra and Mahindra Pvt. Ltd., September 2009
Naked Raku Workshop for Studio Potters in Mumbai, IDC, IIT Bombay, February 2010
“Visual Order” CDP - Book Project - Completed - 2009
“Visualization Drawing” - CDP - Book Project - Ongoing
Visual Ergonomics lecture

Design Degree Show (DDS) Annual Exhibition of IDC

IDC organized events at IDC, IIT Bombay, during June 11-12, 2009, and at Nehru Centre, Mumbai, during June 13-14, 2009. DDS is the annual event showcasing the design efforts at IDC. DDS is aimed at creating design awareness in society and simultaneously offers a platform for people to meet and interact as facilitators for new ideas to emerge and for fruitful collaborations to materialize.

A large number of public, students, entrepreneurs and representatives of various industries and media visited this exhibition. It was well covered by major newspapers, magazines and TV channels.

Seminars/Workshops Hosted

Course on Ergonomics at MIT, Pune PG Group from May 11 to 16, 2009, IITB-CII-Chicago Design Professionals Meet at IDC, IITB, from December 3 to 4, 2009

Other Projects

Chakravarthy B.K.
“Explosive detection system” for Nanotechnology Department, IIT Bombay – Completed.
“I-Sens - Cardiac attack detector” for Nanotechnology Department, IIT Bombay – in progress.
“NMRL Water sensor system” for Prof. S. Mukherjee, Nano Electronics, IIT Bombay – completed.

Film Festivals

National

Sabnani Nina
Animated film “Tanko Bole Chhe” (The Stitches Speak) screened at the Asian Women’s Film Festival, New Delhi and Hyderabad, March 2010
Animated film “Tanko Bole Chhe” (The Stitches Speak) screened at the International Short Film Festival, Chennai, March 2001

International

Sabnani Nina
Animated film “Tanko Bole Chhe” (The Stitches Speak) screened at the International Film Festival Rotterdam, The Netherlands

Visitors to the Department

Dr. Sudhir Patwardhan – “Visual arts”
Mr. Anand Patwardhan – “Film-making”
Mr. Prabodh Parekh – “Poetry”
Mr. Vinod Raina – “Educationist”
Mr. Vijay Krishna – “On Leadership”
Ms. Aruna Mohanty – “Performing Arts: Odissi”

Conferences/Symposia/Workshops

Seminars (participated/ Papers Presented)

National

Ray GG
Expo IDi, IDC, IITB Anthropometry and its application in Design on September 26, 2009 Gave opening remarks on Ergonomics National Seminar “Ergonomics for Improved Productivity” in Aligarh Muslim University on November 20 - 21, 2009
Participated in a Seminar on “Ergo-Design: An approach to User centered Design” on November 20 - 21, 2009

HWWE2009, Kolkata from December 16 – 20, 2009

Rao A.G.
Gave an invited talk on “Innovations in Math Teaching” at Kendriya Vidyalaya Sangathan, Zonal Institute of Education & Training, Mumbai For principals of KV Schools in April 2009

Workshop on “Innovations and Experimentations in Teaching Maths”, for Math Teachers sponsored by Kendriya Vidyalaya Sangathan, Zonal Institute of Education & Training, Mumbai was held from May 29 to June 4, 2009, at Bamboo Studio, IDC.

Gave a slide talk on “Making Learning Effective” to the resource persons at Azim Premji Foundation, Bangalore, on December 10, 2009

Mohanty Raja
Participated in the National Seminar on “Practicing Indian Aesthetics”, University of Mumbai in January 2010

Chakravarthy B.K.

Conducted one day training programme for a core group of engineers of M/s. Mahindra & Mahindra on CLAY Modeling, at IDC, IIT Bombay, Mumbai, March 17, 2010.

Sreekumar G.V.
Organized a two-day seminar and design workshop “Typography Day 2010” at Sir JJ School of Arts, Mumbai, Feb 2010.

Conducted workshop “Typography Day 2010” at Sir JJ School of Arts, Mumbai, Feb 2010.

Conducted workshop on Expressive Typography at “VC expo” organized at IDC.

Sabnani Nina
Presented a paper “A Structural Analysis of the Kaavad Phenomenon using Propp’s methods” at a conference organized by the 33rd Indian Folklore Congress at the Manipur University, Imphal, Manipur on November 16, 2009.

Presented a paper “Homing in with Stories” at the International conference Designing for Children, organized and hosted by IDC on February 3, 2010

Book reading of ‘HOME’ at the Bookaroo Festival for Children’s Literature at Delhi on November 28th 2009

Conducted a Storytelling Workshop for children of Avalon High International School, Vashi, on children’s day, November 14, 2009.

Conducted a Storytelling Workshop for underprivileged children organized by the Mohile Parikh Centre, Mumbai, on January 23, 2010.

Participated in a day long deliberations on Design for School education at the Education meet held in IDC on February 2, 2010.

International

Ray G.G.
Participated in the committee meeting as President of Indian Society of Ergonomics, IEA Congress, Beijing, from August 6 to 16, 2009.

Presented a paper “Ergo-Design, an integrated user centered approach must be adopted for better tool development”, IEA Congress, Beijing, from August 6 to 16, 2009.

Athavankar U.A.
Participated in International conference IASDR’09, From product Semantics to Generative Methods held from October 18 to 22, 2009, in Seoul, Korea.

Rao A.G.
Presented a paper “Craft, Culture and creativity in Design” as an invited speaker in the “Visual Design Conference : Creativeness, Graphics Expression and Vernacular Culture” which was held from September 2 to 4, 2009, by Post Graduate Programme in Design of University of Feire de Santana, Brazil.

Invited Lectures

National

Athavankar U.A.

“My village My Country: Management at the Grassroots”, weschool Welinker Education, February 2010

“My Struggle with Games and Puzzles Design and Learning”, invited vision talk in conference: Design for Children, IDC, IIT Bombay, February 2010
Rane Mandar
“Semantics and Communication Theory” at Symbiosis Institute of Design, Pune, on March 12 2010

“Lecture of Grid and Graphic Design” Wellingkar Institute of Management (Design Management Students) Mahim, Mumbai, April 20, 2012

Sharma Nishant

“Human Centered Innovation” Fr. Conceicao Rodrigues College of Engineering, Bandra, Mumbai, November 6, 2009

“Designing Two Wheelers for Indian Context” at Indian Institute of Technology, Kanpur, on April 9, 2010

Invited to be a jury member in the Design FARMTRAC tractor for 2020 organised by Escorts India and IIT Kanpur, 10 April 2010

Sreekumar G.V.
“Typography and Grid design” Wellinkar Institute of management, Matunga, Bombay

“Typography, Information Graphics and Grid Design” at Department of Applied Art, Faculty Of Fine Arts, M.S. University of Baroda, Vadodara, Gujarat.

“Typography and Information Graphics” at “VC expo” organised at IDC.

Invited to be a Jury Member at National Institute of Fashion Technology, Khargar, Navi Mumbai.

Invited to be a Jury Member at Faculty Of Fine Arts, M.S. University of Baroda, Vadodara, Gujarat.

International
Athavankar U.A.
“Design in India: Focus on Mumbai and shared issues of the region” at Asia Design Survey, Seoul forum 2009 and WDCSS, Seoul, South Korea, Oct 2009

“India as a Innovation laboratory”, by Japan Industrial Design Promotion Organization (JIDPO), Tokyo, Japan, Jan 2010

Rao A.G.
“Visual encodings of Culture: Concerns of Contemporary Design” in Graphica: Design Conference at Baru, Sao Paulo held on 8th and 9th September, 2009.


Significant Awards/Distinctions
Sabnani Nina
“Jury’s Special Prize award for Tanko Bole Chhe” at the FICCI-BAF festival, Mumbai. March 2010

Best Animation film on “Social Welfare for Tanko Bole Chhe” at the FICCI-BAF festival, Mumbai March 2010

“Best Creativity award for Tanko Bole Chhe” at the International Short Film Festival, DBICA, Chennai, March 2010

Honorary Work
Ray G.G.
DST meeting, Delhi, called by Ms. Sobana Vaskaran June 25, 2009

DST meeting, called by Dr. Shashi Ahuja, July 3, 2009

DST Project evaluation, Trivandrum, as member of the expert committee. May 21 – 23 May, 2009

ICAR Evaluation, Dapoli, January 6 and 7, 2010

Chakravarthy, B.K.
Reviewed papers submitted to international conference ICoRD’09 in the area of innovation.

Faculty Members and their Specializations
1. U.A. Athavankar
   Product Design
   Product Semantics, Cognition and Imagery

2. V.P. Bapat
   Product Innovation
   Plastic Product Design, Rapid Prototyping and Tooling, Design for Manufacture

3. B. K. Chakravarthy
   New Product Design, Product Form & Aesthetics, Innovation
4. A. Joshi  
User studies,  
Interaction Design for Emerging Economies,  
HCI + SE

5. P. Joshi  
Computer Aided Design,  
Product form and aesthetics,  
Product prototyping

6. R. Mohanty  
Basic Design, Print Media,  
Illustration, Exhibition Design,  
New Media

7. K. Munshi  
Product Design,  
Design Management and Design Tools

8. R. Poovaiah  
Information Design  
Interaction design  
Experience Design

9. K. Ramchandran  
Product Design  
Design Methodology  
Design Management

10. R. Sandesh  
Product Design  
Form Studies,  
Craft Based Design and Livelihood Development

11. S. Ranade  
Animation,  
Illustration

12. A.G. Rao  
Product Design,  
Basic Design,  
Bamboo Craft, Creativity

13. S. Rao  
Animation, Illustration, Special Effects

14. G.G. Ray  
Workstation Ergonomics,  
Automobile Ergonomics,  
Product Ergonomics.  
Interface Design

15. Rane Mandar  
Graphic Design

16. N. Sadhu  
Product and  
Visual Ergonomics,  

17. G.V. Sreekumar  
Typography,  
Magazine Design,  
Font Design,  
Information Graphics

18. Nina Sabnani  
Animation,  
Illustration,  
Visual Ethnography,  
Storytelling, Film Studies

19. K. Trivedi  
Graphic Design,  
Indian Design Traditions,  
Exhibition Design.

20. P. Tetali  
Animation, Gaming,  
Cartooning, New Media in Education

21. S. Balan  
Digital Film-making  
Photography and Digital Cinematography

22. N. Sharma  
Automotive Design,  
Computer-aided Industrial Design,  
Product Form and Aesthetics
Introduction

The Centre of Studies in Resources Engineering (CSRE) was established in 1976 at the Indian Institute of Technology Bombay by the Ministry of Education and Social welfare. It was set up on the recommendations of the Council of IITs with the purpose of advancing the frontiers of science and giving the country breakthrough technology and programs for generating the manpower required in the area of Natural Resources Engineering. The centre is well known for its work on applications of Satellite Data, GIS, GPS and Microwave Remote Sensing for Natural Resources Management. The centre is already running M.Tech and Ph.D. programs in 'Natural Resources Engineering'. The third batch of 11 M.Tech (NR) students received their degrees in 2009 convocation. The centre received several new projects sponsored by government and other scientific organizations such as DST, ISRO, DRDO, ONGC, etc.

The centre has accomplished significant progress in its activities of academic programs. It has started B.Tech. (U.G. Minor Program) in Geo-informatics and Applications. Further, an M. Tech. Institute Elective “Introduction to Geospatial Technologies” is being offered from second semester.

Infrastructural facilities are strengthened with the addition of Portable ‘WeatherMan’ automatic weather station, Dual Frequency Differential GPS System from Leica Geosystems (Switzerland) and hand-held GPS (Trimble GeoExplorer); DSSAT (decision support system for agro-technology transfer) software and a Coastal and Marine Research Lab. is being set up with facilities such as Instant Multiparameter Sonde, wet chemical analysis equipment, Plankton Nets, Samplers, Secchi Disks, Microscope, etc.

Sponsored research and consultancy activities continued with significant progress in the area of snow cover mapping methods using three component and four component decomposition theorems and development of polarimetric discriminators for identification of snow which has resulted in the RADAR snow index development. Interferometry based coherence analysis was carried out for snow cover mapping. Time series glacier movement estimations are being done with SAR interferometry and offset tracking techniques which help in estimating the decadal glacier movement in Himalayas. The movement of snow line during ablation period is also investigated and will be correlated with meteorological parameters to understand the response time of the glaciers and also the impact of global warming on these glaciers. The centre is also associated with Chandrayan-I mission programme and contributed towards developing methodology for resolving the water ice deposition ambiguity on lunar poles.

The centre has also contributed towards high resolution image analysis, hyper-spectral image analysis, and content based image retrieval and educational content development. High resolution remotely sensed images present unique challenges to image analysis researchers as it requires new information extraction strategies that capture the spatial, textural, and spectral information present in these images. The center is also working on theoretical aspects of Geospatial technology such as Development of Efficient Algorithms, Dynamic Models and Multi Dimensional Data Handling etc.,

New Infrastructure

Setting up of Coastal and Marine Research Lab. in CSRE with facilities such as Instant Multiparameter Sonde, Wet chemical analysis equipment, Plankton Nets, Samplers, Secchi Disks, Microscope, etc.

High-end hand-held GPS (Trimble GeoExplorer); DSSAT (decision support system for agro-technology transfer) software to simulate crop growth/yield monitoring, pest management, climate change scenarios

Portable ‘WeatherMan’ automatic weather station and One Set of Dual Frequency Differential GPS System has been ordered from Leica Geosystems, Switzerland, for use as permanent reference station for GPS-related research activities.
Lab Development with basic facilities of various sensors, distributed sensing devices, dedicated server, 3G Broadband Dongle, etc., to deploy Sensor Network and its application in the field of agriculture.

**Academic Program**

<table>
<thead>
<tr>
<th>Students Intake:</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>M.Tech.</td>
<td>14</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>12</td>
</tr>
<tr>
<td>Degrees Awarded</td>
<td></td>
</tr>
<tr>
<td>M.Tech.</td>
<td>11</td>
</tr>
</tbody>
</table>

The centre offers M.Tech and Ph.D. program in ‘Natural Resources’. Presently, 11 faculty members including 1 scientist with expertise in various areas of remote sensing and resources engineering and allied subjects are involved. About 12 students are admitted under Ph.D. program in the centre in 2009-10. B.Tech. (U.G. Minor Program) in “Geoinformatics and Applications” and M.Tech Institute Elective are also being offered.

Further, the centre participates in basic and applied areas of Resources Engineering through sponsored research projects in frontier areas and offers expertise in the consultancy projects. A web/CD-ROM tutor for digital image processing for remote sensing is being prepared which is useful at M.Tech. level for students and course instructors.

**R & D Activities**

The R & D activities of the centre are in the area of remote sensing, natural resources identification, development & management, and spatial data base systems and applications. Other areas of activity include:

- Development of inversion algorithms for estimation of geo-physical parameters of snow such as grain size, snow wetness and snow density using polarimetric SAR data and implementation and validation of developed algorithms for Himalayan region.

- Remote sensing and GIS applications to hydrology, earth sciences including mineral exploration, terrain evaluation and land use planning, wetland and coastal investigation, desertification and drought monitoring, environmental management, landslide investigations.

- Microwave remote sensing of soil moisture and SAR Interferometry, training and Database development.

- Image data processing and analysis
- GIS software and Development
- Theoretical aspects of Geospatial Technology related to Development of Efficient Algorithms, Dynamic Models, Spatial Data Security Methods and Spatial Data Structures
- Stratospheric Ozone and Trace Gases Assessment and Monitoring.
- Development of multimedia educational content for digital image processing with emphasis on remotely sensed images.
- Ensemble classifiers, hyper spectral image analysis and high resolution image segmentation and classification.
- Computer Vision and Graphics
- Geo-ICT and Sensor Network in Agriculture/ Environment

The center continues to interact with the Department of Space, Government of India, through ISRO-IIT Bombay Space Technology Cell which sponsors research projects in the areas of remote sensing and space technology.

**Sponsored Projects**

<p>| | |</p>
<table>
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<tr>
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<tbody>
<tr>
<td>New Projects</td>
<td>03</td>
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<tr>
<td>Ongoing Projects</td>
<td>15</td>
</tr>
<tr>
<td>Completed Projects</td>
<td>08</td>
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</tbody>
</table>

**Consultancy Projects**

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<tbody>
<tr>
<td>New Projects</td>
<td>04</td>
</tr>
<tr>
<td>Ongoing Projects</td>
<td>06</td>
</tr>
<tr>
<td>Completed Projects</td>
<td>08</td>
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</table>
## Sponsored Projects

### New

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Project Title</th>
<th>Sponsoring Agency</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>“Development of Techniques for Raster Change Detection in Desert Terrains using Low Resolution Images and Map”</td>
<td>DTRL (DRDO)</td>
<td>New</td>
</tr>
<tr>
<td>3.</td>
<td>“Virtual Satellite Image Processing and Analysis Laboratory”</td>
<td>MHRD</td>
<td>New</td>
</tr>
<tr>
<td>4.</td>
<td>“Soil moisture mapping using ALOS PALSAR Polarimetric data”</td>
<td>Japan Aerospace Exploration Agency (JAXA), Japan</td>
<td>Ongoing</td>
</tr>
<tr>
<td>5.</td>
<td>“Hyperspectral Image Analysis with applications to agriculture”</td>
<td>ISRO-IIT(B) Space Technology Cell</td>
<td>Ongoing</td>
</tr>
<tr>
<td>8.</td>
<td>“Methodology Development for Modelling and monitoring Pollutant Plumes near Mahul Creek &amp; Vashi Creek (CETP), using Remote Sensing &amp; GIS techniques”</td>
<td>MPCB</td>
<td>Ongoing</td>
</tr>
<tr>
<td>9.</td>
<td>“Training and Services of GRAM++”</td>
<td>Self sustained</td>
<td>Ongoing</td>
</tr>
<tr>
<td>10.</td>
<td>“Development of Geo-gateway Software for Interchange of Spatial Data between Well-known GIS Formats”</td>
<td>CAIR, DRDO, Bangalore;</td>
<td>Ongoing</td>
</tr>
<tr>
<td>11.</td>
<td>“Study of the behavior of glaciers in Bagha basin through remote sensing”</td>
<td>SAC, Dept.Space</td>
<td>Ongoing</td>
</tr>
<tr>
<td>12.</td>
<td>“Use /Land cover classification using polarimetric techniques”</td>
<td>PRL, Dept.Space</td>
<td>Ongoing</td>
</tr>
<tr>
<td>13.</td>
<td>“Spatio temporal monitoring of snow cover and glacier areas and development of glacier information system using advanced geomatic techniques”</td>
<td>SASE (DRDO)</td>
<td>Ongoing</td>
</tr>
<tr>
<td>14.</td>
<td>“Generation of high resolution DEMs and Land/Snow cover maps using airborne LiDAR and digital photogrammetric survey data”</td>
<td>SASE (DRDO)</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Sr. No</td>
<td>Project Title</td>
<td>Sponsoring Agency</td>
<td>Project Status</td>
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</tr>
<tr>
<td>15.</td>
<td>“Processing of polarimetric ALOS PALSAR data for snow parameters estimation”</td>
<td>JAXA, Japan</td>
<td>Ongoing</td>
</tr>
<tr>
<td>16.</td>
<td>“Snow and glacier characteristics and interferometric studies of Gangotri glacier region using high resolution TERRA SAR – X data”</td>
<td>DLR, Germany</td>
<td>Ongoing</td>
</tr>
<tr>
<td>17.</td>
<td>“Snow characterization and glacier mapping using dual polarization Envisat ASAR data”</td>
<td>ESA, Italy</td>
<td>Ongoing</td>
</tr>
<tr>
<td>19.</td>
<td>“Analysis of Hyperspectral Images with Applications to Agriculture”</td>
<td>ISRO-IIT(B) Space Technology Cell</td>
<td>Completed</td>
</tr>
<tr>
<td>20.</td>
<td>“Wetland Mapping for Thane, Sholapur and Goa”</td>
<td>ISRO</td>
<td>Completed</td>
</tr>
<tr>
<td>21.</td>
<td>“Development of methodology for generation of high resolution Digital terrain Model and land/ show cover maps using airborne LiDAR and Digital Photogrammetric Techniques”</td>
<td>DST</td>
<td>Completed</td>
</tr>
<tr>
<td>22.</td>
<td>“NWIA: Goa Study”</td>
<td>Space Application Center</td>
<td>Completed</td>
</tr>
<tr>
<td>23.</td>
<td>NWIA: Thane and Solapur Study</td>
<td>MRSAC, ISRO</td>
<td>Completed</td>
</tr>
<tr>
<td>24.</td>
<td>“Polarimetric SAR data processing for classification and point target data detection”</td>
<td>DEAL, Dehradun</td>
<td>Completed</td>
</tr>
<tr>
<td>25.</td>
<td>“Assessment of Drought and its Management Scenarios over Beko Watershed- A Decision Support System”</td>
<td>Department of Science and Technology (DST), Govt. of India</td>
<td>Completed</td>
</tr>
</tbody>
</table>

**Consultancy Projects**

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Project Title</th>
<th>Sponsoring Agency</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ground Subsidence Studies Using GPS measurements for FY 2009-10</td>
<td>NIKO Resources Ltd. Olpad, Surat</td>
<td>New</td>
</tr>
<tr>
<td>2.</td>
<td>Siting of GASWELL drilling points for given Geographic Coordinates UsingGPS</td>
<td>NIKO Resources Ltd. Hazira, Surat</td>
<td>New</td>
</tr>
<tr>
<td>3.</td>
<td>Professional Services For Guidance on E-Governance System Integration</td>
<td>Ulhasnagar Municipal Corporation</td>
<td>New</td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Project Title</td>
<td>Sponsoring Agency</td>
<td>Project Status</td>
</tr>
<tr>
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<tr>
<td>5.</td>
<td>“Member of Apex and Technical Evaluation Committees”</td>
<td>Municipal Corporation of Greater Mumbai</td>
<td>Ongoing</td>
</tr>
<tr>
<td>6.</td>
<td>“Landuse / Landcover Change detection studies for core/buffer zone of Ambuja Cement Ltd.’ existing mines in Chandrapur district (Maharashtra) and Raipur district (Chhattisgarh)</td>
<td>Gujrat Ambuja Cements Ltd.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>7.</td>
<td>“Consultant and Knowledge Partner to Ulhasnagar Municipal Corporation”</td>
<td>Ulhasnagar Municipal Corporation</td>
<td>Ongoing</td>
</tr>
<tr>
<td>8.</td>
<td>“Assessment of Ground Subsidence for Gas Field Areas of NIKO Resources Ltd. Olpad, Surat Using GPS”</td>
<td>NIKO Resources Ltd., Landmark, 6th floor, Race Course, Baroda Gujrat</td>
<td>Ongoing</td>
</tr>
<tr>
<td>9.</td>
<td>PPD Analysis at BHS Off-Shore Platform for ONGC-Ahmedabad “</td>
<td>ONGC</td>
<td>Ongoing</td>
</tr>
<tr>
<td>10.</td>
<td>Assess the impacts and vulnerability of the present climate and climate change on the three most vulnerable coastal districts in India and formulate a framework for adaptation</td>
<td>NATCOM 2(MOEF)</td>
<td>Ongoing</td>
</tr>
<tr>
<td>11.</td>
<td>Study of physiography and land use pattern around Shella using temporal remotely sensed data and its analysis</td>
<td>Lafarge India Pvt. Ltd.</td>
<td>Completed</td>
</tr>
<tr>
<td>12.</td>
<td>Landuse / Landcover Change detection studies for core/buffer zone (Chandrapur Dist.)</td>
<td>Ambuja Cements Ltd</td>
<td>Completed</td>
</tr>
<tr>
<td>13.</td>
<td>Landuse / Landcover Change detection studies for core/buffer zone (Raipur Dist.)</td>
<td>Ambuja Cements Ltd</td>
<td>Completed</td>
</tr>
<tr>
<td>14.</td>
<td>Ground Subsidence Studies Using GPS measurements for FY 2009-10</td>
<td>NIKO Resources Ltd. Olpad Surat</td>
<td>Completed</td>
</tr>
<tr>
<td>15.</td>
<td>Siting of GASWELL drilling points for given Geographic Coordinates Using GPS</td>
<td>NIKO Resources Ltd. Hazira, Surat</td>
<td>Completed</td>
</tr>
<tr>
<td>17.</td>
<td>Member of Apex and Technical Evaluation Committees</td>
<td>Municipal Corporation of Greater Mumbai;</td>
<td>Completed</td>
</tr>
<tr>
<td>18.</td>
<td>Software development for polarimetric SAR data classification and point target detection”</td>
<td>DEAL, DRDO, Dehradun</td>
<td>Completed</td>
</tr>
</tbody>
</table>
Extension Activities

Significant Collaborations

Venkataraman, G.
Technical Collaboration with SASE (DRDO) and Member of the core group for analysing MiniSAR data of Chandrayaan-1 mission

Rao, Y. S.
Collaboration is made with DEAL, Dehradun on SAR data for defence applications

Adinarayana, J.
Indo-Japan Collaborative Project “Geo-ICT and Sensor Network based DSS for Agriculture/Environment assessment” (with National Agriculture Research Center, Tsukuba, Japan; Department of Electrical Engineering and ANGRAU, Hyderabad)

International Visits

Adinarayana, J.,
Visited Technical University under the IIT-DAAD Faculty Exchange Programme (March 21-28, 2010)

Venkatachalam, P(Ms).
Attended International Conference on computational Science and Applications (ICCSA 2009) at Yongin, Korea during June 29th – July 1st, 2009 and presented a paper on Neural Network Based Cellular Automata Model for Dynamic Spatial Modeling in GIS

Visitors to the Centre

Dr Leisa Armstrong. Lecturer, School of Computer and Information Science, Mt Lawley Campus, Edith Cowan University, Perth, Australia

Israr Qureshi. Assistant Professor and student delegation from Hong Kong Polytechnic University

Dr. Raj Murthy. Emeritus Scientist, NWIA, Canada

Conferences / Symposia/ Workshops/ Seminars (Participated/ Papers Presented)

National

Adinarayana, J.
ISP RS WG VIII/6, GEO AG 07 03 & ISRS, Joint International Workshop on Impact of Climate Change on Agriculture, December 17-18, 2009, SAC, Ahmedabad, India
(paper presented by student)

Venkataraman, G.
Attended SPIE Remote Sensing Europe symposium from 31st August, 2009 – 3rd September, 2009 at Berliner Congress Centre, Berlin, Germany

Adinarayana, J.
The 17th International Conference on Geoinformatics, August 12-14, 2009, Fairfax, VA, USA (paper presented by student)

International

Venkataraman, G.
Attended IGS International Symposium on Snow and Avalanches from April 5-10, 2009, at SASE, HQ, Manali, India


Attended Short term Courses Lecture under PLANEX Workshop at Chandigarh, February 1-5, 2010 (organized by PRL) and Delivered the lecture: “Microwave Remote Sensing and Its Application in planetary studies” on 2 Feb, 2010

Murti, M. V. R.
Attended Sixth Chandrayaan-1 Science Meeting, 8-9 Feb., 2010 at PRL, Ahmedabad, India

Attended Training Program for RISAT-UP at SAC (ISRO), Ahmedabad, 22-26 Feb, 2010 and Delivered the lecture: “SAR applications in Snow” on 26 Feb, 2010

Conferences / Symposia/ Workshops/ Seminars (Participated/ Papers Presented)

National

Adinarayana, J.
ISP RS WG VIII/6, GEO AG 07 03 & ISRS, Joint International Workshop on Impact of Climate Change on Agriculture, December 17-18, 2009, SAC, Ahmedabad, India
(paper presented by student)
Rao, Y. S.

One- day seminar conducted on “Microwave Remote Sensing: Sensors, Systems and Data Processing” at the Workshop on Satellite Image Processing, held at Vivekananda Education Societies Institute of Technology, Chembur, Mumbai on Dec. 15, 2009.

Lecture cum demonstration is given in Terna Engineering College, Vashi, New Mumbai, on 8th July 2009 on Microwave Remote Sensing Image Processing.

Two hours lecture-cum-demonstration is given in Father Agnel college, Bandra, September 22, 2009, Microwave Remote Sensing.

Conferences / Workshops Organized

National

Venkatachalam, P.
Conducted a one week training course on “Introduction to Geographic Information Systems and Applications”; Quality Improvement Program, CSRE, IIT Bombay; May 25-29, 2009.

Mohan, B. K.


Venkataraman, G

International

Adinarayana, J.
Sensor Network Workshop ‘Sensor Network Technology and Applications for Agriculture and Environment”; May 20, 2009, Tsukuba, Japan


Invited Lectures

National

Adinarayana, J.

“DSS initiatives in Agri-Systems” Lecture delivered on Mar 14, 2010 at IT-based DSS for Rural Livelihood assessment held from March 11-20, 2010 at National Institute of Rural Development (NIRD), Hyderabad.


Venkatachalam, P.
Delivered lecture on “Geographic Information systems and Applications” in QIP Short term training program on Soft Computing Techniques in Hydrology and Water Resources Engineering held during November 2-6, 2009 at IIT Bombay.

Delivered invited talk on “GIS Applications in Hydrology” in the National Workshop on Coastal Urban Flood Hazards and Management held during February 19 – 20, 2010 at IIT Bombay.

Delivered lecture on “GIS – Current Issues and Future Prospects” in the International Training Program on Geoinformatics held during February, 2010 at NIRD, Hyderabad.

Delivered a talk on “Geospatial Technologies – Open Research Areas” in the National Conference on Emerging Electronic and Computing Systems (NCEECS- 2010) held during March 29 to April 3, 2010 at School of Electronics, Devi Ahilya University, Indore.

Mohan, B. K.


Delivered lecture on “Introduction to Fuzzy Logic and Neural Networks”, at ISTE Short Term Course at K.J. Somaiya College, in January 2010.

Delivered lecture on “Introduction to Neural Networks and Backpropagation Learning”, at Sardar Patel Institute of Technology, Mumbai in March 2010
Delivered lecture on “Introduction to Hyperspectral Image Analysis”, at QIP short term course organized by Department of Earth Sciences, IIT Bombay, in January 2010

**Rao, Y. S**

Delivered lectures on “SAR applications in snow cover mapping and analysis, and Polarimetric SAR data processing and analysis” with lab demonstration, at IIPS Dehradun, March 25, 2009.

**Gedam, S. S.**


Delivered two invited lectures at Kolhapur Institute of Technology, Kolhapur on Remote Sensing and GPS Technology (7th Feb. 2010).

**International**

**Adinarayana, J.**

“Rural- Informatics in Decision Making”, Lecture delivered at Univ. of California, Davis on June, 25, 2009

**Significant Awards and Distinctions**

**Adinarayana, J.**

Nominated consecutively for the third time as Board Member, Indian Society of Agricultural Information Technology (INSAIT), Dharwad, Karnataka.

Nominated for IIT-DAAD Faculty Exchange Programme to Technical University of Dresden, Germany, 21-28.03.2010

Editorial Member of the Journal of IT in Agriculture, USA

**Honorary Work**

**Adinarayana, J.**


Organizing Committee Member, INSAIT-II Conference ‘Agro-Informatics and Precision Agriculture’, 02-03.12.2009


Committee Member of the Organization & Management Advisory Group (O&MAG) under the ICAR’s World Bank-aided /National Agricultural Innovation Project (NAIP) and reviewed several research proposals

Reviewed a couple of research papers in the Journal of IT in Agriculture, USA

**Shyamala Mukherjee**


Member of the ISPRS Intercommission Working Group III / VII on Pattern Recognition for Remote Sensing and the ISPRS Working Group III / 4 on Complex Scene Analysis and 3D Reconstruction.

**Venkatachalam, P.**

Member of REACH Monitoring Committee, TIFAC Centre of Relevance and Excellence in Environmental Geomatics, JNTU, Hyderabad

Member of the DOS and UGC appointed Committee to update and develop Curricula in Remote Sensing, GIS and GPS

Member, Editorial Board, Indian Journal of Geomatics

**Y. S. Rao**


**G Venkataraman**


Papers reviewed for IEEE IGARSS – 2009 and Current Science journals

**Faculty Members and their specialization**

1. **H. S. Pandalai**

   Head of CSRE and Professor of Department of Earth Sciences
   Ore geology, Mining and Geostatistics
2. J. Adinarayana  
   Agro-Informatics and Rural Development

3. S. S. Gedam  
   Stereo Image Processing and Digital Photogrammetry, Remote Sensing and GIS Applications (Surface Hydrology, Urban Infrastructure etc..) Global Positioning Systems and applications.

4. A. B. Inamdar  

5. M. V. Khire  
   Terrain evaluation, Landuse Planning, Waste Land Development, Monitoring Desertification and Run-off Estimation

6. B. Krishna Mohan  
   Image Processing, High resolution image analysis, GIS, Multimedia educational content development for image processing

7. M. V. R. Murti  
   Remote Sensing of Atmosphere and Trace gases; Spectroscopic Analysis of Planetary Materials XRF, XRD, AAS and ICP.

8. R. Nagarajan  
   Remote sensing and GIS applications to Natural Hazards-Landslides and Drought

9. Y. S. Rao  
   DEM Generation using Radar Interferometry (InSAR) Technology applications.

10. Shyamala Mukherjee  
    Computer Vision and Graphics and Computational Methods

11. (Ms.) P. Venkatachalam  

12. G. Venkataraman  
    Spatial Modelling for Mineral Exploration, Microwave Remote sensing to the study of Glacier Characteristics.
Academic Programme

CTARA’s third batch of 13 students pursuing M.Tech. (Technology and Development) was inducted in July 2009. The second batch successfully completed 10-week field work. CTARA admitted two Ph.D. students. In the TD 612 course on “Technology in Practice”, CTARA conducted 13 lecture courses on “Cotton Technology”, delivered by experts from the Central Institute for Research on Cotton Technology (CIRCOT), Matunga, and on “Water Resources Management” delivered by Dr. Ravi Chopra, Director, Peoples’ Science Institute, Dehara Doon. CTARA held its 25th Anniversary celebration programme on 29-30 April 2010. Dr. Prasad Modak as Adjunct Professor and Dr. (Ms.) Bakul Rao as Adjunct Associate Professor joined CTARA in July and August 2009, respectively.

Shah N. G.
CTI-USA committed to provide fellowship to second M.Tech. student at CTARA.

Rao Bakul
Introduced a new Institute Elective at M.Tech. level “Environment Systems: Assessments & Monitoring”.

R & D Activities

Shah, N. G.
As a part of KVIC-IITB Interface Unit projects the following progress was made:

The process improvements in Bio-diesel plant enabled to enhance the capacity of the unit installed at YMC-Tara to 400 lit. per day from 200 lit. per day. The unit is being run on pilot basis to assess its technical and financial viability. CTARA and Chemical Engineering departmental faculty members will continue to provide necessary technical assistance in this project.

The Second Sneha Oil Making Unit (50 lit/day) was commissioned at the site of NGO from Pune, i.e., Shripad Seva Mandal.

A 10 kg/day “Potato Puffing Unit” using fluidized-bed technique was demonstrated to some Village Industry entrepreneurs and the unit is now waiting for the extended trials at the end-user facility.

Rao Anand, B.
“Demonstration and assessment of economic viability of new, energy efficient and less polluting brick-making technology (Vertical Shaft Brick Kiln – VSBK) in the tribal block of Konkan region in western Maharashtra” – the project has been funded by RGSTC (Rajiv Gandhi Science & Technology Commission, Government of Maharashtra) and the work has begun. After the initial hiccups the project site has been finalized and the kiln is under construction.

“Global Energy Assessment” – the project has been funded by the International Institute for Applied Systems Analysis (IIASA), Austria.

“Occurrence and impacts of climate-related natural hazards” – the project has been funded by the Ministry of Environment and Forests. Mr. Gokul Iyer, M.Tech. (Energy Science and Engineering) student, is working on “Impact of climate change on energy demand: Case of thermal stress” and being co-guided by Prof. Anand Patwardhan.

Narayanan, N. C.
Project Adviser/Consultant to the Study of “Liquid and Solid Waste Management in Urban Local Bodies” by the Centre for Environment and Development (CED), a recognised centre of excellence of the Ministry of Urban Affairs, Government of India. The project is funded by the Ministry of Urban Affairs, Government of India.

Wagle Subodh, M.
“Developing Town-Level Status Reports and Town-Level Background Notes in Ten Towns in Maharashtra” as part of the TISS project funded by the Ford Foundation

Analysis of ‘Revised Approach Paper on Bulk Water Tariff for Maharashtra’, issued by MWRRA

Visitors to the Centre

Prof. J. S. Pai, Executive Director, Protein Foods & Nutrition Development Association of India, “Interventions in Food Processing to Improve Nutrition”, August 10, 2009

Dr. Christopher Bull, Division of Engineering, Brown University, “Practice and Engineering Education”, August 14, 2009


Mr. Rajesh Radhakrishnan, Chair of the Asia Committee of Compatible Technology International, “Appropriate Technology as a Vehicle to Alleviate Poverty” and “Whats in it for me in giving back to Society: Developing Skills in Leadership, Entrepreneurship through Social Venture Projects”, August 24, 2009

Dr. Shreehari (Raja) Marathe, Director, Rashtrasant Tukdoji Maharaj Swayampurnata Kendra, Nanded, Dr. Shivaji Rao, Director, Environmental Studies, GITAM, Vishakhapatanam, “Cloud-seeding Experiments in Nanded - Ground Experience”, September 1, 2009

Dr. Amarjeet Singh, Ph.D., University of California, Los Angeles (UCLA), “Efficient monitoring using mobile sensing platforms – From systems, theoretical foundations to in-field validation”, September 3, 2009

Dr. Syed Ismail, “Opportunities for Electronics in Agriculture”, October 5, 2009

Mr. Ulhas Paranjpe, “Rainwater Harvesting - Rain Water as a source of water in Rural area”, November 9, 2009

Mr. Gautam Mazumdar, Fellow - Scouting Division, Villgro, “Social Entrepreneurship”, October 30, 2009

Prof. Dipankar, “How to Organise a Project”, January 13, 2010

Dr. S.Sreenivasan, Director, CIRCOT, Mmmbai, “Current Scenario and Future Prospects for diversified applications of cotton”, January 12, 2010

Prof. V. M. Naik (Adjunct), Chemical Engineering, IITB, “Uncorking of a Polymorphic Genie: The Story of Soap”, February 3, 2010

Mr. Nirmalendu Jajodia, Chief of Technology and Operations, National Commodity and Derivative Exchange (NCDEX), “Information and Communication Technology Application to Agri-commodity Trading”, March 17, 2010

Dr. Srinivasa Rao, Biotechnology and Biomedical Scientist, “Rural Development and Role of Biotechnology”, March 10, 2010

Mr. Y.N. Sharma, Retired Director (Biogas Programme), KVIC, “Non-conventional Energy Programme – BioGas Plant KVIC Model”, March 2, 2010


Conferences/Symposia/Workshops/Seminars (Participated and Papers Presented)

National

Date, A. W.

Shah, N. G.
Participated in 9th Intl. ISHMT-ASME Heat and Mass Transfer conference held at BARC Mumbai during 4-6 Jan 2010 and presented a poster on “Design, construction and testing of potato cubes drying and puffing unit using fluidized bed system”.

3 CEP in-house courses for KVIC-Mumbai were conducted as below:

Jaggery making held at Kolhapur during 5-6 February 2010 which was attended by 30 KVIC entrepreneurs and development officers

Herbal oil extraction held at YMC-Tara village, Panvel, during 18-19 February 2010 which was attended by 15 entrepreneurs and development officers from KVIC.

Bio-diesel making held at YMC-Tara village, Panvel, during 20-21 February 2010 which was attended by 15 entrepreneurs and development officers.

Rao Anand, B.
Participated in National Research Conference on Climate Change - a conference organized at IIT Delhi, March 5-6, 2009 and made a presentation on “CO2 Capture and Storage (CCS) – Relevance for India”.

Participated in Workshop on Breaking the Climate Deadlock: Towards a New Climate Policy for India, held at the Tata Institute of Social Sciences, Mumbai

Participated in the Workshop on Water entitlements and allocations for livelihoods and ecosystem needs and the legal-institutional framework for conflict resolution convened by the Forum for Policy Dialogue on Water Conflicts in India held in Pune on 25-26 February 2010.


Attended the Training Course on Understanding Groundwater by ACWADAM from January 30-31, 2010 at BAIF Centre, Pune.

Wagle Subodh, M.
Conceived and organized the National Workshop on Independent Regulatory Authority and Related Reforms in Water Sector in India

Presentation on “Comparative Assessment of Situation of Municipal Services in India”, in International Workshop on Urban Services, organized by the Municipal Services Project, New Delhi, 31st March 2009

International

Shah, N. G.
Participated in IFT meeting during 6-10 June 09 held at Anaheim, CA-USA, and made a poster presentation on “Effect of Ozone on the development of redness in tomato and its use in evaluating shelf-life dynamics”.

Anand B Rao
Participated in the International Energy Conference (IEC 2009) – June 22-24, 2009, held at The Hofbug Congress Center, Vienna, AUSTRIA

Narayanan, N. C.
Coordinated the National Workshop on Independent Regulatory Authorities and Related Institutional Reforms in the Indian Water Sector jointly with the Tata Institute of Social Sciences, Mumbai, and PRAYAS, Pune, from 28-29 August, 2009, at Mumbai, India.

Narayanan, N. C.
Coordinated the National Workshop on Independent Regulatory Authorities and Related Institutional Reforms in the Indian Water Sector jointly with the Tata Institute of Social Sciences, Mumbai, and PRAYAS, Pune, from 28-29 August, 2009, at Mumbai, India.

Invited a panelist in the Workshop on Clean Coal Technologies during the “Second International Conference on Advances in Energy Research” and made a presentation on “CO₂ Capture and Sequestration (CCS)” on December 10, 2009 at IIT Bombay, Mumbai, INDIA

Narayanan, N. C.
Coordinated the National Workshop on Independent Regulatory Authorities and Related Institutional Reforms in the Indian Water Sector jointly with the Tata Institute of Social Sciences, Mumbai, and PRAYAS, Pune, from 28-29 August, 2009, at Mumbai, India.

Narayanan, N. C.
Coordinated the National Workshop on Independent Regulatory Authorities and Related Institutional Reforms in the Indian Water Sector jointly with the Tata Institute of Social Sciences, Mumbai, and PRAYAS, Pune, from 28-29 August, 2009, at Mumbai, India.
during May 4-6, 2009, Hotel Park Village Resort, Kathmandu, Nepal

Invited Lectures

National

Shah, N. G.

Rao Anand, B.
“Global Warming and Clean Development Mechanism” – lecture delivered at a CEP organized by Prof. Rangan Banerjee, November 24, 2009

Narayanan, N. C.

Honorary Work

Rao Anand, B.
Participated in the Global Energy Assessment Lead Analyst Scoping Meeting – (June 19-20, 2009) held in Austria Convention Center (Bruno Kreisky Platz), Vienna, AUSTRIA as a member of the GEA team

Date, A. W.

Significant Awards/Distinctions

Narayanan, N. C.
Member, Governing Body, South Asia Consortium for Interdisciplinary Water Resources Studies (SaciWATERs), Hyderabad, India.

Faculty Members and their Specialization

1. A.W. Date

2. Narendra G. Shah
   Agro-Food Industrial development, Biomass processing for food and energy

3. Anand B. Rao
   Climate change and CDM, Energy and environment, Sanitation

4. Natarajan C. Narayanan
   Water Policy, Governance and Conflicts. Interdisciplinary research in environment and development (political ecology)

5. Subodh M. Wagle
   Public Policy and Governance, Independent Regulatory Agencies, Infrastructure Reforms, Water Sector Regulatory, Urban Governance Reform

6. Prasad Modak
   Environmental Policy, Environmental Impact Assessment, Environmental Management, Environmental Modeling

7. Bakul Rao
   Environmental impact framework for rural areas, State of environment studies, Field assessments & remediation, Matrix characterization, Climate change
The Computer Centre provides computational and network infrastructural facilities and services to the IIT Bombay user community. It is responsible for the intra-campus connectivity between the departments and also for connectivity of IIT Bombay to the outside world. During the year, the following activities have been undertaken to expand and upgrade the network infrastructure at IIT Bombay:

- Extension of the campus network facilities to new areas (residential buildings – mainly Type I – both in Hill Side and Lake Side locations) started last year is in advanced stage of completion. Laying of separate underground channels from Computer Centre to Hill Side and Lake Side residences has been completed. The target residential buildings have been wired up. Five network kiosks have been built at various locations to keep switches and network racks.

- Complete revamp of hostel networks both in terms of active and passive components has been completed in Hostels 1 through 11 during the year. Two gigabit ports have been provided per room. In addition, the cable network in Hostels 12 and 13 is currently being inspected and changes are being effected wherever necessary. The under-construction wings for Hostels 12 and 13 will be connected as and when they are ready.

- During the year, the total Internet bandwidth for IIT Bombay campus users has been increased from 108 to 218 Mbps.

**High Performance Computing Clusters:** The computing clusters GALAXY and CORONA continue to function as before. Given the space constraint, these clusters continue to be housed in Aerospace Engineering and Chemistry Department buildings, respectively. After a lot of effort towards solving the infrastructural issues, the third cluster of 512 nodes is currently operational at the ground floor of the Department of Computer Science and Engineering.

**National Knowledge Network:** IIT Bombay continues to be a member of the National Knowledge Network (NKN). This is a multi-gigabit network initiative started by the National Informatics Centre (NIC). This network infrastructure is being used by CDEEP to conduct Distance Education programmes.

**Hardware/Software Infrastructure:** All service offerings at the Computer Centre are based on OPEN SOURCE software systems. Computer Centre has registered as official mirror for various flavours of Linux Operating Systems on its anonymous FTP server which is available to the user community at large.

The institute continues to be a member of Microsoft Developer Network Academic Alliance (MSDNAA) software licensing programme. This allows the user community to use most of the Microsoft software products in a non-production environment. Campus-wide licence of AVG anti-virus software has been in operation.

Software packages such as ANSYS, MATLAB, MATHEMATICA, MAPLE, and Libraries from Numerical Algorithm Groups (NAG), etc., are available through site licenses administered by the Computer Centre.

**Projects for the Near Future:** The core network of IIT Bombay is quite old. The switches are nearly five years old. The underground fibre-optic cable network is operational for more than 13 years. The cable network, as it exists now, is rather ad hoc and has been patched many times because of damages (mostly during construction/repair of roads and new buildings). There is a strong case for creating a properly planned fibre-optic cabling infrastructure using single mode fibre with adequate redundancies so as to improve the reliability of network access. The replacement of core network switches is under active consideration. The goal is to have a future-ready network that can be easily migrated to a 10-gigabit infrastructure.
Introduction

The Centre for Formal Design and Verification of Software was set up in April 1999, with the following broad objectives:

- Carry out R&D activities towards building advanced tools and environments, based on formal methods for industrial scale safety-critical applications.

- Create resources, develop expertise and provide consultancy for Independent Verification and Validation (IV & V) for safety-critical systems used in DAE and other similar organizations.

- Provide education and training in Verification and Validation (V & V) of such systems

Over the past 11 years, CFDVS has established itself as a national R&D centre in the area of formal verification of high-integrity software and hardware. The centre has contributed to several R&D programs in formal verification, and has taken up sponsored industrial projects from various government organizations like VSSC, ADA, DRDL and DRDO, and also from high-profile private organizations like Intel, Microsoft Research, Texas Instruments, General Motors, etc.

The use of mathematically rigorous techniques for verification and validation of safety critical software and hardware is growing worldwide, and CFDVS is well-poised to continue contributing towards indigenous development of tools and technologies in this domain in the coming years. Having successfully demonstrated that high-quality formal verification technology can be developed and implemented indigenously during the first 11 years of its existence, CFDVS is now embarking on a more ambitious research and development plan for the next 5 years. This includes, among other objectives, addressing scalability issues in formal verification, and development of hardware and software analysis tools that can be applied to real-life systems with complex control, data processing and communication components.

Student strength (at M.Tech and Ph.D. levels) in CFDVS has grown to very healthy numbers over the years. Over the last 11 years, 12 Ph.D. students have worked/are still working on their doctoral dissertation at CFDVS. Of these, 5 Ph.D. students have already graduated, 1 student has submitted his dissertation, and 1 student is currently in the process of writing his dissertation. In addition, more than 70 M.Tech. students and more than 50 B.Tech. students from IIT Bombay have done their M.Tech. and B.Tech. projects, respectively, from CFDVS. Research and development work done at CFDVS has resulted in more than 75 publications in international peer-reviewed conferences and journals. During the past eleven years, strong linkages have also been developed between CFDVS and DAE scientists.

A workshop on Model-based Development using Esterel/Scade was also conducted under the aegis of CFDVS in 2009. Scientists from BARC, NPC, and IGCAR have attended this workshop in good numbers. Scientists from DAE closely associated with CFDVS have also served as faculty in this workshop.

Principal Investigators of CFDVS have given invited talks and tutorials at various places in India and abroad. These include several invited talks given at BARC, ADA, VSSC, several IITs, Institute of Mathematical Sciences at Chennai, NICTA, University of New Southwales at Sydney.

The research and development projects being carried out at CFDVS can be broadly classified in the following categories:

1. Logic, Symbolic Simulation, Model Checking and Theorem Proving
2. Trusted Translation Systems
3. Static Assertion Checking Tools
4. Tools and Techniques for GALS Systems and SoCs
R & D Activities

Ongoing Research Projects
Development of ACE II

CESE : A Visual Formalism for Specification and Verification of SoCs

VEDAC and EXPERT : Modeling and Verification Toolsets for GALS

Design and Analysis of High-Speed Interfaces for GALS systems

Slicing Tools for Synchronous Reactive Programs

Reachability Analysis in Timed Automata

Bounded Model Checking of IDL formulae

Optimizations for Automata-based Validity Checking of QDDC

Clock Reducing Approximations in Verification of Timed Automata

Symbolic Model checking with Additive Decomposition

Inductive Theorem Proving and Rewriting Techniques

Verification of Programmable Logic Controllers

Test derivation of Distributed Component-based Systems

Automatic Generation and Verification of Optimizers

Trusted Code Generators

Sponsored Projects

Ongoing

Visual Specification and Modeling of Distributed Systems, sponsored by General Motors, Bangalore

Formal Verification of Akash onboard process, sponsored by DRDL, Hyderabad

Development of tool for formal verification of VHDL based data and control Dominated designs used in safety critical systems, sponsored by BRNS, Mumbai

Completed

Feasibility Study of Formal verification of onboard Software, sponsored by Vikram Sarabhai Space Centre, Trivandrum

Improving GCC ports of ABACUS and ANUPAMA, sponsored by ANURAG, DRDO, Hyderabad

Project Under Discussion

Formal Verification of Hardware Modules in ANAIO FPGA, sponsored by Bhabha Atomic Research Centre, Mumbai

Faculty members and their specialisations

1. G. Sivakumar, CSE Dept. (The Head)
   Logic and Automated Reasoning, Networks and Distributed Systems

2. Supratik Chakraborty, CSE Dept.
   Formal methods in analysis/validation/verification of digital systems, Asynchronous and concurrent systems, Timing Analysis

   Distributed Systems; Mobile computing; concurrency Analysis

4. S. Biswas, CSE Dept
   Parallel and distributed Processing, Neural Nets, Architecture

5. A. Sanyal, CSE Dept.
   Functional Programming, Compilers and programming languages

   Programming Languages Compilers, data flow analysis

   Functional Programming Applications (Domain Specific Languages), Embedded Systems/Parallel Programming Language, Distance Learning

8. Krishna S., CSE Dept.
   DNA Computing, Membrane Computing, Grammar Systems, combinatorics on words, Formal Methods, Duration calculus and Logics of Time.

9. R. K. Shyamasundar (Adjunct Faculty)

10. P.K. Pandya (Adjunct Faculty)
    Logic, Concurrency, Programming Languages, Formal Methods and Software Engineering. Specific work has been on Duration Calculus, Refinement Algebra and CSP, Hoare Logics for Distributed Programs and Scheduling Theory.

Research Engineers/Scientists:

11. Ms. Seetha Jayasankar
12. Mr. Abhisekh Sankaran
Introduction

In the year under consideration, CDEEP growth continued in terms of its reach to a larger section of the academic society and also by making available as many as 62 full semester courses through the internet. Fifteen of these courses were transmitted through satellite provided by ISRO. The number of Receiving Institutes (SITs) increased from 58 to 64 and the number of Remote Centers receiving transmission through satellite is now 29. There were more than 500 known recipients of our courses all over the country, besides many more, who watched the courses on web without interacting with us as the courses were offered free of cost. There were two CEP courses conducted through CDEEP involving 40 mathematics teachers as participants and giving each one of them a set of recordings for their reference. The CDEEP courses created are being made available on internet, and the to start with, 50 courses are selected with support from MHRD. A unique teachers’ training programme involving 865 computer programming teachers was conducted through EDUSAT over a period of 11 days in December 2009 involving 22 of the SITs of EDUSAT. The NPTEL phase II course creation started in the present year with the support of CDEEP. CDEEP recorded most of the important events that took place on the campus, including talks by distinguished guests, some of whom were Nobel Laureates. The publications and the conferences attended by CDEEP faculty are given below.

Conferences/Symposia
(Participated/ Papers Presented)

Madhulika Goyal and Sahana Murthy

Divya Tiwari, Richa Sehgal, Jayant Bansal and Sahana Murthy

“Content development for successful e-learning environment.” at Eleltech India, Hyderabad, November 5, 2009.

Workshops / CEP courses conducted

Conducted 1-day CEP course “Instructional design for e-learning animation” at IIT Bombay, November 28, 2009 (for Engineering college teachers) and January 9, 2010 (for Physics college teachers and Ph.D. research scholars).


B. L. Tembe
Faculty Development in Blended and Online Learning, March 15 to 17, 2010, San Diego, USA
Introduction

The Centre for Research in Nanotechnology and Science (CRNTS) has been the nodal point wherein the efforts of about 40 faculty members across the institute and affiliated to several departments are synergized. The centre houses a number of research equipment required for research in Nano and makes them available to all. Thus, as a common meeting point, CRNTS promotes interaction among the faculty of different departments and promotes interdisciplinary research in Nano sciences and technology.

During the Year 2008-09, a new PhD programme in Nanotechnology had been initiated. Following this, PhD students are being recruited during every admission session. The ratio of the number of successful applicants to the number of total applicants is close to 1:200.

The facilities being set up in CRNTS presently include the cell and tissue culture facility and the chemistry laboratory for synthesis of nanoparticles and nano-coatings. The FEG-TEM is fully operational and has evoked significant interest amongst students and faculty. The FEG-SEM operator training is in progress and will soon start accepting samples.

Sophisticated Analytical Instrument Facility

From its inception in 1976, Sophisticated Analytical Instrument Facility (formerly known as Regional Sophisticated Instrumentation Centre), has grown over the past three decades and has successfully made efforts to acquire, maintain and provide advanced analytical research facilities to a broad spectrum of users from universities, R&D laboratories, industries and educational Institutions. Due to generous grants from the Department of Science and Technology, new sophisticated analytical instruments have been added to our centre at regular intervals to keep up with the ever developing research & advanced technology. One additional state-of-the-art facility, viz., ESR (Electron Spin Resonance Spectrometer) will be added in the year 2010.

SAIF at IIT Bombay continued its endeavor of providing excellent instrumental facilities thereby attracting large numbers of scientific and research personnel from universities, R&D establishments and industry. A large number of students and faculties at IIT Bombay extensively use SAIF facilities for their research work.

The centre has provided facilities for the analysis of 10733 samples during the year 2009-10. The value of service provided is Rs. 70,73,897/- with concession and Rs. 2,09,83,908/- without concession. The contribution of SAIF to the various categories of users from IIT Bombay is given in Table-1 along with value of services provided.

Table 2 provides information on samples analysed during the year 2009-10 and the earnings accrued to SAIF from external users.

Academic institutions, R&D laboratories and Industry have continued to utilize the various analytical facilities at SAIF, IIT Bombay.

The Department of Science & Technology, New Delhi, continued to support SAIF facilities by providing financial support of Rs. 2,73,00,000/- for procurement of state of the art facilities.

As before, interaction with industries and various academic institutions has been a part of the SAIF activities, which include R&D. SAIF continues to interact with industries, academic and R&D institutions as part of its activities. The following are the significant contributions during the year 2009-10.
R & D Activities

Ongoing sponsored projects:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Project Name</th>
<th>Sponsorer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Development &amp; Characterization of Nanophosphors for Strategic Applications</td>
<td>DRDO</td>
</tr>
<tr>
<td>2.</td>
<td>Analysis &amp; Process Modification of CETP at Ankleshwar</td>
<td>ETL</td>
</tr>
<tr>
<td>3.</td>
<td>Physics Based Approach for Modeling of Electromagnetic Wave Absorbers</td>
<td>DRDO</td>
</tr>
</tbody>
</table>

Scientists/Engineers and their Specializations

1. **Dr. C.S. Harendranath**

2. **Mr. L.S. Mombasawala**
   - Electronics; Instrumentation and measurement.

3. **Dr. (Mrs.) S. Vijayalakshmi**
   - Gas Chromatography, Gas Chromatography-Mass Spectrometry, Preparation of microporous and macroporous adsorbents.

4. **Dr. (Mrs.) M.N. Gandhi**

5. **Dr. R.P.R.C. Aiyar**
   - Magnetism and Magnetic materials, Nanomagnetic materials, computational electromagnetics.

Sophisticated Analytical Instrument Facility

**Table 1: Contribution of SAIF to Academics at IIT Bombay**
(01-Apr-2009 To 31-Mar-2010)

<table>
<thead>
<tr>
<th>Sr No.</th>
<th>Course</th>
<th>No. of Users</th>
<th>No. of Samples</th>
<th>Charges (Rs.)</th>
<th>As per Industry Charges (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B.Tech.</td>
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<td>54</td>
<td>24525</td>
<td>98100</td>
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<tr>
<td>2</td>
<td>Dual Degree Programme</td>
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<td>63</td>
<td>37000</td>
<td>148000</td>
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<td>3</td>
<td>M.Sc.</td>
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<td>93750</td>
<td>375000</td>
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<td>4</td>
<td>M.Tech.</td>
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<td>697</td>
<td>232235</td>
<td>928940</td>
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<td>5</td>
<td>Ph.D.</td>
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<td>3627</td>
<td>1893804</td>
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<td>6</td>
<td>Post Doctoral Fellow</td>
<td>10</td>
<td>45</td>
<td>30790</td>
<td>123160</td>
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<tr>
<td>7</td>
<td>Other (Faculty/Project Staff)</td>
<td>44</td>
<td>290</td>
<td>167885</td>
<td>671540</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>492</td>
<td>4964</td>
<td>2479989</td>
<td>9919956</td>
</tr>
</tbody>
</table>
### Sample Analysed Information (External+Internal)

**Period:** (01-Apr-2009 To 31-Mar-2010)

<table>
<thead>
<tr>
<th>Sr No.</th>
<th>Instrument</th>
<th>No. of Users</th>
<th>No. of Internal Samples</th>
<th>No. of External Samples</th>
<th>No. of Samples</th>
<th>Internal Charges (Rs.)</th>
<th>External Charges (Rs.)</th>
<th>Charges (Rs.)</th>
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</thead>
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<td>1</td>
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<td>123</td>
<td>392</td>
<td>857</td>
<td>1249</td>
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<td>53</td>
<td>277</td>
<td>330</td>
<td>17100</td>
<td>101671</td>
<td>118771</td>
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<td>3</td>
<td>ESR</td>
<td>131</td>
<td>202</td>
<td>1097</td>
<td>1299</td>
<td>33300</td>
<td>263289</td>
<td>296589</td>
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<tr>
<td>4</td>
<td>FTIR</td>
<td>148</td>
<td>591</td>
<td>427</td>
<td>1018</td>
<td>78025</td>
<td>159914</td>
<td>237939</td>
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<tr>
<td>5</td>
<td>FTIR-IMG</td>
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<td>39</td>
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<td>39</td>
<td>18000</td>
<td>0</td>
<td>18000</td>
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<td>370</td>
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<td>277500</td>
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<tr>
<td>7</td>
<td>IAS</td>
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<td>115</td>
<td>115</td>
<td>0</td>
<td>15856</td>
<td>15856</td>
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<td>8</td>
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<td>NMR</td>
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<td>1734</td>
<td>967</td>
<td>2701</td>
<td>931630</td>
<td>801143</td>
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<td>10</td>
<td>SIMS</td>
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<tr>
<td>11</td>
<td>TEM</td>
<td>237</td>
<td>855</td>
<td>665</td>
<td>1520</td>
<td>644800</td>
<td>730099</td>
<td>1374899</td>
</tr>
<tr>
<td>12</td>
<td>TG/DTA</td>
<td>45</td>
<td>74</td>
<td>178</td>
<td>252</td>
<td>48150</td>
<td>159471</td>
<td>207621</td>
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<tr>
<td>13</td>
<td>XRF</td>
<td>35</td>
<td>362</td>
<td>329</td>
<td>691</td>
<td>87484</td>
<td>184037</td>
<td>271521</td>
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<tr>
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<td>1335</td>
<td>4964</td>
<td>5769</td>
<td>10733</td>
<td>2479989</td>
<td>4593908</td>
<td>7073897</td>
</tr>
</tbody>
</table>

Total Number of Samples Analyzed, Number of Users & Charges
Earnings are from External Samples Rs. 4593908
75% discount for University/Educational Institute
40% discount for research Institute

### Samples analysed in different categories in 2009-2010

**Period:** (01-Apr-2009 To 31-Mar-2010)

<table>
<thead>
<tr>
<th>Category</th>
<th>Internal IITB</th>
<th>University</th>
<th>National Lab</th>
<th>Large Scale Industry</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>4964</td>
<td>4144</td>
<td>386</td>
<td>1239</td>
<td>10733</td>
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</table>

**Earning with concession during 2009-10 (Rupees)**

<table>
<thead>
<tr>
<th>Category</th>
<th>Internal IITB</th>
<th>University</th>
<th>National Lab</th>
<th>Large Scale Industry</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2479989</td>
<td>2042879</td>
<td>512111</td>
<td>2038918</td>
<td>7073897</td>
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</table>

**Earning without concession during 2009-10 (Rupees)**

<table>
<thead>
<tr>
<th>Category</th>
<th>Internal IITB</th>
<th>University</th>
<th>National Lab</th>
<th>Large Scale Industry</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9919956</td>
<td>8171516</td>
<td>853518</td>
<td>2038918</td>
<td>20983908</td>
</tr>
</tbody>
</table>
### Table 2: Samples Analysed
(01-Apr-2009 to 31-Mar-2010)

#### Annual Internal External Report

<table>
<thead>
<tr>
<th>Type</th>
<th>Users</th>
<th>Samples</th>
<th>Charges</th>
<th>Actual Charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>492</td>
<td>4964</td>
<td>2479989</td>
<td>9919956</td>
</tr>
<tr>
<td>External</td>
<td>843</td>
<td>5769</td>
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<td>11063952</td>
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<tr>
<td>Total</td>
<td>1335</td>
<td>10733</td>
<td>7073897</td>
<td>20983908</td>
</tr>
</tbody>
</table>

#### Department Wise Total Internal Charges
**Period : 01-Apr-2009 To 31-Mar-2010**

<table>
<thead>
<tr>
<th>Sr No.</th>
<th>Department</th>
<th>No. of Users</th>
<th>No. of Samples</th>
<th>Internal Charges (Rs.)</th>
<th>As per Industry Charges (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C.E.S.E.</td>
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<td>61</td>
<td>37925</td>
<td>151700</td>
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<tr>
<td>2</td>
<td>Chemical Engineering</td>
<td>46</td>
<td>335</td>
<td>209710</td>
<td>838840</td>
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<tr>
<td>3</td>
<td>Chemistry</td>
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<td>2708</td>
<td>1389455</td>
<td>5557820</td>
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<tr>
<td>4</td>
<td>Civil Engineering</td>
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<td>165</td>
<td>83950</td>
<td>335800</td>
</tr>
<tr>
<td>5</td>
<td>Corrosion Science &amp; Engineering</td>
<td>2</td>
<td>31</td>
<td>6500</td>
<td>26000</td>
</tr>
<tr>
<td>6</td>
<td>C.R.N.T.S.</td>
<td>9</td>
<td>46</td>
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<td>111100</td>
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<td>7</td>
<td>CTARA</td>
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<td>29625</td>
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<td>Electrical</td>
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<td>63</td>
<td>33350</td>
<td>133400</td>
</tr>
<tr>
<td>10</td>
<td>Energy Science &amp; Engineering</td>
<td>14</td>
<td>66</td>
<td>42450</td>
<td>169800</td>
</tr>
<tr>
<td>11</td>
<td>Engineering Physics</td>
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<td>12</td>
<td>9300</td>
<td>37200</td>
</tr>
<tr>
<td>12</td>
<td>Mechanical Engineering</td>
<td>6</td>
<td>26</td>
<td>15975</td>
<td>63900</td>
</tr>
<tr>
<td>13</td>
<td>Met. Engg. &amp; Mat. Science Dept.</td>
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<td>14</td>
<td>Physics</td>
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<td>237</td>
<td>83600</td>
<td>334400</td>
</tr>
<tr>
<td>15</td>
<td>S.A.I.F.</td>
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<td>5</td>
<td>5000</td>
<td>20000</td>
</tr>
<tr>
<td>16</td>
<td>School of Bioscience &amp; Bio Engineering</td>
<td>60</td>
<td>458</td>
<td>225650</td>
<td>902600</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>484</strong></td>
<td><strong>4964</strong></td>
<td><strong>2479989</strong></td>
<td><strong>9919956</strong></td>
</tr>
</tbody>
</table>
Introduction

The Industrial Engineering and Operations Research (IEOR) at IIT Bombay is an interdisciplinary programme that offers Ph.D. and M.Tech. degrees in IEOR and an M.Sc.-Ph.D. dual degree in Operations Research. IEOR has five faculty members and, together with other institute faculty who are associated with the programme in teaching and research, IEOR has a depth and breadth in capability that makes the programme unique in the country.

Apart from its continued research focus in several areas, IEOR has expanded its course offerings to include new courses at both the postgraduate and undergraduate levels.

A new integrated Msc.-Ph.D. programme in Operations Research has been started in the academic year 2009-10. Students enter this programme by qualifying through the JAM exam. The programme is aimed at students with a background in Mathematics and Statistics at the Bachelor’s level. The first batch admitted seven students in July 2009. A completely new set of courses specially designed for such students has been offered, comprising 5 courses and a lab in the first semester and 4 courses and a seminar in the second semester.

Academic Programmes

IEOR offers M.Tech. and Ph.D. degrees and an M.Sc.-Ph.D. dual degree. The strength of Ph.D. Students has been on the rise in the last two years, and the current strength is 10. There are now 6 students in the M.Sc.-Ph.D. programme. The M.Tech. programme is among the popular ones across almost all streams in engineering.

<table>
<thead>
<tr>
<th>Degrees Awarded in 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.Tech. : 21</td>
</tr>
<tr>
<td>Ph.D. : 1</td>
</tr>
</tbody>
</table>

A new course, IE 718 Networks, Games and Algorithms was introduced this year, building on a successful shorter version of the course last year. Eight new courses under the IE label, IE 605 Engineering Statistics, IE 501 Optimization Models, IE 503 Operations Analysis, IE 505 Computer Programming and Algorithms, IE 614 Linear Systems, IE 502 Probabilistic Models, IE 504 Service and Infrastructure Systems, IE 616 Decision Analysis and Game Theory were offered and one new laboratory course IE.507 Modeling and Computation Lab was offered to the students of the new M.Sc.-Ph.D. programme and others.

IEOR faculty participate in the teaching and research activities of CTARA and the Department of Mathematics. IEOR continues to contribute to undergraduate teaching, with substantial elective registration of students in elective courses, and with contribution by faculty and students to the teaching of the institute level core course on Data Analysis and Interpretation.

IEOR is participating in the IITB-Monash Academy Ph.D. programme, with three doctoral students in the joint programme.

R&D Activities

The R & D activities of the IEOR group span a variety of areas ranging from simulation to optimization and scenario analysis. The agencies range from government departments, research labs, private industry and private institutions.
Sponsored Projects

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Sponsoring Agency</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Evaluation of options for sizing of commercial aircraft”</td>
<td>National Aerospace Laboratories, Bangalore</td>
<td>Completed Project</td>
</tr>
<tr>
<td>“Design and Development of Distributed Hybrid Simulation Environment for Supply Chain Analysis”</td>
<td>DST</td>
<td>Ongoing Project</td>
</tr>
<tr>
<td>“Markov Decision Processes and Stochastic Games”</td>
<td>IRCC, IIT Bombay</td>
<td>Ongoing Project</td>
</tr>
</tbody>
</table>

Consultancy Projects

Apart from ongoing projects, the IEOR department undertook one new project which led to a revenue of Rs 4,40,000. Two projects initiated earlier were completed during the year.

Continuing Education Programmes

Venkateswaran Jayendran

Visitors

R. K. Amit, Department of Management Studies at IISc Bangalore “Dynamic Contracts for Demand Management” on May 28, 2009

Joydeep Dutta, Department of Mathematics and Statistics, IIT Kanpur, delivered a series of lectures: (1) “Fundamentals of Mathematical Programming” (2) “Variational Inequalities” (3) “Gap Functions and” (4) “Nonlinear Complementarity Functions” during his visit from July 27 to 30, 2009.


Rakesh Kulkarni, Xerox Innovation Group (the research arm of Xerox Corporation), visited on November 30, 2009.

H.S. Jacob Tsao, San Jose State University, U.S.A., visited on December 9, 2009.

Conferences/ Symposia/ Workshops/ Seminars (Participated/Papers Presented)

National

Venkateswaran Jayendran and Vignesh2 B.

Bijulal1 D.
Presented a paper “Stability Analysis of Closed-loop Supply Chains” co-authored with Jayendran Venkateswaran and N. Hemachandra, in the 8th Triennial Conference of Association of Asia Pacific Operational Research Societies (APORS 09), held at the Jaipuria Institute of Management, Jaipur, during 6-9 December, 2009.
Venkateswaran Jayendran


Rangaraj Narayan
Presented a paper “Route generation for multi-modal Traffic Assignment using k-shortest paths”, co-authored with Pulkit Jain, Rahul Pandey, Hesham Rafi and M.Ravibabu at the XIII Annual Conference of the Society of Operations Management (ACSO2009-OM13) held at IIT Madras from 20-22 December 2009. He also chaired a session in the conference.

International

Narayanan Vishnu
Attended the Mixed Integer Programming workshop 2009, held at the University of California, Berkeley, from June 8-11, 2009. He presented a paper titled “The Submodular Knapsack Polytope,” co-authored with Alper Atamturk.


Venkateswaran Jayendran
Presented the paper “Analysis of Output Data in Distributed Simulation”, coauthored with B. Vinod Kumar Reddy at the 2009 INFORMS Simulation Society Research Workshop, University of Warwick, UK, June 25-27 2009. This has been published in the proceedings of the workshop (pg 18-22).

Invited Lectures

National

Hemachandra N.
Gave a talk “A stochastic game based model for pollution tax”, Workshop on Operations Research and Data Analytics on November 20, 2009, organized by IBM and ISB at GLAMS Center, Indian School of Business, Hyderabad. The theme of the workshop was “Risk management in an uncertain world”.

Rangaraj Narayan
Gave a talk (along with U. Hari Prasad) titled “Enhancing use of IT in Indian Railways” on 3rd December 2009 in New Delhi at the workshop on ICT in Railways: Requirements and Solutions, Technologies and Applications, organised by Indian Infrastructure magazine in collaboration with the Centre for Infrastructure Policy and Regulation (Indian Institute of Management, Ahmedabad).

Gave an invited talk at S.P.Jain Institute of Management and Research on Sunday, 28th March 2010, on “Service queuing, logistics strategy and network optimization” in a programme on Services Sciences, Management and Engineering.

Honorary Work


Narayan Rangaraj and N. Hemachandra have been Associate Editors for IEEECASE 2010.

Faculty Members and their Specializations

1. Vishnu Narayanan
   Integer Programming, Convex Optimization, and Polyhedral Theory

2. K.S. Mallikarjuna Rao
   Game theory, Stochastic Control, Probability, Mathematical Finance, Partial Differential Equations

3. Jayendran Venkateswaran
   Modeling & Distributed Simulation (Discrete-event, System Dynamics), Integrated Supply Chain Analysis
4. **N. Hemachandra**  
Operations Research, with emphasis on stochastic models, like Markov decision models, Queueing models, Game theory. Application areas include Communication networks, Supply chains, Financial Engineering, Logistics and Power systems

5. **Narayan Rangaraj**  
Optimization and Operations Research, Logistics and Supply Chain Management, Railway Operations, Transportation

Associated Faculty: Teaching and Research

6. P.G. Awate (ME)  
7. A. Subash Babu (ME)  
8. D. Manjunath (EE)  
9. P. Chaporkar (EE)

Associated Faculty: Research

10. S.A. Soman (EE)  
11. A. Subramanyam (MA)  
12. K. Suresh Kumar (MA)  
13. M. Sohoni (CSE)  
14. R.K. Pant (AE)  
15. A.A. Diwan (CSE)
Introduction
The Systems and Control Engineering group at IIT-Bombay is a unique entity in the Indian academic circle, offering exclusive graduate level education in systems and control. Apart from its core faculty members, the group has at least a dozen participating faculty members from other departments who contribute to the research and teaching activities of the group. The active research areas of the group include process control, smart structures, global optimization, embedded systems, reliable control, nanotechnology, systems biology, robotics, geometric mechanics, nonlinear systems theory and control. The group offers both the M.Tech. and Ph.D. programmes. Over the years, the alumni of the group have been placed in many of the leading control, automation industries and academic institutions of the country.

Academic Programme
The group offers M.Tech and Ph.D. programmes. During the academic year 2009-2010 the number of students joined the M.Tech. programme was 21, Ph.D programme was 8 and Dual Degree programme was 2. This year 13 M.Tech. and 6 Ph.D. degrees were awarded.

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<th>Student Intake</th>
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<td>M.Tech.</td>
<td>21</td>
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<td>Ph.D.</td>
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<td>Dual Degree</td>
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<td>M.Tech.</td>
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<td>Ph.D.</td>
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R & D Activities

Sponsored Research Projects:
Ongoing : 8

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<th>Project Title</th>
<th>Sponsoring Agency</th>
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<tr>
<td>“Virtual laboratories Pilot Project: Real-time embedded control of magnetic levitation system”</td>
<td>MHRD</td>
</tr>
<tr>
<td>“Control law development for singularity avoidance in CMGs on satellites”</td>
<td>Indian Space Research Organization</td>
</tr>
<tr>
<td>“Path planning and control of nonholonomic systems”</td>
<td>Department of Science and Technology</td>
</tr>
<tr>
<td>“Modelling and control of mechanical systems with flexible elements and fluids”</td>
<td>Indo-French Centre for the Promotion of Advanced Research</td>
</tr>
<tr>
<td>“Decentralized Control of Multi-satellite Formation Flying”</td>
<td>ISRO</td>
</tr>
<tr>
<td>“Analysis and implementation of cooperative control behavior of a distributed multi-vehicle system”</td>
<td>IRCC</td>
</tr>
<tr>
<td>Software Development for intelligent control of Mobile Robots based on Higher Order Sliding Modes.</td>
<td>Indo-Mexican</td>
</tr>
<tr>
<td>Small Satellite Formation Flying Innovative and Low Cost Control Technologies.</td>
<td>Royal Society of London UK</td>
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Extension Activities

Prof. R. N. Banavar organized a Winter School 2010 on Control and Dynamical Systems during 25th -30th Jan 2010 at IIT Bombay. This winter school at IIT-Bombay exposed graduate students to diverse aspects of the field and current areas of research.

Nataraj P. S. V. organized CEP courses on “Automation and Control”, Pinnacle Knowledge Group, Dubai, May 2009 for 6 days.

“Digital Control”, at Nuclear Power Corporation India Ltd. (NPCIL), Mumbai, July 2009 for 3 days.

Bandyopadhyay B.
Presented four Seminar lectures in the University of Kent, the University of Bristol and the University of Sheffield in December 2009.

Visitors to the Department

Chaudhuri, S. K.
Associate Director, RCI, DRDO Lab, visited Syscon during Sept. 2009. He delivered lecture on “Indian Missile Systems and Technology”.

Bernard Maschke
University Professor in Automatic Control, University of Lyon, visited Syscon during Oct 2009. He delivered a series of lectures on “A Hamiltonian Approach to Controlled Distributed Parameter Systems.”

Awards

Bandyopadhyay, B.

Conferences / Symposia / Workshops / Seminars

Srivastava S. & Nataraj P.S.V.

Nataraj P. S. V. and Deshpande Manoj M

Banavar, R. N.
“European Control Conference”, ECC 09 Budapest, Hungary, August 2009

“IEEE Conference on Decision and Control”, Shanghai, China, Dec 2009

“Winter School for Control and Dynamical Systems” – (From 25th Jan to 30th Jan 2010) Workshop for graduate students in the country.

Sinha A.

Invited Lectures

Banavar R. N.
Invited to give a talk on “Control, Mechanics and Geometry” at the IISc Mathematics Initiative Workshop, Department of Mathematics, IISc, Bangalore, December 2009.

Faculty Members and their Specialization

Core Faculty

1. Banavar R. N.
Convener, Systems and Control Engg. Optimal control, Geometric mechanics and nonlinear control Lagrangian and Hamiltonian mechanics.

Application areas - Mechanical (robotics), aerospace (launch vehicles, spacecrafts) and electrical power system networks.

2. Bandyopadhyay B.
Large Scale Systems, System Reduction, Nuclear Reactor Control, Sliding Mode Control (Continuous & Discrete), Power Systems - Stability & Control, Modeling, Control & Implementation of Smart Structures, Space Launch Vehicles - Stability & Control, Gas Turbines- Stability & Control, Flexible manipulators, Stability & Control Multirate Output Feedback based Control (POF / FOS).

3. Nataraj P. S. V.
Robust Stability and Control especially using quantitative feedback theory (QFT) techniques, Nonlinear System Analysis and Control, and Reliable Computing using interval analysis techniques.
4. Sinha Arpita  
Cooperative control of Multi-agent systems, Resource Allocation, Team theory and its application, Game theory.

5. Vachhani Leena  
Reconfigurable hardware, Embedded control systems, Robotic path planning algorithms, Hardware/software codesign.

Associated Faculty

6. Gudi Ravindra D.  
Dept. of Chemical Engg.  
Linear and Nonlinear Identification, Nonlinear and Multimodel Control, Statistical Methods 
Large scale systems — optimization & control Green Engineering.

7. Moudgalya Kannan  
Dept. of Chemical Engg.  
Process Control, Simulation, Software Engg.

8. Patwardhan Sachin C.  
Dept. of Chemical Engg.  
Control relevant dynamic modeling of linear and nonlinear systems, Nonlinear model predictive control, On-line fault diagnosis and fault tolerant control Nonlinear state estimation and particle filtering, Online parameter estimation and adaptive predictive control

9. Bhartiya Sharad  
Dept. of Chemical Engg.  
Modeling, Identification and control of hybrid systems, Analysis of biological regulatory networks

10. Bhushan Mani  
Dept. of Chemical Engg.  
Fault detection and diagnosis, Sensor network design, Constrained state estimation, Optimal alarm management, Statistical data analysis applications to pollution source identification and fermentation operations.

11. Noronha Santosh  
Dept. of Chemical Engg.  
Modeling and analysis of metabolic and genetic regulatory networks, Fault detection and diagnosis, Adaptive Control of Bioreactors

12. Agarwal Vivek  
Dept. of Electrical Engg.  
Power Conversion, Power quality issues, Non-conventional energy, Intelligent control of power electronic systems, Design of electronic systems, Electromagnetic Interference and compatibility(EMI/EMC)

13. Belur Madhu N.  
Dept. of Electrical Engg.  
Systems & Control theory, Behavioral theory of Systems and Control, Optimal control, Numerical aspects, Hybrid systems

14. Pillai H. K.  
Dept. of Electrical Engg.  
Control theory; Behavioural theory of Systems; Multidimensional systems; optimal control; Coding theory; Optimization techniques.

15. Chakraborty Debraj  
Dept. of Electrical Engg.  
Optimal Control, Differential Games, Nonlinear Feedback Theory, Control of Biological Systems and Diseases.

16. Duttagupta Siddhartha P.  
Dept. of Electrical Engg.  
Microelectronics

17. Seth Bharatendu  
Dept. of Mechanical Engg.  

18. Issac K. K.  
Dept. of Mechanical Engg.  
Synthesis of Mechanisms, Dynamics of Machines, Optimal Design of Mechanical Systems, Robotics

19. Seshu P.  
Dept. Mechanical Engg.  
Smart / Intelligent Structures, Finite Element Analysis, Stress and Vibration Analysis, Simulation of Dynamics of High Speed Mechanisms.

20. Gandhi P. S.  
Dept. Mechanical Engg.  
Nonlinear Dynamical Systems and Control, Mechatronics, Micro Electromechanical Systems (MEMS), Robotic systems, kinematics and dynamics, Appropriate technology for India.

21. Suryanarayanan S.  
Dept. Mechanical Engg.  
Applications of tools from systems/control theory towards the design of mechatronic systems. Current problems of interest include controller design for large wind turbines, active flow control, controllers for automotive systems, energy management strategies for hybrid power devices.

22. Khosla N. K.  
Dept. of Metallurgical Engg. & Material Science  
Hardware implementation of control algorithms
Books

Arceivala, S. J. and Asolekar, S. R.

Bandyopadhyay B., Fulwani Deepak and Kim K. S.

Bhujade M.R.
Parallel computing, (Revised Edition Dec 2009) New Age science limited UK

Eldho T.I. and Desai Y.M.
(Editors) Lecture Notes for QIP/ CEP Short-term course, Finite Element Methods and Applications in Civil Engineering, 2009.

Eldho T.I.
Youtube webcasted the Video Course on Fluid Mechanics, and rated as popular engineering course video

Eldho T.I., E.P. Rao and B.K. Mohan. (Editors)

Ghorpade S. R. and Limaye B.V.

Gopalakrishnan, S., Mitra, M.

Huggi V. P. and Rastogi A. K.

Janga Reddy M.

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Kelkar, S.A.
Strategic IT Management, New Delhi :PHI Learning, 2010

Khan, Azizuddin., & Khan, A.
Cognitive Style and Mentoring: An Approach for Organizational Development (Eds). New Delhi: Global Publishing House

Narayanan K.
Published an edited volume on Indian and Chinese Enterprises: Global Trade, Technology and Investment Regimes [jointly with N.S. Siddharthan], [Routledge: London & New Delhi].

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Simulation of power electronic circuits, Narosa, New Delhi, 2009.

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Shingare P., Bandypadhyay B. and Abhyankar H. K.

Sirola, Vikram

Sreekumar G.V.
Member. Text book committee at NCERT, Delhi. Creating Content for Text Books on Graphic Design for School Students

Solanki Chetan

Sudarshan S.

Ukarande S. K. and Rastogi A. K.

Venkataraman, G., and Gulab Singh

Vijaya R.

Chapters in Books

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“Seismic translational failure analysis of MSW landfills using pseudo-static approach”, In GeoFlorida 2010: Advances in Analysis, Modeling & Design, Geotechnical Special Publication No. 199, ASCE,
Edited by Dante Fratta, Anand J. Puppala and Balasingam Muhunthan (ISBN 978-0-7844-1095-0) USA, pp. 2830-2839, in CD-ROM.

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Kulkarni Malhar

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Kotha S., Kashinath D., Lopus M., Panda D.

Kotha S., Kashinath D., Lopus M., Panda D.
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Lokanadham, B., Nikam, Vinay and Gupta Kapil

Maiti P.; Mukesh D.; Bhaduri S.; Lahiri G. K.

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Mathew, G., Nair, A., Rao, T. K. G. and Pande, K.

Mehta, Rohit, Bapat, S.L., Atrey, M.D.

Mehta,S., Naik, H. B., Desai, K. P., Atrey, M.D.

Mishra A., Naik, N.K.

Mitra, G., Bhattacharyya, K. and Mukul, M.

Mohan S. Jagan, Bapat, S. L., Atrey, M. D.

Mohanta, L, Atrey, M.D.


Moolchandani, K. A., Pant, R. S.

Mukherjee, S.

Mukul, M., Jade, S., Bhattacharyya, A. K., and Bhusan K.

Musti, S., Subimal Ghosh and Mujumdar, P. P.

Naik, N.K., Yeramma, P., Thoram, N.M., Ravikumar, G, Kavala, V. R.

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Nair P., Jayachandran T., Puranik B., Bhandarkar U.V.

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Patel, S. C., Ravi, S., Anilkumar, Y., and Pati, J. K.  

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Ramanathan A.  

Rao Gopal  

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Sheth, H. C., Ray, J. S., Bhutani, R., Kumar, A., Awasthi, N.  

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“A Note on Using Digital Media for the Study and Documentation of ‘Kaavad’ Tradition in Rajasthan” Journal of Indian Folklore Vol 9

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Trivedi, R. and Singh, T.N.

Valdiya, K. S., Pande, K.

Vinjamoor H. and Belur M.N.

International

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Adhikari, J.

Afanasev Andrei, Brodsky Stanley J., Carlson Carl E., Mukherjee Asmita

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Ajmera, T. K. and Rastogi A. K.

Alam, M. A. and Chandrasekhar, D.

Albou, A., Raveendra, S.; Karajagikar, P.; Samajdar, I.; Maurice, C.; Driver, J.H.

Alexander L.K., Bobroff J., Mahajan A.V., Koteswararao B., Laflourencie N., and F. Alet
Ali A., Joseph R., Mahieu B. and Rao C.P.  

Ali, Md. Ehesan; Oppeneer, Peter M.; Datta, Sambhu N.  

Alper Atamturk and Vishnu Narayanan  

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Arya, R.K., Vinjamur, M.  

Baghel G.S. Shaikh, S.M. and Rao C.P.  
Baghel G.S. and Rao C.P.

Baiju, K. R., Namibiar, C. G., Jadhav, G. N., Kagi, H., Satish-Kumar, M.

Bairy Ramesh

Bajoria K. M. and Das S.

Bajoria K. M., Sangle K K and Talikoti R. S.


Balakrishna M. S., Venkateswaran R., Mague J. T.

Balakrishna M. S., Venkateswaran R. and Mobin S. M.

Bali, S.C.; Kain, V.; Raja, V.S.

Banavar R. N. and Dey Biswadip
“Stabilizing a Flexible Beam on A Cart: A Distributed Port Hamiltonian Approach Journal of Nonlinear Science”, *Springer*, published online (Dec. 8th, 2009)

Bandyopadhyay B., Gandhi P. S., and Kurode S.

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Banerjee, R.

Barahate S.D., Prakash M., Kedare S.B.

Barick K. C., Aslam M., Jinsong Wu, Dravid Vinayak P. and Bahadur D.

Barick K. C., Lin Yen-Po, Bahadur D., Prasad Pottumarthi V., Dravid Vinayak P. and Aslam M.

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Barick, K. C.; Aslam, M.; Jinsong Wu, Vinayak Dravid, P.; Bahadur, D.

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Banerjee, R.
Barick, K. C.; Bahadur, D.


Basu, A.; Das, D.; Bapat, P.; Wangikar, P.P.; Phale, P. S.

Baxla, S.P., Roy, A.A., Gupta, T., Tripathi, S.N., Bandyopadhyaya, R.


Bernard A., Taillandier G. and Karunakaran K.P.

Beuria, T.K.; Singh, P.; Surolia, A.; Panda, D.

Bhattacharya, A., Peled, U.N. and Srinivasan, M. K.

Bhattacharya S., Momaya K., and Iyer K. C.


Biswas Santidan, Das Dibyendu, Parmananda Punit and Sain Anirban

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Tiwari A.N.

Tyagi N.S. and Karmakar, S.

Udupa Raghavendra, Bhole Abhijit and Bhattacharyya Pushpak

Verma Kamaljeet and Bhattacharyya Pushpak


Vyajayanthi, J.P., Patel, U.D. and Sumathi, S.
Introduction

Central Library continued to be the hub of all research and academic activities of IIT Bombay and played significant role in facilitating creation and dissemination of knowledge during the year. It offered a range of services including reference and consultation, membership and circulation, document delivery, resource sharing, information alert service, book bank for needy students, user awareness programmes, and ICT-enabled web-based services. It also extended support to establish a library at the IIT Gandhinagar and IIT Indore. The library earned over Rs 37 lakhs for various services rendered to professionals, educational institutes, industry and corporate houses.

2. Collection Development and Management

Collection building is one of the important functions of the library that supports academic and research work of the students, faculty, staff and other users. Library collection comprising of books, journals, theses, reports, standards, pamphlets and other reading material in science, engineering, technology, humanities, social sciences and management is considered one of the best in the country and is its greatest asset. The total collection of library as on March 2010 stands as follows:

<table>
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<th>Collection</th>
<th>Added during 2009-10</th>
<th>Total as on 31 March 2010</th>
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<td>3580</td>
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<td>TLL &amp; BC (Book bank) collection</td>
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<td>Reports, pamphlets, standards</td>
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<td>Photocopies, films</td>
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<td>Subscription to journals</td>
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A list of new additions of books and reports is issued every fortnightly and can be accessed on the library home page. An email alert is also sent to the requesting faculty member(s) about the arrival of publications requested by them. Special care was taken to neatly maintain the library stacks to facilitate users to locate the desired document quickly. A book exhibition was also organized during August 2009 to facilitate students, faculty and staff to browse and select latest publications in their subjects. In view of the space constraint, low usage and cost effectiveness, the library / Library Committee in consultation with the departments and centers decided to discontinue print version of journals.
3. Digital Library

Central Library has its own homepage (http://www.library.iitb.ac.in), provides web-based access to its resources, procures over 12,000 electronic journals and databases, supports on-line submission of theses and dissertations, and has set up an institutional repository of publications brought out by the IIT Bombay community.

The library is a part of the institute-wide network and has adequate computing infrastructure to cater to the needs of the users. The WI-FI facility in the reading area continues to attract users to bring in their laptops to have seamless access to print and electronic resources.

3.1 OPAC (On-line Public Access Catalogue)

The OPAC is one of the most heavily used databases of the library and is accessible 24x7 via library web page. Besides listing all the documents available in the library, it allows on-line reservation, circulation, fine collection, and indicates status of a particular book. OPAC is searchable by author, title, accession number, subject and several other fields.

3.2 E-Resources

The Central Library provides web-based access to over 12,000 full text journals and 12 databases 24 x 7 on institute-wide network as per the following details:

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<td>ACS Journals -</td>
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<td>ACS Legacy Archives (23 journals 1879-1995) -</td>
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<td>AIP Journals -</td>
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<td>AMS Journals -</td>
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<td>ASCE Journals -</td>
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<td>ASME Journals (+ AMR) -</td>
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<td>ASTM Standards -</td>
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<tr>
<td>BioOne 1 (82 high impact bioscience journals and 1 book) -</td>
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<td>Blackwell Journals -</td>
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<td>Capitaline -</td>
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<td>CMIE Databases -</td>
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<td>CRIS-INFAC CRISIL. Ind. Information -</td>
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<td>EBSCO Databases -</td>
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<td>ICE (24 journals) -</td>
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<td>IEEE/IEE Electronic Library Online -</td>
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<td>INFORMS (12 journals package) -</td>
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<td>INSIGHT -</td>
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### 3.2.2 Databases

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<td>Indian Patents</td>
<td>On library intranet</td>
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<td>INSPEC</td>
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</tbody>
</table>

### 3.2.3 Multimedia (intranet, CD-net)

- Chemical Abstracts – 12th & 13th Collective Index
- Chemical Abstracts – 12th & 13th Collective Index
- Chemical Abstracts on CD (2003- )
- Indian Patents
- Indian Standards
- Power Diffraction Files

### 3.2.4 Addition of New E-Resources:

- Nature journals (27)
- Annual Reviews
- Science of Synthesis
- Lecture Notes in Computer Science
- Lecture Notes in Control and Information Science
- Lecture Notes in Physics
- Sage’s Subject Collection – Psychology
- Psycarticles
3.3 Electronic Theses & Dissertations
(http://etd.library.iitb.ac.in)

Central Library supports electronic submission of theses and dissertations by the postgraduate and doctoral students. It maintains a full-text database of over 5000 items submitted since 1999-2000 on Intranet. During the year, 377 M. Tech. dissertations and 159 Ph. D. theses were submitted online. The library has also developed a database (providing bibliographic details and abstract) using open source software, GSDL of all the Masters dissertations and Ph. D. theses submitted since 1999 and 1965, respectively. This database containing over 2500 records is accessible through the library homepage.

3.4 Institutional Archive
(http://dspace.library.iitb.ac.in/jspui/)

Central Library has set up an archive of publications brought out by the institute. The archive already has over 1650 items and is being updated to cover more publications which are permissible within the copyright regulations. The archive is expected to evolve into a database of all publications produced by the IIT Bombay community and is accessible on the Internet through the library homepage.

4. Library Services

4.1 Reference, Consultation & Circulation

Reference service helps users to make full use of library resources and services. It provides necessary assistance to users in locating information or document of their choice. The Library loaned 73,114 books and other documents to its members during the year. In addition to members, 695 visitors including students, research scholars, engineers and faculty members from several academic and R&D institutions used the library. It is open from 0900 to 2300 hrs on all working days and from 1000 to 1700 hrs on holidays (except three national holidays) when it operates with skeletal staff. Library remains open till 0100 hrs on all days during examinations. The lending of books was started on all holidays and lending hours were extended by 2 hours (i.e. up to 2000 hrs) on all weekdays. “Ask the Librarian” link provided from the library homepage encourages users to avail the reference service virtually.

4.2 Membership

The library currently serves about 8500 members including students, faculty, staff, retired faculty and officers, IIT Bombay Alumni, Corporate houses, and educational institutes.

4.3 Sharing of Resource and Partnerships

The library maintains excellent relations with libraries of IITs, BARC, NITIE, C-DAC, IISc, IIG, TIFR, TISS and UICT for exchange of books, journals, photocopies and videocassettes for the mutual benefit of the users. It loaned 85 and borrowed 10 books to / from other libraries.

4.4 Photocopying Service

Photocopying service is one of important services offered by the library. It provided 4918 pages of photocopies to the faculty of the institute free of charge and 45735 pages to other individuals and organizations on payment. About 42 organizations maintain Deposit Account with the library to obtain photocopies quickly.

4.5 Book Bank (TLL and BC Collections)

The library maintains a book bank to help students belonging to Scheduled Castes, Scheduled Tribes and economically weaker sections of the society. The bank mainly consists of the prescribed text books for undergraduate courses and loans up to 7 books each to these students for full semester. During the year, 653 students availed this facility and borrowed 3045 books from this collection.

4.6 Information Alert Services

The library continues to alert the users about the latest information of their interest by:
- List of Additions, new arrivals
- Lest-you-miss
- News items display
- Useful articles Display
- Faculty publications display
- Display of Scholarship and fellowship information
- Display of Forthcoming conferences, other national and international events, employment opportunities, and prospectus of foreign universities

5. Users Education, Conferences, Seminars

Users education is an important regular activity of the library to inform, alert, educate and train users about various resources and services of the library. In addition to orientation programmes organized for new students, the library conducted short duration training programmes on “How to Use” SciFinder Scholar, Web of Science, and CMIE databases for our faculty and students so that they are able to use these resources more effectively. For users desiring to learn more about
any service, database or any resource, the library provides one-on-one training. The library also organized half-a-day interactive sessions on “Enhancing User Awareness” for new faculty and research scholars to familiarize them with various resources and services. The library makes good use of various mailing lists, and news groups to interact and communicate with the user community, to inform them about the new activities and services, and to obtain their comments and suggestions. The brochure “Know Your Library” continues to be a popular medium to give detailed information about activities and services of the library.

6. Staff

The library has a team of talented and dedicated officers and staff who perform their duties exceptionally well, and are always appreciated by our users for their intelligence, enthusiasm and honesty with which they serve them. In addition to their regular jobs, most of them are involved in various academic activities like presenting papers in seminars and conferences, delivering lectures in various training programmes, serving on various expert committees, guiding research etc. Some of the major contributions/achievements are listed below:

1. Mr. D. Jotwani, Institute Librarian visited Library and Information Services of the major Universities in Australia as a part of his Endeavour Executive Award for professional development during May-June 2009. He was invited to deliver a lecture on “Library Services in Web 2.0 Environment” during 7th Annual Meet and INDEST Workshop held at IIT Kharagpur, January 2010. He was also invited by the INFLIBNET Centre, Ahmadabad to present a theme paper on “Re-engineering of Library Acquisitions” during PLANNER 2010 held at Tezpur University (Assam), February 2010. Mr Jotwani delivered a key note address at the National Workshop on Digital Content Management, Gujarat University, Ahmadabad, March 2010. He also served as Chairman / member of the following:

- Member, National Advisory Committee, INDEST-AICTE Consortium, New Delhi.
- Chairman, Project Review and Steering Group, Digital Library Project, Ministry of Information and Communication Technology, New Delhi.
- Member, Programme Committee, International Conference on Digital Libraries (organized by TERI), Feb 2010.


3. Dr. H. S. Waydande, Assistant Librarian (SS) participated as a Resource Person in the following:

- “Role of Library in Quality Education” One Day workshop on Utilization of Libraries at VIIT Pune held on 18th April 2009.
- International Conference on Digital Libraries (ICDL 2010) held at TERI New Delhi from 23– 26 February, 2010. I was Member of International Program Committee and Main Rapporteur for ICDL 2010.

4. Ms. S. D. Kulkarni, Assistant Librarian (SS) was invited to deliver a lecture to M.L.I.Sc. Students on “Library Resource Management & Retrospective Conversion at University of Mumbai in Dec. 2009. She also acted as an
examiner for B.Lib Sc/M Lib Sc Courses in SNDT Women’s University, Mumbai.

5. Mr M N Jadhav, Assistant Librarian (SS), Mr Om Prakash Bhendigiri, Assistant Librarian, Mr D B Kamble, Library Information Officer, and Mr P C Gaikwad, Library Attendant (SG), received Certificate of Appreciation and a Reward for Exemplary Library Service during Institutes Golden Jubilee Celebrations. Mr R J Tiwari and Mr Rajesh S Sarmalkar, Library Staff were also awarded certificate of appreciation for their meritorious service on the Republic Day.

6. Manju Naika, Senior Library Information Assistant published the following papers:


7. **Building**

The library building is old, its stacks are full and have no space to accommodate new additions. It also has no space for group study, interactive learning, digital knowledge centre and other services. The library building needs to reflect current trends in ICT and the changing needs of library staff, students and faculty in their use of the library resources and services. In order for the library to remain relevant and to attract large number of users, it needs to create a variety of spaces and an ambiance which all our users will find extremely attractive and conducive for their work. A Task Force has been constituted to work out a plan for renovation of library building.

8. **Support to IIT Gandhinagar and IIT Indore**

Central Library extended all support and help to set up libraries at IIT Gandhinagar and IIT Indore. It procured, processed and supplied books, deputed staff, delivered photocopies of articles and lent out several books on inter-library loan. The library also helped in selecting and training of the staff.
ACADEMIC REPORT

Admission offered at IIT Bombay for the following Programmes in 2009-10 are given below.

<table>
<thead>
<tr>
<th>Programme</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ph.D. (Autumn+Spring)</td>
<td>432</td>
</tr>
<tr>
<td>M.Tech.</td>
<td>676</td>
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<tr>
<td>M.Mgt.</td>
<td>101</td>
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<tr>
<td>M.Des.</td>
<td>57</td>
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<tr>
<td>M.Phil.</td>
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<tr>
<td>M.Sc.-Ph.D. (Dual Degree)</td>
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<tr>
<td>M.Sc.</td>
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<tr>
<td>Dual Degree</td>
<td>248</td>
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<tr>
<td>5 Yr. Int. M.Sc.</td>
<td>19</td>
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<tr>
<td>B.Tech.</td>
<td>459</td>
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<tr>
<td>Preparatory Course</td>
<td>27</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2231</strong></td>
</tr>
</tbody>
</table>


MEDALS


STATEMENT SHOWING THE TYPES OF SCHOLARSHIPS, STIPEND AND FINANCIAL ASSISTANCE AWARDED TO THE B.TECH., Dual Degree, M.Sc.(INTEGRATED), STUDENTS FOR THE YEAR 2009-10

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Types of Scholarships</th>
<th>Amount</th>
<th>No. of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The Institute Merit-cum-Means scholarship with benefit of free tuition</td>
<td>Rs. 1000/-</td>
<td>588</td>
</tr>
<tr>
<td>2.</td>
<td>The facilities of free messing (only basic menu) to SC/ST</td>
<td>Basic Menu bill plus pocket allowance of Rs. 250/-p.m. &amp; exemption from payment of Hostel Room Rent</td>
<td>263</td>
</tr>
<tr>
<td></td>
<td>Name of the Scholarship</td>
<td>Rate of the Schp</td>
<td></td>
</tr>
<tr>
<td>----</td>
<td>--------------------------------------------------</td>
<td>------------------</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Free tuition Facility</td>
<td>only Tuition fee waiver</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>National Talent Search Scholarship (NTS)</td>
<td>Rs. 500/- p.m.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(approximately)</td>
<td>219</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Scholarship from Steel Authority of India Ltd</td>
<td>Rs. 500/- p.m.</td>
<td></td>
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<td></td>
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<td>01</td>
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</table>

**IIT Bombay Heritage Fund scholarship**

<table>
<thead>
<tr>
<th>Name of the scholarship</th>
<th>Rate of the Schp</th>
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</thead>
<tbody>
<tr>
<td>David J Dunn Schp.</td>
<td>Rs.1000/- p.m.</td>
</tr>
<tr>
<td>Vidyadhar and Radhika Kulkarni Schp.</td>
<td>Rs.1000/- p.m.</td>
</tr>
<tr>
<td>Dr Vijaya Apte Memorial Schp.</td>
<td>Rs.1000/- p.m.</td>
</tr>
<tr>
<td>Jagjivan Ujamashi Talsania Schp.</td>
<td>Rs.1000/- p.m.</td>
</tr>
<tr>
<td>Vasant Himatlal Talsania Schp.</td>
<td>Rs.1000/- p.m.</td>
</tr>
<tr>
<td>Mr Badriddin Sonawalla Schp.</td>
<td>Rs.1000/- p.m.</td>
</tr>
<tr>
<td>Prabhakar D Mahajan Schp.</td>
<td>Rs.1000/- p.m.</td>
</tr>
<tr>
<td>Lionel J D'luna Schp.</td>
<td>Rs.1000/- p.m.</td>
</tr>
<tr>
<td>T R S Anand &amp; Bhanumati Anand Schp.</td>
<td>Rs.1000/- p.m.</td>
</tr>
<tr>
<td>Indira Manidhane Schp.</td>
<td>Rs.1000/- p.m.</td>
</tr>
<tr>
<td>Prabhakar D Mahajan Schp.</td>
<td>Rs.1000/- p.m.</td>
</tr>
<tr>
<td>Kanitkar Schp.</td>
<td>Rs.1000/- p.m.</td>
</tr>
<tr>
<td>Mr &amp; Mrs Ranganathan Schp.</td>
<td>Rs.1000/- p.m.</td>
</tr>
<tr>
<td>Shri C K Apte Schp.</td>
<td>Rs.1000/- p.m.</td>
</tr>
<tr>
<td>Jayant Sathe Schp.</td>
<td>Rs.1000/- p.m.</td>
</tr>
<tr>
<td>Balkrishna K Mundhe Schp.</td>
<td>Rs.1000/- p.m.</td>
</tr>
<tr>
<td>Anonymous Schp.</td>
<td>Rs.1000/- p.m.</td>
</tr>
<tr>
<td>Anonymous Schp.</td>
<td>Rs.1000/- p.m.</td>
</tr>
<tr>
<td>Sandra Lee Purkayastha Schp.</td>
<td>Rs.1000/- p.m.</td>
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<td>IIT Bombay Heritage Fund Schp.</td>
<td>Rs.1000/- p.m.</td>
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<td>IIT Bombay Heritage Fund Schp.</td>
<td>Rs.1000/- p.m.</td>
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<tr>
<td>Abraham Thomas Schp.</td>
<td>Rs.1000/- p.m.</td>
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<tr>
<td>IIT Alumni @ Microsoft Schp.</td>
<td>Rs.1000/- p.m.</td>
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<td>IIT Alumni @ Microsoft Schp.</td>
<td>Rs.1000/- p.m.</td>
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<tr>
<td>P K Sheshambal Schp.</td>
<td>Rs.1000/- p.m.</td>
</tr>
<tr>
<td>Dina Nath &amp; Gayatri Nath Schp.</td>
<td>Rs.1000/- p.m.</td>
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<tr>
<td>IIT Alumni @ Microsoft Schp.</td>
<td>Rs.1000/- p.m.</td>
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<td>Suresh &amp; Varsha Nihalani Schp.</td>
<td>Rs.1000/- p.m.</td>
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<tr>
<td>Anonymous Schp.</td>
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<td>Subha &amp; Anand Talwalkar Schp.</td>
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<td>Sr. No.</td>
<td>Type of Scholarship</td>
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</tr>
<tr>
<td>1</td>
<td>Institute Teaching Assistantship * (Ph.D) (* revised w.e.f 01.04.07)</td>
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<tr>
<td>2</td>
<td>Postgraduate Assistantship to M.Tech. students (2 yr. programme)</td>
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<tr>
<td>3</td>
<td>Postgraduate Assistantship to M.Des. students (2 yr. programme)</td>
</tr>
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<tr>
<td>4</td>
<td>Postgraduate Assistantship to M.Phil students (2 yr. programme)</td>
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<td>5</td>
<td>CSIR Fellowship to Ph.D students</td>
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<td>M.Tech students</td>
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<td>QIP Scholarships to M.Tech students</td>
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# List of Scholarship/Fellowship

## Government Fellowship/Scholarship

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**Department: Chemistry**

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<td>Prasenjit Maity</td>
<td>Cluster Derived Ionic Polymer Supported Nanocatalysts for Hydrogenation and Oxidation Processes in Aqueous-Biphasic Medium</td>
<td>Prof. Goutam K. Lahiri</td>
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<td>Late Transition Metal Complexes of N-Heterocyclic Carbenes and their Utility in Chemical Catalysis.</td>
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<td>Studies on Polymers Based on Functionalized 3,4-Propylene dioxythiophene.</td>
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<td>Novel Cyclic and Acyclic Phosphorus (III) Based Ligands: Syntheses, Transition Metal Chemistry, Catalytic and Biological Applications.</td>
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<td>Metal Carbonyl Assisted Organic Transformations of Acetylenes by Addition of CS2, CO and CH3OH.</td>
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<td>Stereochemistry : Studies of its Role in Protein Folding and Scope in De Novo Design.</td>
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<td>Studies on Discrete Iron Phosphates and Phosphonates, Layered Alkaline Earth Metal Phosphonates and Polyhedral Tin Carboxylates.</td>
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**Department : Civil Engineering**

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<td>Seismic Analyses and Design of Waterfront Retaining Structures using Pseudo-Static and Pseudo-Dynamic Approaches</td>
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<td>Corrosion Protection of Steel Reinforcement in Concrete with externally applied FRP Sheets.</td>
<td>Prof. Jangid R.S.&lt;br&gt;Prof. Malhotra S.N.&lt;br&gt;Prof. A. Mukherjee</td>
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<td>Defining Level of Service Criteria for Urban Streets in Indian Context.</td>
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<td>Determination of Hydraulic Conductivity of Unsaturated Soils</td>
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<td>Enhancing Performance of Concrete Exposed to Heat, Sulfate and Preloading by Addition of Polypropylene Fibres</td>
<td>Prof. Desai Yogesh M.</td>
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**Department : Computer Science & Engineering**

| 1.  | 01405301 | Sriram G Sanjeevi        | Connectionist Reasoning Models using Coarse-Coded Distributed Representations. | Prof. Bhattacharya P.                        |
| 2.  | 02405003 | Amey Karkare            | Heap Reference Analysis                                                      | Prof. Uday Khedkar Prof. Sanyal Amitabh     |
| 3.  | 03405702 | Guravannavar Ravindra Ningappa | Optimization and Evaluation of Nested Queries and Procedures.              | Prof. Sudarshan S.                           |

**Department : Earth Sciences**

<p>| 1.  | 04406801 | Anupam Ghosh            | Late Pleistocene- Holocene ForaminiferalBiofacies along the Gulf of Cambay. | Prof. Saraswati P.K.                        |
| 2.  | 03406303 | Pramod Kumar            | Shell Bed Taphonomy, Palaeoenvironment and Sequence Stratigraphy of Early Midecene Sequence, Western Kutch, India. | Prof. Saraswati P.K                        |
| 3.  | 05406001 | (Ms) Ranjini Ray        | Dykes in the Deccan Traps.                                                  | Prof. Sheth C Hetu                           |</p>
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<td>Kripamoy Sarkar</td>
<td>Landslide Risk Analysis around Luhri Area, Lower Himalaya, Himachal Pradesh, India.</td>
<td>Prof. E. Chandrasekhar Prof. Singh Trilok Nath</td>
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<td>Distributed Detection in Wireless Sensor Networks.</td>
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<td>Sensor Network Coverage: Stochastic Analysis of Non-Uniform Density Models</td>
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**Department : Humanities & Social Sciences**

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<td>M. P. Ganesh</td>
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<td>Prof. Gupta Meenakshi</td>
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<td>Culture and Genre in Translation : The Colonial Encounter in Bengali Literature (1850-1900).</td>
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<td>(Ms) Suparna Banerjee</td>
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<td>Health Effects of Urban Air Pollution: A Study of Mumbai</td>
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<td>(Ms) Swati Smita</td>
<td>The Role of Social Support on the Stressors and Outcomes of work-family conflict among nurses</td>
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<td>Perception of Fairness of Performance Appraisal System: A Study of a Public Sector and a Private Sector Bank</td>
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<td>Climate Related Disasters: An Analysis of Vulnerability and Coping Strategies of Households in Eastern Uttar Pradesh</td>
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<td>Bhartrhari’s Concept of Jati: A Study with Special Reference to the Jati-Samuddesa of Vakyapadiya</td>
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<td>Fahed Zulfeqarr</td>
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<td>Processing of Molybdenum and TZM Alloy for Advanced Nuclear Reactor Systems.</td>
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**Interdisciplinary Groups: Corrosion Science & Engineering**

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**Centre for Environmental Science & Engineering**

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<td>(Ms) Deepika . Bhupendrakumar Upadhyay</td>
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<td>Solidification and Stabilization of Hazardous Waste from a Typical Steel Processing Industry.</td>
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**Interdisciplinary Groups : Industrial Engineering & Operations Research**

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<td>Effective Metrics for Software System Performance Prediction Incorporating Environmental Parameters</td>
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<td>Fuzzy approach to well-being analysis for composite power systems reliability studies.</td>
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**Specialization : Interaction Design**

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   Employment Finder for Low Income Group.
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   Prof. Joshi Anirudha

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   Designing A Device for Taxis and Rickshaws.
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**RECIPIENTS OF DEGREE OF MASTER OF SCIENCE (EXIT DEGREE)**

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<td>Relationship Between Carbon and Nitrogen Removal in Constructed Soil Filter System</td>
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<td>Flow and Segregation of Granular Mixtures on an Inclined Plane</td>
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<td>Ankit Sharma</td>
<td>Deformation of Charged Drops</td>
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<td>A Novel Approach to Multiparametric Quadratic Programming</td>
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<td>Optimization of Hybrid Distillation Pervaporation Process</td>
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3. 07305044 Kumar Avinava Dubey Global and Local Learning to Rank. Prof. Chakrabarti Soumen
4. 07305046 Amit Kumar Rambachan Singh Curating and Searching the Annotated Web. Prof. Chakrabarti Soumen Prof. G. Ramakrishnan
5. 07305401 (Ms) Kulkarni Sayali Satish Collective Annotation of Wikipedia Entities in Web Text. Prof. Chakrabarti Soumen
6. 07305031 Pulkit Gupta Measurement Study of 802.11a/b/g Wireless Mesh Network Links. Prof. Bhaskar Raman Prof. Purushottam Kulkarni
7. 07305051 Mande Tanmay Vinod Automated Service Composition using Semantic Descriptions. Prof. Bellur Umesh
8. 07305030 Shashidhar Y. Model-based Design and Analysis: from Esterel to Robots. Prof. K. Arya
10. 07305037 Shitanshu Verma Incorporating Semantic Knowledge for Sentiment Analysis. Prof. Bhattacharya P.
11. 07305042 Anup Vijaykumar Patel Inductive Logic Programing based Annotator Development and a Case Study on NER. Prof. Bhattacharya P. Prof. G.Ramakrishnan
12. 07305048 Avishek Ghosh Semantic Extraction from Text. Prof. Bhattacharya P.
13. 07305050 Jagadish M. Fixed Size Subset Sum. Prof. Vishwanathan Sundar
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| 26  | 07310028 | Anjani Kumar Pandey | Integration of segmented object manufacturing machine.                      | Prof. Karunakaran K.P.                             |
| 27  | 07310808 | Chaudhari Jeetendra Prakash | Thermomechanical modeling of LENSTM process.                                | Prof. De Amitava                                   |
| 28  | 07310R07 | Anup Kalyan Bhattacharya | Finite element based efficient modeling of submerged arc welding process.   | Prof. De Amitava                                   |
| 29  | 07310027 | Biradar Vijaykumar Annarao | An optimization of milling process through simulation.                        | Prof. Karunakaran K.P.                             |
| 30  | 07310404 | Anand R. Wankhede | Feasibility of producing multilayer part by metal injection moulding.       | Prof. Date P.P.                                    |
| 31  | 07310R06 | Lekkala Ravi | Modeling and analysis of burrs in micro-milling.                             | Prof. S. S. Joshi                                  |
| 32  | 07310023 | Abraham Palaty | Gripper system for handling flexible sheets of discrete size.               | Prof. Ramakrishnan N.                              |
| 33  | 07310802 | Vasantgadkar Nikhil Anil | Development of pulsed laser deposition system using excimer laser.         | Prof. S. S. Joshi Prof. Upendra Bhandarkar         |
| 35  | 07310032 | Vaghasia Dolarkumar Kanjibhai | Gating system design optimization for sand casting.                      | Prof. Ravi B.                                      |
| 36  | 07310033 | Ankur Sharma | Mould cavity layout optimization in sand casting.                            | Prof. Ravi B.                                      |
| 37  | 07310803 | Anerao Prashant Ramchandra | Casting feeder design optimization driven by solidification simulation.   | Prof. Ravi B.                                      |

**Department: Mechanical Engineering  Specialization: Thermal & Fluids Engineering**

<p>| 38  | 07310303 | Nehe Prashant Balasaheb | Studies of flame propagation and stabilization in microcombustors.          | Prof. Sudarshan Kumar                              |
| 39  | 05310030 | Brij Kishore Soni | Numerical prediction of pressure drop and heat transfer characteristics in | Prof. Date A.W.                                    |</p>
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Department: Metallurgical Engineering & Materials Science Specialization: Materials Science

1. 07311016 Ranade Shantanu Rajendra Structure Property Relationship Studies in Multiwall Carbon Nanotube Based Polymer Blends. Prof. Arup R. Bhattacharyya Prof. Kulkarni Ajit R.

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2. 07311023 Ravikiran Lingaparthi Doping of RF Sputtered ZnO Films. Prof. Srinivasa Raman Prof. Major S.S.
3. 07311404 Sudeep Verma RF-Sputtered GaN thin Films. Prof. Srinivasa Raman Prof. Major S.S.
4. 07311018 K Murali Krishna Synthesis and Characterization of Magnetic Core-Shell Nanostructures. Prof. Bahadur D.
5. 07311020 Chhabi Ram Matawale Microstructure, Deformation and Mechanical Behaviour of Cu-CNT Composite. Prof. Prasad R.C.
7. 07311013 Adhish Majumdar Modeling Deformation in Hexagonal Close-Packed Metals. Prof. Prita Pant Prof. Samajdar I.
8. 07311004 Sujith T.S. Formability Behaviour Study in EDDQ Transverse Welded Tailor Welded Blanks. Prof. Narsimhan K.
9. 07311014 Nikhil Ramakrishnan Formability of Aluminium Alloy Sheet. Prof. Narsimhan K.
10. 07311403 Chidanand Magadum Studies on Plasma Arc Welding of 0.3 C- Cr MoV(ESR) Steel Ultra High Strength Steel. Prof. Raman R.
11. 07311011 R Mahesh Babu Tape Casting of Alumina. Prof. Parag Bhargava
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**Interdisciplinary Groups : Corrosion Science & Engineering**

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<td>1. 07317402 Senthil Kumar A.</td>
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<td>5. 07317301 Manoj Kumar M. V.</td>
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**Centre for Environmental Science & Engineering**

1. 07318801 (Ms) M.R. Anjana  
   Assessing Biodegradability of Distillery Spentwash and its Enhancement for Anaerobic Treatment  
   Prof. A.K. Dikshit

2. 07318002 (Ms) Nandini Shome  
   Application of Bioluminescence Inhibition Assay for Toxicity Evaluation of Environmental Samples.  
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3. 07318001 (Ms) S. Ashwini Kumari  
   Studies in Bisorption of Heavy Metals  
   Prof. S.K. Gupta  
   Prof. S.R. Asolekar

4. 07318005 (Ms) Chikkala Renuka  
   Development of Strategies for Treatment and Disposal of Certain Mixed Hazardous Waste.  
   Prof. S.R. Asolekar

5. 07318009 Bhukya Vinod  
   Removal of Fluoride using low cost Adsorbent  
   Prof. S.K. Gupta  
   Prof. S.R. Asolekar

6. 07318003 Kurle Chaitanya Chandrakant  
   A Tool for Assessment of Technologies for Recycling Treated Wastewater  
   Prof. S.R. Asolekar

7. 07318006 Satyapal Singh  
   Air and Noise Impact Assessment of a New International Airport.  
   Prof. R.S. Patil  
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8. 07318301 Alok Mishra  
   Prof. Anurag Garg

9. 07318401 Krishna Harishchandra Perekar  
   Development of Strategy for Control of Indoor Air Environment in a Municipal Power Laundry  
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   Prof. Parikh P.P.

10. 07318802 Praveen Kumar Mishra  
     Biosorption of Oil on Algae  
     Prof. Suparna Mukherji
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**Interdisciplinary Groups: Industrial Engineering & Operations Research**

1. 07319001 D. Narendra Varma  Sensitivity Analysis of Value at Risk (VAR) and Conditional Value at Risk (CVAR) Prof. K.S.Mallikarjuna Rao
2. 07319809 Sandip Subhashrao Joshi  A Study of Sponsored Search Auctions  Prof. N. Hemachandra
3. 07319009 Ramesh Gangadharrao Kallol  Application of Pricing and Revenue Management  Prof. N. Hemachandra
4. 07319803 Vinay Kumar Kalakbandi  A Study on Performance Measurement and Improvement of A Manufacturing Company  Prof. Babu A. Subash
5. 07319811 Vignesh B.  Capacity Requirement Planning in ITES Supply Chain  Prof. J. Venkateswaran
6. 07319004 Ankur Singh  Impact of Demand Forecasting Techniques on Supply Chain Performance  Prof. J. Venkateswaran
7. 07319805 Sankara Prasad K.  Analysis of the Bullwhip Effect and Design of Dynamic Base Stock Control Policies in the Multistage Production-Inventory Systems  Prof. Awate P.G.
8. 07319003 Vinod Kumar Reddy B.  Output Analysis on Distributed Simulation of Supply Chain  Prof. J. Venkateswaran
9. 07319812 (Ms) Shreya Jain  Application of Priority Dispatching Rules in Assembly Job Shops  Prof. Awate P.G.
10. 07319807 Tapan Dey  Game Theoretical Analysis in Supply Chain  Prof. K.S.Mallikarjuna Rao
11. 07319804 Aitha Prateep Kumar  A Real Options Approach to Protect Valuations : Application to RFID Investment Valuation in Supply Chains  Prof. N. Hemachandra
12. 07319002 Mohammed Jamal  Capacitated Lot-Sizing in Multi Echelon Inventory System  Prof. Awate P.G.
13. 07319006 Lokesh Paliwal  Model Predictive Control Principles and Applications  Prof. Awate P.G.
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<td>Distributed and Hybrid Simulation Environment for Supply Chain Analysis</td>
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**Interdisciplinary Groups: Reliability Engineering**

1. 07322004  Didla Vijaya Babu  Reliable Data Transfer Evaluation in Wired and Wireless Ad-hoc Networks Using OPNET Simulator  Prof. A.K. Verma
2. 07322005  Varaprasada Rao Gandrapu  Industrial Reliability Modeling and Analysis of Antilock Brake System Using Petri Nets  Prof. A.K. Verma
3. 07322007  Deepak Garg  A Model for Improvement of Efficiency in Software Testing  Prof. A.K. Verma  Prof. (Ms.) A. Srividya
4. 07322013  Devesh Agrawal  Estimating and Improving the Reliability of Software being Developed and Deployed  Prof. A.K. Verma  Prof. (Ms.) A. Srividya
5. 07322008  Sumit Prakash Gupta  Reliability Analysis of Plain Concrete Beam  Prof. (Ms.) A. Srividya  Prof. A.K. Verma
6. 07322010  Douzi Imran Khan  Design and Control of Automatic Transmission System for Automobiles  Prof. A.K. Verma  Prof. (Ms.) A. Srividya
7. 07322003  Bhanuchandar Pattapu  Yield Estimation in VLSI Circuits  Prof. A.K. Verma
8. 07322009  Mayank Jain  Design for Six Sigma of Plastic Injection Moulding  Prof. (Ms.) A. Srividya  Prof. A.K. Verma
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**Interdisciplinary Groups: Systems & Control Engineering**

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**Department : School of Information Technology**

1. 05329R09  Anuj Agrawal  Feasibility of Light-Frames in Access Networks.  Prof. Ashwin A. Gumaste
3. 06329901  Kalgi Srinivasa Srihari  Designing, Developing and Scaling Up BET.  Prof. G.Ramakrishnan  Prof. Bhattacharya P.
4. 06329902  Prathab K.  A Light-Weight Model-Oriented Storage for Concept Networks.  Prof. Joshi Rushikesh K.
5. 06329906  Amit Ratnapal Savita  Application of Dependency Parsing to Rule-Based and Statistical Machine Translation.  Prof. Om P. Damani

**Department : Biosciences & Bioengineering**

1. 07330002  Deshpande Hrishikesh Narayanrao  Signal and Image Processing For Cardiac And Functional MRI.  Prof. Gadre V.M.
2. 07330004  (Ms) Niharika Gupta  Nanoparticles for Development of Oral Vaccines.  Prof. Banerjee Rinti
3. 07330806  Priyank Kulshrestha  Thermosensitive Magnetic Liposomes for Combined Hyperthermia and Drug Delivery.  Prof. Banerjee Rinti  Prof. Bahadur D.
4. 07330401  (Ms) Parab Vaishali Vinayak  Computational Investigations of Information Processing in Medium Spiny Neurons.  Prof. Manchanda Rohit
6. 07330001  Bhupesh Bharat Patil  Instrumentation for Impedance Cardiography.  Prof. Pandey P.C.
7. 07330006  (Ms) P. Vamsi Ravali  Role of Polymers in Surface Plasmon  Prof. Mukherji Soumyo
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<td>Estimation of Geoidal Surface For Mumbai Region Using GPS Data</td>
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| 20. | 04D01010| (Ms) Sanyal Tannishtha Pradeepkumar | Optimization Studies Related to Airline Maintenance Scheduling                 | Prof. Rangaraj Narayan  
Prof. Pant R.K. |

**Department : Chemical Engineering  Specialization : Process Systems Design & Engineering**

1. 03D02012 Ahmad Ali Positive Matrix Factorization for Air Pollutant Source Identification Prof. Chandra V  
Prof. Manibhushan  

**Department : Chemical Engineering Specialization: Process Systems Design & Engg**

2. 02D02019 Konkati Anil Kumar Simulation of 3D Immersed Boundary Method with Variable Viscosity Prof. Sameer Ralph Jadhav  

3. 03D02011 Ajay Singh Use of Femlab to Simulate Bipolar Electrolysis on Multiparticle Electrode Systems Prof. Juvekar V.A.  

4. 03D02005 Abhinandan Bhandari Shear Rheology of Dilute Polymer Solutions Prof. P.Sunthar  

5. 04D02008 Devendra Sanjay Tambe Simulation of Interfacial Dynamics Using Level Set Method Prof. Juvekar V.A.  

6. 04D02013 Ankur Batra Modeling of Lean NOx Trap Catalyst Prof. Aghalayam Preethi  

7. 04D02001 Anshul Gupta Stability of Two Fluid Systems in Electric Fields Prof. Rochish Thaokar  

8. 04D02002 Preshit Dundekar Modeling Lung Deposition of Nanoparticle Aerosol Drugs Prof. Chandra V  
Prof. Mehra A.  

9. 04D02003 Adwait Karanjkar Stability Analysis of Hyrdodynamic and Colloidal Systems Prof. Rochish Thaokar  

10. 04D02009 Agarwal Avtansh Anil Bifurcation Analysis of Uniformly Active, Adiabatic Packed Bed Reactors Prof. Ganesh Viswanathan  

11. 04D02010 Devender Kumar Feature Selection Based on Support Vector Machines for Efficient Fault Diagnosis Prof. Manibhushan  

12. 04D02012 Prateek Maheshwari Adaptive Model Predictive Control Using Time Series Models : Applications to Industrially Relevant Prof. Sachin Patwardhan  
Prof. Bhartiya S.
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**Department : Mechanical Engineering**  
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Fabrication of a Mechanically Operated Wheelchair able to Climb up and Down Stairs  
Prof. Amarnath C.

**Department : Mechanical Engineering**  
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Prof. Shashikanth S.

3. 03D10042 Krishnarao Tadikonda  
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8. 04D10035 Abhishek Sharma  
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9. 04D10001 Ritesh Devani  
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Prof. D.N. Pawaskar

10. 04D10006 Raveesh Vyas  
A Study on Non Invasive Techniques for Rapid Imaging of Cross Sections of Yarns  
Prof. Guha Anirban Prof. U.B.Sheorey

11. 04010017 Pradhan Simit Subodh  
Prototype Development for Hopping Height Control of a One-Legged Hopping Robot  
Prof. Seth Bhartendu

12. 04D10007 Siddharth Sekhsaria  
Design and Development of Elbow Prosthesis  
Prof. Ravi B.
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**Department :** Mechanical Engineering  **Specialization :** Computer Integrated Manufacturing

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**Department: Mechanical Engineering**  **Specialization: Thermal & Fluids Engineering**

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<td>Development of a Coupled Neutronics Thermal-Hydraulics Model for the Analysis of Reactor Core</td>
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<td>35. 04D01005</td>
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<td>Study of Fluid Flow and Plasma Using PIC-MC</td>
<td>Prof. Upendra Bhandarkar</td>
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<td>Study of Compressible Flow Using DSMC</td>
<td>Prof. Bhalchandra Puranik</td>
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<td>Vineet Karhail</td>
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<td>Nalin Swaroop</td>
<td>Simulation of Building Performance</td>
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**Department: Metallurgical Engineering & Materials Science**  **Specialization: Ceramics & Composites**

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<td>Dr. K. Kasturirangan</td>
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Three Nominees of the Central Government

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<td>24.</td>
<td>Prof. C.N.R. Rao, Chairman, Scientific Advisory Council to the Prime Minister, CSIR Centre of Excellence in Chemistry, Chemistry &amp; Physics of Materials Unit, Jawaharlal Nehru Centre for Advanced Scientific Research, Jakkur P.O., Bangalore-560 064.</td>
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<td>25.</td>
<td>Prof. C.S. Seshadri, Director, Chennai Mathematical Institute, Chennai Plot H1, SIPCOT IT Park, Padur PO, Siruseri - 603 103.</td>
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<td>26.</td>
<td>Prof. Sabyasachi Bhaattacharya, Director, Tata Institute of Fundamental Research, Homi Bhabha Road, Mumbai 400 005.</td>
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<td>27.</td>
<td>Dr. Kota Harinarayan, Chairman, Research Council of Central Scientific Instrument Organization, Raja Ramanna Fellow, National Aero Space Laboratories, P.O. No. 1779, Bangalore - 560 017.</td>
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28. Shri Tarun Das,  
Member  
Chief Mentor,  
Confederation of Indian Industry,  
Plot No.249-F, Sector 18,  
Udyog Vihar, Phase IV,  
Gurgaon 122 015,  
Haryana.

29. Shri Milind Deora,  
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Member of Parliament (Lok Sabha),  
65, Lodhi Estate,  
New Delhi – 110 003.

30. Shri Ananta Nayak,  
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Member of Parliament (Lok Sabha),  
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New Delhi – 110 001.

31. Shri B. J. Panda,  
Member  
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2, Mahadev Road,  
New Delhi.

32. Shri Ashok Thakur,  
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Director, IIT Bombay,
Powai, Mumbai 400 076

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New Delhi 110 115.

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Indian Institute of Science Education & Research (IISER),
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Pune-411 008.

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Himachal Futuristic Communications Ltd.,
8, Commercial Complex, Masjid Moth,
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Managing Director,
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239, Anna Salai, Chennai 600 006.

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Prof. J.M. Vasi (from 01/01/10)
Professor,
Department of Electrical Engineering,
IIT Bombay,
Mumbai 400 076.

Ex-officio
Shri B.S. Punalkar
Registrar, IIT Bombay,
Powai, Mumbai 400 076
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Homi Bhabha Chair Professor, 7th floor,
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Trombay, Mumbai – 400 085

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Powai, Mumbai 400 076

Shri Ashok Thakur, IAS Member
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Deptt. of Higher Education
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Ministry of Human Resource Development,
Deptt. Of Higher Education, Technical Section-1,
Government of India, Shastri Bhavan,
New Delhi – 110 115

Prof. A.Q. Contractor Member (Ex-officio)
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IIT Bombay,
Mumbai 400 076

Prof. R.K. Shevgaonkar (from 07/08/09)
Dy. Director (FEA),
IIT Bombay,
Mumbai 400 076

Shri B.S. Punalkar Secretary (Ex-officio)
Registrar,
IIT Bombay, Powai,
Mumbai 400 076
Building and Works Committee

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Director, IIT Bombay,
Powai, Mumbai 400 076.

Superintending Engineer, Member
Mumbai Central Circle-1, CPWD,
5th Floor, Old CGO Building,
101 MK Road,
Mumbai - 400 020.

Superintending Engineer, Member
Mumbai (PWD) Circle & Housing Dept.,
25 Murzban Road,
Fort, Mumbai - 400 001.

Shri K. Srinivas, Member
Head,
Arctectural & Civil Engg. Division,
BARC, North Site,
Trombay, Mumbai - 400 085.

Director(T), Member
Department of Secondary & Higher Education,
Ministry of Human Resource Development,
Government of India, Shastri Bhavan,
New Delhi - 110 001.

Prof. K.V.K. Rao (from 20/04/09) Member
Dean (Infrastructure Planning & Development),
IIT Bombay, Powai,
Mumbai - 400 076.

Shri B.S. Punalkar Member-Secretary (Ex-officio)
Registrar,
IIT Bombay, Powai,
Mumbai 400 076.
Heads of Departments

Prof. P.M. Mujumdar
Aerospace Engineering

Prof. Dulal Panda
Biosciences & Bioengineering

Prof. Anurag Mehra
Chemical Engineering

Prof. Nand Kishore
Chemistry

Prof. Y.M. Desai
Civil Engineering

Prof. Abhiram Ranade (up to 19.03.2010)
Prof. Amitabha Sanyal (from 19.03.2010)
Computer Science & Engg.

Prof. T. K. Biswal
Earth Sciences

Prof. D.K. Sharma
Electrical Engg.

Prof. (Ms.) Meenakshi Gupta
Humanities & Social Sciences

Prof. J.K. Verma (up to 30.11.2009)
Prof. M.K. Srinivasan (from 01.12.2009)
Mathematics

Prof. S.L. Bapat
Mechanical Engg.

Prof. R.O. Dusane
Met. Engg. & Mat. Science

Prof. Raghava Varma
Physics

Prof. Rangan Banerjee (up to 08.06.2009)
Prof. (Ms.) Anuradda Ganesh (from 08.06.2009)
Energy Science and Engineering

Heads of Centres

Prof. Ravi Poovaiah (up to 31.05.2009)
Prof. G.G. Ray (from 01.06.2009)
Industrial Design Centre

Prof. Raman S. Srinivasa (up to 09.05.2010)
Prof. Soumyo Mukherjee (from 10.05.2010)
Centre for Research in Nanotechnology and Science (SAIF is merged to CRNTS)
Prof. H.S. Pandalai (up to 20.08.2010)
Prof. (ms.) P. Venkatachalam (from 20.08.2010)
Centre of Studies in Resources Engineering

Prof. S.R. Asolekar (up to 14.06.2009)
Prof. Virendra Sethi (from 15.06.2009)
Centre for Environmental Science and Engineering

Prof. G. Sivakumar
Centre for Formal Design and Verification of Software

Prof. P. M. Mujumdar
Centre for Aerospace Systems Design and Engineering

Prof. A. W. Date
Centre for Technology Alternatives in Rural Areas

Prof. Kannan Moudgalya (up to 07.12.2009)
Prof. B.L. Tembe (from 08.12.2009)
Centre for Distance Engineering Education Programme

Heads of Schools

Prof. (Ms.) Karuna Jain
Shailesh J. Mehta School of Management

Convenors of Interdisciplinary Programmes

Prof. Narayan Rangaraj
Industrial Engineering & Operations Research

Prof. Ravi Banavar
Systems & Control Engineering
**Academic Staff (Alphabetically) (1.4.2009 to 31.3.2010)**

Following abbreviations have been used:

- SJMSOM = Shailesh J. Mehta School of Management
- CESE = Centre for Environmental Science and Engineering
- IDC = Industrial Design Centre
- BJMSBB = Bhupat & Jyoti Mehta School of Bioscience & Bioengineering
- CS&E = Computer Science and Engineering
- IE&OR = Industrial Engineering and Operations Research
- KreSIT = Kanwal Rekhi School of Information Technology
- CAD = Computer aided Design Centre
- RSIC= Regional Sophisticated Instrumentation Centre
- (Cont.) = Contract

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<td>Adhikari Jhumpa</td>
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<td>Bapat Varadraj B.</td>
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<td>Baskar. S</td>
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<td>Technical Officer</td>
<td>M.Tech. (IIT Kharagpur)</td>
<td>C- DEEP</td>
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<td>33</td>
<td>Patil M.K.</td>
<td>Dy. Registrar</td>
<td>M.Com (Shivaji University)</td>
<td>Academic Section</td>
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<td>34</td>
<td>Patil S.G.</td>
<td>Medical Officer</td>
<td>MBBS (Mumbai)</td>
<td>IIT Hospital</td>
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<tr>
<td>35</td>
<td>Patki Savita V.</td>
<td>Assistant Registrar</td>
<td>B. A (Bombay University)</td>
<td>Accounts Section</td>
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<td>36</td>
<td>Phadke D.N.</td>
<td>Assistant Librarian (SG)</td>
<td>Ph.D. (Pune University)</td>
<td>Central Library</td>
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<td>37</td>
<td>Punalkar B.S.</td>
<td>Registrar</td>
<td>M.A. (Shivaji University)</td>
<td>Registrar Office</td>
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<td>38</td>
<td>Rajan Prema A.</td>
<td>Assistant Registrar</td>
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<td>40</td>
<td>Ramesh P.G.</td>
<td>Dy. Registrar</td>
<td>M.Phil in Public Administration(Madurai Kamaraj University)</td>
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<td>42</td>
<td>Reddy P.M.</td>
<td>Sports Officer</td>
<td>Ph.D. (Gwalior)</td>
<td>Student's Gymkhana</td>
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<td>43</td>
<td>Ringnekar Nila D.</td>
<td>Medical Officer</td>
<td>MBBS (North Maharashtra Univ., Jalgaon)</td>
<td>IIT Hospital</td>
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<td>Romani Indrajit A.</td>
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<td>M.Com (Mumbai University)</td>
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<td>45</td>
<td>Sahoo Biswakesan</td>
<td>Executive Engineer(Elect)</td>
<td>M.E. Burla/Sambalpur Univ.</td>
<td>Electrical Maintenance</td>
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<td>Sawalkar D. K.</td>
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<td>MBA (Marathwada University)</td>
<td>Estate Office</td>
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<td>47</td>
<td>Saxena Indu</td>
<td>Deputy Registrar</td>
<td>Ph.D. (Jamburgal Bajaj Instit.)</td>
<td>Administration</td>
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<td>Sengupta K.</td>
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<td>Ph.D. (Gwalior)</td>
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<td>49</td>
<td>Shah Nisha</td>
<td>Chief Medical Officer</td>
<td>MBBS (Nagpur), MD (Pde)(Nagpur)</td>
<td>IIT Hospital</td>
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<td>M.D.D.G.O. (Nagpur)</td>
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<td>Shetye Asmita S.</td>
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<td>B.E Electronics (Mumbai University)</td>
<td>ASC (Application Software Cell)</td>
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<td>Solanki Manohar R.</td>
<td>Senior Programmer</td>
<td>M.Sc.(Mumbai University)</td>
<td>ASC</td>
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<td>54</td>
<td>Tagare Amita</td>
<td>Counsellor</td>
<td>M.A. (Pune University)</td>
<td>Dean's Office</td>
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<td>Tirmare P.V.</td>
<td>Computer Engineer</td>
<td>B.E. Computer Engg.(shivaji University) M. Tech (Dr. Babasaheb Ambedkar Technological Univ.)</td>
<td>Computer Centre</td>
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<td>56</td>
<td>Unnithan K.R.P</td>
<td>Executive Engineer</td>
<td>B.E. Civil Engineering (Mumbai University)</td>
<td>Estate Office</td>
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<td>57</td>
<td>Verma Hari Shankar</td>
<td>Assistant Registrar</td>
<td>M.A. (Kanpur Univesity)</td>
<td>M.M. Division</td>
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<td>58</td>
<td>Verma Narsingh</td>
<td>Executive Engineer</td>
<td>Diploma in Civil Engineering</td>
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<td>Name</td>
<td>Position</td>
<td>Education</td>
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<td>Vichare Sunil Y.</td>
<td>Computer Engineer</td>
<td>B.E (Pune University)</td>
<td>Computer Centre</td>
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<td>60</td>
<td>Vinjamur Sugandhi</td>
<td>Senior Programmer</td>
<td>MCA (Osmania University)</td>
<td>ASC</td>
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<td>Waydande H.S.</td>
<td>Assistant Librarian(SG)</td>
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<td>62</td>
<td>Yadav S.S.</td>
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<td>Ph.D. (Gwalior)</td>
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<td>POSITION</td>
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<td>Aiyar R.P.R.C.</td>
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<td>2</td>
<td>Bhowmick Uday</td>
<td>Research Scientist</td>
<td>Ph.D. (IIT Bombay)</td>
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<td>3</td>
<td>Gandhi Mayuri</td>
<td>Research Scientist</td>
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<td>Harendranath C.S.</td>
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<td>Kalwankar Arun</td>
<td>Producer-cum-Designer</td>
<td>Dip.in Fine Arts (Drg.&amp;Ptg.)</td>
<td>C-DEEP</td>
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<td>Mombasawala L. S.</td>
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<td>CSRE</td>
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<td>Mukhopadhyay P.</td>
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<td>Vijayalakshmi S.</td>
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<td>Liabilities</td>
<td>Current Year 2009-2010</td>
<td>Previous Year 2008-2009</td>
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<tr>
<td>1)</td>
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<td>2,698,136,953</td>
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<td><strong>Income and Expenditure</strong></td>
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<td>Opening Balance as on 01-04-2009</td>
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<td>197,697,400</td>
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<td>Add/(Less) : Excess of Income/Expenditure during the year</td>
<td>0</td>
<td>0</td>
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<td><strong>Total of Sr. No.1 (a+b)</strong></td>
<td>4,287,641,127</td>
<td>2,895,834,353</td>
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<td><strong>Project &amp; Consultancy Fund</strong></td>
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<td>IRCC</td>
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<td>Consultative Practice Fund</td>
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<td>46,678,744</td>
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<td>General Provident Fund</td>
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<td>629,278,282</td>
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<td>Contributory Provident Fund</td>
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<td>80,629,783</td>
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<td>Post Retirement Medical Scheme Fund</td>
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<td><strong>Other Funds and Adjustable Accounts</strong></td>
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<td>a)</td>
<td>Main Accounts</td>
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<td>1 Staff/Students Fund</td>
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<td>2 Other adjustable Accounts</td>
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<td>31,143,475</td>
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<td>b)</td>
<td><strong>Project &amp; Consultancy</strong></td>
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<td>1 Other Funds</td>
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<td>149,663,694</td>
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<td>2 Other adjustable Accounts</td>
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<td>Unutilised Grant in Aid</td>
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<td>Donation Account</td>
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<td>1,108,577,600</td>
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<td>Endowment of Scholarships</td>
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<td>644,787</td>
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<td>12)</td>
<td>Unspent balance of Coordinated Projects</td>
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<td>796,740,902</td>
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<td>13)</td>
<td>Unutilised Grants from other Organisations</td>
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<td>123,836,130</td>
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<td><strong>Other Liabilities</strong></td>
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<td>Refundable Deposits</td>
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**Grand Total**: 12,249,790,321  9,937,569,271
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<th>Assets</th>
<th>Current Year 2009-2010</th>
<th>Previous Year 2008-2009</th>
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<td>Fixed Assets</td>
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<td>Buildings</td>
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<td>a)</td>
<td>Works completed</td>
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<td>784,769,480</td>
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<td>Works in progress</td>
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<td>1,906,857,025</td>
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<td>3)</td>
<td>Equipment and Tools/Academic Dept. &amp; Centers</td>
<td>1,023,130,379</td>
<td>724,279,572</td>
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<td>Equipment and Tools / other Sections</td>
<td>54,329,613</td>
<td>45,090,939</td>
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<td>5)</td>
<td>Augmentation of Labs Workshops</td>
<td>10,215,690</td>
<td>12,769,612</td>
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<td>7)</td>
<td>Equipment &amp; Tools/Special grant from MHRD</td>
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<td>1,531,953</td>
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<td>Motor Vehicles</td>
<td>1,115,084</td>
<td>1,393,853</td>
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<td>9)</td>
<td>Furniture and Fixtures</td>
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<td>Library Books and Journals</td>
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<td>786,487,157</td>
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<td>Library Books received as Donation</td>
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<td>554,943</td>
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<td>12)</td>
<td>Library Books &amp; Journals/Special grant from MHRD</td>
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<td>Kanwal Rekhi School of Information Technology</td>
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<td>ACRE/ Project Assets</td>
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<td>Computer System DST (IRCC Donation)</td>
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<td>Project &amp; Consultancy</td>
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<td>a)</td>
<td>Equipment and Tools &amp; Books</td>
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<td>2,333,061,332</td>
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<td>a)</td>
<td>Fixed Deposits/investments</td>
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<td>3,164,870,543</td>
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<td>19)</td>
<td>Accrued Interest</td>
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<td>Receivables</td>
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<td>Sundry Debtors</td>
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<td>Guest House Bills Receivables</td>
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<td>651,534</td>
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<td>c)</td>
<td>Grant-in-Aid sanctioned but due</td>
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<td>Recoverable Deposits</td>
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<td>Advance Accounts</td>
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<td>Miscellaneous Expenditure</td>
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<td>Amount receivable from MHRD</td>
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<td>37,700,193</td>
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<td>Excess Expenditure Donation</td>
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<td>Cash in Hand and Bank</td>
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<td><strong>Grand Total</strong></td>
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<td><strong>9,937,569,271</strong></td>
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<td>Previous Year Up to 31.03.2009</td>
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<td><strong>INCOME</strong></td>
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</tr>
<tr>
<td>1</td>
<td><strong>Grant-in-aid from Govt. of India</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Non-Plan</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Grant-in-aid released during the year</td>
<td>1,627,100,000</td>
<td>1,064,943,000</td>
</tr>
<tr>
<td></td>
<td>Add: Shortfall in block grant 07-08 received in 08-09</td>
<td>0</td>
<td>101,057,000</td>
</tr>
<tr>
<td></td>
<td>Less: Grant-in-aid due in 2007-08 received in 08-09</td>
<td>0</td>
<td>117,913,000</td>
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<tr>
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<td>Add: Grant in aid Sanctioned and Due in 2009 10</td>
<td>110,200,000</td>
<td>0</td>
</tr>
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<td>Add: Recurring Grant Transferred from Plan (OSC)</td>
<td>180,445,000</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Add: Amt to be received from MHRD towards Shortfall</td>
<td>20,833,236</td>
<td>0</td>
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<tr>
<td></td>
<td><strong>Sub Total (a)</strong></td>
<td>1,938,578,236</td>
<td>1,048,057,000</td>
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<td></td>
<td>b) Opening Balance B/f 6th Pay Commission</td>
<td>119,468,844</td>
<td>302,543,000</td>
</tr>
<tr>
<td></td>
<td>Non Plan Grant for VI PC arrears</td>
<td>0</td>
<td>119,468,844</td>
</tr>
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<td>Less: Grant a/f for paying 6 PC arrears for 2009-10</td>
<td>0</td>
<td></td>
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<td></td>
<td><strong>Sub Total (b)</strong></td>
<td>119,468,844</td>
<td>183,074,156</td>
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<td>c) Support from IRCC for Recurring Exp.</td>
<td>711,000</td>
<td>0</td>
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<td><strong>Total of (a to c)</strong></td>
<td>2,058,758,080</td>
<td>1,231,131,156</td>
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<td>d) <strong>Plan</strong></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>i) Opening Balance b/f</td>
<td>40,081,608</td>
<td>44,566,026</td>
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<tr>
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<td>ii) Add: Grant-in-aid released during the year</td>
<td>290,000,000</td>
<td>592,950,000</td>
</tr>
<tr>
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<td>iii) Grant-in-aid sanctioned and due in 09-10</td>
<td>120,000,000</td>
<td>0</td>
</tr>
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<td>iv) Add: Amt to be received from MHRD towards Shortfall 09-10</td>
<td>20,361,342</td>
<td>0</td>
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<tr>
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<td>v) Less: Grant in Aid due in 2007-08 received in 08-09</td>
<td>0</td>
<td>36,850,000</td>
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<td><strong>Sub Total d (i to v)</strong></td>
<td>470,443,480</td>
<td>600,606,026</td>
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<td>e) Support from IRCC for Capital Expenditure</td>
<td>2,107,186</td>
<td>0</td>
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<td>f) Donation Received towards Capital Expenditure</td>
<td>4,004,417</td>
<td>0</td>
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<td><strong>Total of (d to f)</strong></td>
<td>476,555,093</td>
<td>600,606,026</td>
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<tr>
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<td>i) Less: Amount utilised for capital expenditures</td>
<td>214,830,395</td>
<td>316,097,592</td>
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<td>ii) Less: Plan Grant a/f for Capital Expenditure 08-09</td>
<td>0</td>
<td>0</td>
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<td></td>
<td>iii) Less: Plan Grant a/f for Capital Expenditure 09-10</td>
<td>0</td>
<td>40,881,608</td>
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<td>iv) Less: Amount Utilised for Capital Expenditure from other Sources</td>
<td>6,111,658</td>
<td>0</td>
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<td><strong>Sub Total (i to iv)</strong></td>
<td>250,742,028</td>
<td>356,179,200</td>
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<td><strong>Total Sr. No. 1 (a+b+c+d+e+f)</strong></td>
<td>2,284,371,135</td>
<td>1,475,597,982</td>
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<td>2</td>
<td><strong>Oversight Committee Recommendation</strong></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>i) Opening Balance b/f</td>
<td>311,100,483</td>
<td>0</td>
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<tr>
<td></td>
<td>ii) Grant-in-aid released during the year</td>
<td>1,310,445,000</td>
<td>810,600,000</td>
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<tr>
<td></td>
<td>iii) Add: Amt to be received from MHRD towards Shortfall</td>
<td>28,024,342</td>
<td>0</td>
</tr>
<tr>
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<td>iv) Less: Amount Utilised for Capital Expenditure</td>
<td>1,469,124,825</td>
<td>457,437,446</td>
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<td></td>
<td>v) Less: Plan Grant a/f for Capital Expenditure 09-10</td>
<td>0</td>
<td>311,100,483</td>
</tr>
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<td>vi) Less: Recurring Grant Under OSC Transferred to Non Plan</td>
<td>0</td>
<td>0</td>
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<td><strong>Sub Total 2 (i to v)</strong></td>
<td>0</td>
<td>42,062,071</td>
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<td>Amount utilised from Endowment Fund</td>
<td>2,080,000</td>
<td>0</td>
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<td>4</td>
<td>Consultation Receipts for library books</td>
<td>2,423,670</td>
<td>0</td>
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<td>5</td>
<td><strong>Net Amount available for Revenue Expenditure</strong></td>
<td>2,287,560,141</td>
<td>1,520,833,723</td>
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<td>6</td>
<td>Fees from students</td>
<td>158,901,747</td>
<td>98,184,731</td>
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<td>7</td>
<td>Other receipts from students</td>
<td>56,622,482</td>
<td>56,199,193</td>
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<td>8</td>
<td>All India Entrance Examination</td>
<td>93,421,118</td>
<td>102,516,512</td>
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<td>9</td>
<td>Other income and miscellaneous receipts</td>
<td>93,040,065</td>
<td>82,796,420</td>
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<td>10</td>
<td>Interest on CP/GPF investment</td>
<td>61,104,302</td>
<td>56,798,819</td>
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<td>11</td>
<td>Interest on Short Term Deposit/CLTD Account</td>
<td>6,280,367</td>
<td>11,196,387</td>
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<td>12</td>
<td>Guest House Receipts</td>
<td>8,531,409</td>
<td>8,260,490</td>
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<td>Leave Salary Received and Pension Contribution</td>
<td>1,243,417</td>
<td>326,273</td>
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<td>SR. NO.</td>
<td>PARTICULARS</td>
<td>Current Year Up to 31.03.2010</td>
<td>Previous Year Up to 31.03.2009</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>------------------------------</td>
<td>-------------------------------</td>
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<td>13</td>
<td>Receipts from Continuing Education Prog.</td>
<td>5,348,850</td>
<td>4,799,196</td>
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<tr>
<td>14</td>
<td>Non Payable Institute Contribution</td>
<td>11,946</td>
<td>794,998</td>
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<td>15</td>
<td>Prior Period</td>
<td></td>
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<td>i)</td>
<td>Price Period Income</td>
<td>54,460</td>
<td>335,161</td>
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<td>ii)</td>
<td>Excess Provision for Teaching Asst. In 07-08 reversed in 08.09</td>
<td>0</td>
<td>38,678,917</td>
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<td>16</td>
<td>Support from IRCC for Recurring Exp.</td>
<td>4,992</td>
<td>4,850</td>
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<td>17</td>
<td>Insurance Claim</td>
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<td></td>
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<td>Excess of Expenditure over Income</td>
<td>41,195,078</td>
<td>0</td>
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<tr>
<td></td>
<td>Less: Amt receivable from MIHRD</td>
<td>41,195,078</td>
<td>0</td>
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<td></td>
<td><strong>Grand Total</strong></td>
<td><strong>2,772,126,204</strong></td>
<td><strong>1,981,454,270</strong></td>
</tr>
<tr>
<td>1</td>
<td>Pay and Allowances</td>
<td>1,246,320,415</td>
<td>691,436,796</td>
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<td>2</td>
<td>Other Allowances</td>
<td>54,027,123</td>
<td>26,077,877</td>
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<td></td>
<td><strong>Sub Total (1 &amp; 2)</strong></td>
<td><strong>1,300,347,540</strong></td>
<td><strong>717,514,673</strong></td>
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<td>3</td>
<td>Retirement Benefits</td>
<td>473,902,751</td>
<td>302,982,884</td>
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<td><strong>Sub Total (3)</strong></td>
<td><strong>473,902,751</strong></td>
<td><strong>302,982,884</strong></td>
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<tr>
<td>4</td>
<td>Administrative Expenses</td>
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<td></td>
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<tr>
<td>i)</td>
<td>General Expenses</td>
<td>15,231,099</td>
<td>13,335,953</td>
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<td>ii)</td>
<td>Other Misc expenses</td>
<td>77,336,564</td>
<td>44,352,822</td>
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<tr>
<td>iii)</td>
<td>Other educational expenses</td>
<td>21,586,127</td>
<td>24,430,071</td>
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<tr>
<td>iv)</td>
<td>All India Entrance Examination</td>
<td>63,619,629</td>
<td>41,315,201</td>
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<td><strong>Sub Total (4)</strong></td>
<td><strong>177,773,419</strong></td>
<td><strong>123,454,047</strong></td>
</tr>
<tr>
<td>5</td>
<td>Departmental Expenses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i)</td>
<td>DOC/Consumables/Academic Deptt. &amp; Centres</td>
<td>35,664,415</td>
<td>25,633,188</td>
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<tr>
<td>ii)</td>
<td>DOC/Other expenditure Academic Deptt. &amp; Centres</td>
<td>11,298,887</td>
<td>10,542,314</td>
</tr>
<tr>
<td>iii)</td>
<td>Maintenance and receipts to equipment and tools</td>
<td>16,060,369</td>
<td>11,651,089</td>
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<tr>
<td></td>
<td><strong>Sub total (5)</strong></td>
<td><strong>63,923,715</strong></td>
<td><strong>47,826,590</strong></td>
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<td>6</td>
<td>Students Gymkhana Expenditure</td>
<td>6,016,049</td>
<td>6,214,436</td>
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<td>7</td>
<td>Scholarship</td>
<td>178,342,865</td>
<td>153,045,812</td>
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<td>8</td>
<td>Financial Assistance to Hostels (Mess Employees)</td>
<td>69,475,275</td>
<td>48,694,734</td>
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<tr>
<td>9</td>
<td>Health Facilities</td>
<td>28,592,232</td>
<td>21,757,608</td>
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<tr>
<td>10</td>
<td>Housekeeping and Estate maintenance</td>
<td>295,772,107</td>
<td>252,501,437</td>
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<td>11</td>
<td>Water and Elect. Charges</td>
<td>175,924,248</td>
<td>139,737,291</td>
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<td>12</td>
<td>Kanwal Rekhi School of Information Technology</td>
<td>0</td>
<td>0</td>
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<tr>
<td>13</td>
<td>Recurring Expenditure Girish Gaitonde Lecture Hall Complex</td>
<td>0</td>
<td>132,998</td>
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<td>14</td>
<td>Surplus Transferred to Endowment Fund A/c</td>
<td>0</td>
<td>150,092,433</td>
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<td>15</td>
<td>Golden Jubilee Expenses</td>
<td>2,956,005</td>
<td>7,499,327</td>
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<td></td>
<td><strong>Grand Total</strong></td>
<td><strong>2,772,126,204</strong></td>
<td><strong>1,981,454,270</strong></td>
</tr>
<tr>
<td>SR NO</td>
<td>RECEIPTS</td>
<td>Amount in Rs.</td>
<td>SR NO</td>
</tr>
<tr>
<td>-------</td>
<td>-----------------------------------</td>
<td>---------------</td>
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</tr>
<tr>
<td>1</td>
<td>Opening Balance</td>
<td></td>
<td>1</td>
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<td>Cash in Hand and at Bank</td>
<td>851,176.064</td>
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</tr>
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<td>ii</td>
</tr>
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<td>2</td>
<td>Intangible</td>
<td></td>
<td>iii</td>
</tr>
<tr>
<td>i)</td>
<td>Non-Plan</td>
<td>1,627,100.000</td>
<td>iv</td>
</tr>
<tr>
<td>ii)</td>
<td>Plan</td>
<td>290,000.000</td>
<td>v</td>
</tr>
<tr>
<td>iii)</td>
<td>QSC</td>
<td>1,310,445.000</td>
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<td>3</td>
<td>Fees from students</td>
<td>158,901.747</td>
<td>viii</td>
</tr>
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<td>4</td>
<td>Other receipts from Students</td>
<td>56,622,482</td>
<td>a)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>b)</td>
</tr>
<tr>
<td>5</td>
<td>All India Entrance Examinations</td>
<td>89,192,236</td>
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<td>6</td>
<td>Other income &amp; Misc. Receipts</td>
<td>93,012,320</td>
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<td>7</td>
<td>Interest from CPF/GPF Investments</td>
<td>51,486,350</td>
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<td></td>
<td>Sub Total</td>
</tr>
<tr>
<td>8</td>
<td>Interest on short term Deposits</td>
<td>5,467,488</td>
<td>a)</td>
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<td></td>
<td></td>
<td>i)</td>
</tr>
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<td></td>
<td></td>
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<td>ii)</td>
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<td>iii)</td>
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<td></td>
<td>v)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sub Total</td>
</tr>
<tr>
<td>9</td>
<td>Guest House Receipts</td>
<td>7,994,286</td>
<td>b)</td>
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<td></td>
<td>c)</td>
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<td>10</td>
<td>Leave salary and pension</td>
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<td>Contribution</td>
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<tr>
<td>11</td>
<td>Receipts from Continuing Education Programme</td>
<td>5,348,859</td>
<td>d)</td>
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<td></td>
<td></td>
<td></td>
<td>i)</td>
</tr>
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<td>ii)</td>
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<td>iii)</td>
</tr>
<tr>
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<td>iv)</td>
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<td>12</td>
<td>Grants from other Organisations</td>
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<td>Adjustable Accounts</td>
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<td>Sub Total</td>
</tr>
<tr>
<td>i)</td>
<td>Advances Accounts</td>
<td>624,582,722</td>
<td>e)</td>
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<td>ii)</td>
<td>Other accounts</td>
<td>945,370,045</td>
<td>i)</td>
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<td>iii)</td>
<td>Refundable Deposits</td>
<td>340,034,500</td>
<td>ii)</td>
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<td>iv)</td>
<td>Endowment of Scholarship</td>
<td>872,264</td>
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<tr>
<td>v)</td>
<td>Recoverable Deposits</td>
<td>1,142,256</td>
<td>iii)</td>
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<tr>
<td>vi)</td>
<td>Misc. Expenses Recovery</td>
<td>7,792,200</td>
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<td>1,927,794,957</td>
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<td>sundry Deposits</td>
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<td>Sub Total</td>
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<td>Main Account</td>
<td>9,460,275</td>
<td>f)</td>
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<td>15</td>
<td>Guest House Bill Receivable</td>
<td>197,530</td>
<td>g)</td>
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<tr>
<td>16</td>
<td>Support from Donations for Capital Expenditure</td>
<td>4,004,447</td>
<td>h)</td>
</tr>
<tr>
<td>SR. NO.</td>
<td>RECEIPTS</td>
<td>Amount In Rs.</td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>----------</td>
<td>--------------</td>
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</tr>
<tr>
<td>17</td>
<td>Post Prior Period Receipts</td>
<td>54,450</td>
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<td>Accrued Interest</td>
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<td>Main Account</td>
<td>2,842,718</td>
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<td>FRMS Account</td>
<td>8,225,955</td>
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<tr>
<td>i)</td>
<td>Support from IRCC for Exp &amp; Furniture</td>
<td>60,000</td>
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<tr>
<td>ii)</td>
<td>Consultancy Library Books</td>
<td>7,989,018</td>
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<td>Fixed Deposit Enclosed</td>
<td>508,126,933</td>
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<td>IRCC Account</td>
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<td>IRCC Fund Account</td>
<td>377,930,711</td>
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<td>22</td>
<td>Donation Account</td>
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<tr>
<td></td>
<td>Donation Fund Account</td>
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<td>23</td>
<td>Post Retirement Medical Scheme Account</td>
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<td>FRMS Fund account</td>
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<td>24</td>
<td>Contributory Provident Fund A/c</td>
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<td>Fund Account</td>
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<td>General Provident Fund A/c</td>
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<td>Fund Account</td>
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<td>26</td>
<td>Receipt from Insurance Claim</td>
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<td>27</td>
<td>Non-Payable Inst. Contribution</td>
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<td>28</td>
<td>Support for Recurring Exp. From IRCC</td>
<td>2,611,000</td>
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<table>
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<tr>
<th>PAYMENTS</th>
<th>Amount In Rs.</th>
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<tr>
<td>1)</td>
<td>Health Facilities</td>
</tr>
<tr>
<td>3)</td>
<td>House Keeping and Estate Maintenance</td>
</tr>
<tr>
<td>4)</td>
<td>Water &amp; Fuel Charges</td>
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<td>5)</td>
<td>Grants from other organizations</td>
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<td>6)</td>
<td>Adjustable Accounts</td>
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<td>i) Advances Accounts</td>
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<td>ii) Other Accounts</td>
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<td>iii) Refundable Deposits</td>
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<td>iv) Endowment Scholarship</td>
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<td>v) Recoverable Deposits</td>
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<td>vi) Fixed Deposits</td>
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<tr>
<td></td>
<td>vii) Misc. Expenses</td>
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</tbody>
</table>

**Total 4** | **2,495,095,027**

| 5)       | Sundry Creditors | |
|         | Main account | 281,934,830 |

| 6)       | Project & Consultancy | |
|         | Exp. & Tools | 269,137,362 |
|         | Books | 329,267 |

| 7)       | Post Retirement Medical Fund | |
|         | i) Medi Claim Paid | 3,263,448 |
|         | ii) Refund of Subscription | 14,030 |

| 10)      | Donation Account | |
|          | 625,689,450 |

| 11)      | Closing Balance | |
|          | Cash in Hand and at Bank | 441,966,096 |

**GRAND TOTAL** | **1,117,039,379**

**GRAND TOTAL** | **1,117,039,379**